2021 IBC Apartment Buildings

Based on the 2021 International Building Code®



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Course Description

- This seminar addresses the key issues of the 2021 *International Building Code®* (IBC®) that are applicable to residential multi-family structures classified as Group R-2 occupancies.
- The focus will be on those requirements that are unique to apartment buildings, with an emphasis on fire-and life-safety concerns.
- In addition, those accessibility provisions applicable specifically to apartment buildings will be addressed.



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Goal

- Participants will be able to identify, understand and apply those key nonstructural provisions of the IBC that are applicable to Group R-2 apartment buildings.



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Objectives

Upon completion, participants will be better able to:

- Identify those IBC nonstructural requirements that are typically applicable to apartment buildings classified as Group R-2 occupancies.
- Establish a methodology for the review and application of the IBC provisions as they relate to the design, plan review and inspection of apartment buildings.
- Understand why those IBC requirements that are specific to apartment buildings differ from the requirements applicable to other types of buildings.
- Determine the extent of accessibility required in apartment buildings.



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Course Outline

- Module 1 Occupancy Classification
- Module 2 Automatic Sprinkler Protection
- Module 3 Type of Construction
- Module 4 Location on Lot
- Module 5 Special Detailed Requirements
- Module 6 Means of Egress
- Module 7 Fire and Smoke Protection Features
- Module 8 Fire Protection
- Module 9 Accessibility Scoping



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Occupancy Classification

Module 1



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Classification of Residential Uses

- In residential buildings, two primary considerations affect the specific occupancy classification:
  - Transient/nontransient nature of occupants
  - Dwelling unit/sleeping unit configurations
- In addition, the occupancy classification varies based upon the number of occupants within the building.
- A combination of these factors allows for the appropriate classification necessary to address the anticipated hazards.



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Key Terms

- The key definitions applicable to apartment buildings include:
  - **DWELLING UNIT.**
    - Independent living facilities including provisions for living, sleeping, eating, cooking and sanitation.
  - **NONTRANSIENT.**
    - Occupancy of a dwelling unit or sleeping unit for more than 30 days.



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Classification of Residential Uses

- The more specific concerns related to apartment buildings include:
  - "Home is your castle" concept recognizing personal freedoms of individuals within their own living space
  - Highest number of deaths and injuries to occupants due to fire events.
    - Sleeping activities cause delay in responding to emergency situation
    - Cooking activities create ignition source
    - Potential for electrical, smoking and other hazards
    - Substantial combustible loading is typically present



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Classification of Apartment Buildings Section 310.3

- An apartment house is specifically identified as a Group R-2 occupancy provided the building contains three or more dwelling units.
  - A residential condominium building would also be considered as a Group R-2 occupancy where there are three or more dwelling units
- Although most apartment buildings can be considered as single-occupancy buildings, a mixed occupancy condition may exist when other incompatible hazards are introduced.



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Subordinate Use Designations Section 302.2

- In addition to the dwelling units, other portions of an apartment building having similar hazards and risks to building occupants would also typically be classified as part of the Group R-2 where accessory to the dwelling units, including:
  - Assembly spaces with occupant loads < 50 or floor areas < 750 sf, such as lobbies, exercise rooms, activity rooms, etc.
  - Storage rooms
  - Small support areas such as business offices, etc.



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Occupied Roofs Section 302.1

- Where the roof is occupied, it shall be provided with an occupancy classification based on the occupancy it most closely resembles, including the following assembly spaces:
  - Swimming pool and deck
  - Social gathering area
  - Tennis court
  - Lounge area
  - Observation deck
- Such assembly uses would typically be classified as a portion of the Group R-2 where their occupant load is 49 or less, or less than 750 square feet.
  - Otherwise such assembly spaces would typically be classified as Group A-3 occupancies, creating a mixed-occupancy condition.



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Mixed-Occupancy Garage Condition Section 508

- A common mixed-occupancy condition occurs where a parking garage is located within the apartment building.
  - The parking garage would typically be considered as a Group S-2 occupancy unless it meets the conditions allowing for classification as a Group U occupancy.
- A Group S-2 garage could be open, enclosed, or a combination of open and enclosed.
  - A Group U private garage is limited to use by tenants of the apartment building and garage compartments are limited in size with required fire-resistive separations.



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Mixed-Occupancy Conditions Section 508

- Where occupancies other than Group R-2 are present in an apartment, a mixed-occupancy condition would exist and the provisions of Section 508 would apply.
- At least one of three mixed-occupancy methods must be applied:
  - Accessory occupancies
  - Nonseparated occupancies
  - Separated occupancies
- Where the entire apartment building is classified as a Group R-2 occupancy, Section 508 is not applicable.



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Classification of Apartment Buildings

- The focus of this educational program will be limited to only those provisions applicable to Group R-2 occupancies.
  - Where other occupancies are present in the building, they will be typically be regulated based upon their own unique hazards and characteristics.



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Automatic Sprinkler Protection

Module 2

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Automatic Sprinkler Systems Section 903.2.8

- An automatic sprinkler system in accordance with Section 903.3 is required throughout all buildings contain a Group R-2 occupancy.
- Section 903.3.1.1 recognizes the use of an NFPA 13 sprinkler system
- Section 903.3.1.2 permits the installation of a sprinkler system complying with NFPA 13R where specified conditions are met.
- In addition, Section 903.3 establishes sprinkler requirements for three specific areas:
  - Balconies and decks
  - Corridors and egress balconies
  - Attics

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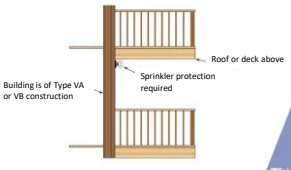
NFPA 13R Sprinkler Protection Section 903.3.1.2

- Scoping for the permitted use of an NFPA 13R sprinkler system in Group R occupancies requires the following conditions must all be met by the Group R to allow for use of an NFPA 13R system:
  - No more than 4 stories above grade plane
  - Floor level of highest story to be no more than 30 feet above lowest level of fire department vehicle access
  - Floor level of lowest story to be no more than 30 feet below lowest level of fire department vehicle access
- In podium buildings (Sec. 510.2 and 510.4), the number of stories shall also be measured from grade plane.

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Automatic Sprinkler Systems Section 903.3.1.2.1, #1

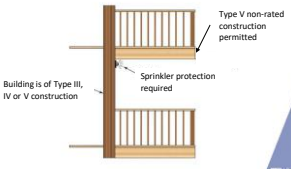
- In buildings provided with NFPA 13R sprinkler systems, sprinkler protection to be extended to dwelling unit balconies, decks and ground floor patios where:
  - Building is of Type V construction, and
  - There is a deck or roof above



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Automatic Sprinkler Systems Section 903.3.1.2.1, #2 Section 705.2.3.1, Exc. 3

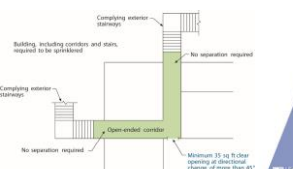
- Balconies and similar projections are not required to have a fire-resistance rating where:
  - Building is of Type III, IV or V construction, and
  - Sprinkler protection is extended to such areas



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Automatic Sprinkler Systems Section 903.3.1.2.2

- Open-ended corridors and balconies, as permitted under Exception 3 of Section 1027.6, shall be provided with sprinkler protection.
- In addition, such protection shall extend to associated exterior stairways and ramps.



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Protection of Attics in Group R Occupancies Section 903.3.1.2.3

- Additional sprinkler protection or acceptable alternative methods required for attics in multi-family occupancies equipped with an NFPA 13R system
- Applicable where roof assembly more than 55 feet above LLFDA
- Method of determining height of roof assembly established as greatest of:
  - Eave of highest pitched roof
  - Intersection of highest roof to exterior wall
  - Top of highest parapet

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Protection of Attics in Group R Occupancies 903.3.1.2.3

- Methods of protection include:
  - Provide sprinkler protection
  - Construct attic of noncombustible materials
  - Construct attic of FRT wood
  - Fill attic with noncombustible insulation



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Application of Sprinkler Requirements

- Trade-offs due to the installation of an automatic sprinkler system are selectively identified as applicable based on:
  - Section 903.3.1.1 NFPA 13 system
  - Section 903.3.1.2 NFPA 13R system
- Where both code sections are referenced, the use of either type of sprinkler system provides the trade-off.
- Where only Section 903.3.1.1 is referenced, the presence of an NFPA 13R sprinkler system does not provide a trade-off

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Application of Sprinkler Requirements

- Examples of code provisions that do not apply where an NFPA 13R sprinkler system is installed include:
  - Reduction to ½-hour dwelling unit separation from 1-hour
  - Increase in amount of unprotected openings in fire-resistance-rated exterior walls due to fire separation distance
  - Increase of permissible dead-ends in corridors from 20 feet to 50 feet
  - Allowable area increase
  - Elimination of smoke dampers in exhaust openings of shaft enclosures



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Type of Construction

Module 3



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Concept of Type of Construction Classification

- Provisions of Chapter 6 addressing type of construction primarily address **structural integrity** under fire conditions.
- Table 601 sets forth minimum fire protection for:
  - Primary structural frame members
  - Bearing walls
  - Floor construction
  - Roof construction
- Additional concerns relate contribution to building's fire load



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Concept of Type of Construction Classification

- Although all types of construction can selectively be used for apartment buildings, the most common types are:
  - Types IIIA and IIIB
  - Types VA and VB
- These four construction types will be the focus of this seminar.



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Type III Buildings

- Type III buildings typically have noncombustible exterior walls, although the use of FRT wood is permitted under certain conditions.
- Type III construction may have interior elements of any materials.

NONCOMBUSTIBLE EXTERIOR* – ANY MATERIAL INTERIOR				
Type of Construction	Primary Structural Frame Members	Exterior Bearing Walls	Interior Bearing Walls	Floor and Roof Construction
Type IIIA	1-hour	2-hour	1-hour	1-hour
Type IIIB	Nonrated	2-hour	Nonrated	Nonrated

* FRT wood framing and sheathing permitted under specified conditions



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Concept of Building Classification

- Type V buildings may be constructed entirely of combustible or noncombustible materials, or may be a combination of such materials.

ANY MATERIAL – INTERIOR AND EXTERIOR				
Type of Construction	Primary Structural Frame Members	Exterior Bearing Walls	Interior Bearing Walls	Floor and Roof Construction
Type VA	1-hour	1-hour	1-hour	1-hour
Type VB	Nonrated	Nonrated	Nonrated	Nonrated



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Process of Building Classification

- Prior to addressing the specific details of the Type III and Type V construction types, it is necessary to do a quick review of the process to identify how the acceptable types of construction are determined for a specific building.
- This process is primarily found in Chapter 5 dealing with allowable building heights and areas.



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Process of Building Classification

- The initial determination in the classification of construction type is made by the designer through the identification of their preference.
- Such preference is typically Type VB construction, as it allows for the most flexibility in the design of the building due to:
  - No structural fire-resistance required
  - No limit on materials of construction



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Process of Building Classification

- Where Type VB construction is not acceptable due to the apartment building's size, particularly height in stories, other options are available.
- Each construction type has its height and area limited based on the occupancy (occupancies) within the building.
  - The designer then selects the complying construction type that best meets their design and budgetary needs.



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Process of Type of Construction

- This process requires the designer to calculate the allowable height and allowable area for the desired construction type in order to verify compliance.
- Only when the allowable height and area as established by the code are not exceeded is the corresponding type of construction acceptable.
  - Special allowances often applied to apartment buildings include:
    - Use of one or more fire walls
    - "Podium" or "pedestal" construction



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Process of Type of Construction

- Once the type of construction is selected for the building, the provisions of Chapter 6 (and other applicable provisions throughout the IBC) will regulate the building's structural fire-resistance and use of appropriate materials.



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Allowable Height in Feet Table 504.3

- For Group R-2 occupancies, the following height in feet limits are established for Type IIIA, IIIB, VA and VB construction:

TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE

	Type IIIA	Type IIIB	Type VA	Type VB
S13R	60	60	60	60
S	85	75	70	60

S = Buildings equipped throughout with an NFPA 13 sprinkler system
S13R = Buildings equipped throughout with an NFPA 13R sprinkler system



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Allowable Height in Stories Table 504.4

- For Group R-2 occupancies, the following height in stories limits are established for Type IIIA, IIIB, VA and VB construction:

TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE

	Type IIIA	Type IIIB	Type VA	Type VB
S13R	4	4	4	3
S	5	5	4	3

S = Buildings equipped throughout with an NFPA 13 sprinkler system
S13R = Buildings equipped throughout with an NFPA 13R sprinkler system



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Allowable Area Factor Table 506.2

- For Group R-2 occupancies, the following allowable area factors are established for Type IIIA, IIIB, VA and VB construction:

TABLE 506.2
ALLOWABLE AREA FACTOR IN SQUARE FEET

	Type IIIA	Type IIIB	Type VA	Type VB
S13R	24,000	16,000	12,000	7,000
S1	96,000	64,000	48,000	28,000
SM	72,000	48,000	36,000	21,000

S1 = Buildings no more than 1 story above grade plane equipped throughout with an NFPA 13 sprinkler system
SM = Buildings with 2 or more stories above grade plane equipped throughout with an NFPA 13 sprinkler system
S13R = Buildings equipped throughout with an NFPA 13R sprinkler system



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Allowable Building Height Section 504

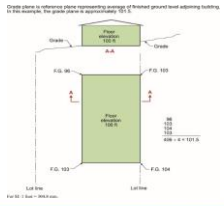
- Because allowable height in stories above grade plane is most often the limiting factor in an apartment building's type of construction, it is important that the number of stories in relation to grade plane be determined.
- Where a story is not defined as 'above grade plane' (basement), it is not considered in the limitations of Table 504.4.



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Grade Plane
Section 202

- In the determination of allowable building height in both feet and number of stories, it is necessary to identify the grade plane.
- Grade plane is relatively simple to calculate if the land adjoining a building is relatively flat.



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Building Height
Section 202

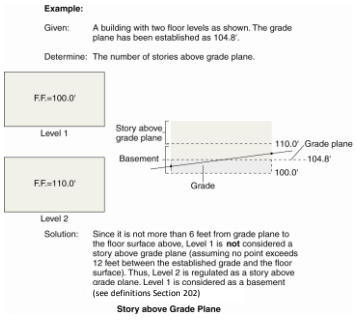
Story: That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.

Story Above Grade Plane: Any story having its finished floor surface entirely above grade plane, or in which the finished surface of the floor next above is:

- More than 6 feet above grade plane, or
- More than 12 feet above the finished ground level at any point.

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Building Height in Stories



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Occupied Roofs
Section 503.1.4

- A roof level is permitted to be used as an occupied roof provided the rooftop occupancy is permitted by Table 504.4 to be located on the story immediately below the roof.
  - Exceptions permitted for sprinklered buildings with occupant notification extended to roof area, and for Type I or II open parking garages.
- In addition, area of occupied roofs are not to be included in building area regulated by Section 506.

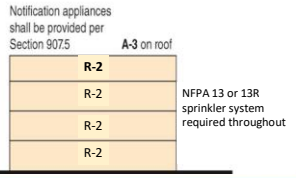


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Occupied Roofs
Section 503.1.4

Example:
A sprinklered (NFPA 13R) apartment building of Type VA construction with a Group A-3 recreation use on the roof
Group R-2: 4 stories max. (S13R)
Group A-3: 3 stories max.

Except for complying penthouses, enclosures of occupied roof areas limited to 48 inches above roof surface





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Allowable Building Area
Section 506

- Building area is limited to that established by Table 506.2, along with any permitted increase because of the presence of significant frontage on open space.
- The allowable area of each story must be in compliance.
  - In addition, buildings four or more stories in height above grade plane must be in compliance for the sum of the floor areas of all stories above grade plane.



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Basements
Section 506.1.3

- Basements do not need to be included in the total allowable area, provided the aggregate area of the basements do not exceed the area permitted for a single-story building.
- In addition, as previously addressed, the following building areas are not to be included in the determination of allowable area:
  - Occupied roofs
  - Mezzanines



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Frontage Increase
Section 506.3

- An increase in allowable area is permitted for buildings that have substantial open space adjacent to the exterior walls (to facilitate fire department access). Open space also greatly limits the potential for exterior materials to contribute to a fire within the building.
- To qualify, the yard or public way must have a minimum width of 20 feet. No allowable area increase is given unless at least 25% of the building's perimeter has complying frontage.



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Frontage Increase
Section 506.3.3

- The area factor increase based on frontage is determined in accordance with Table 506.3.3.

TABLE 506.3.3 Frontage Increase Factor[a]

Percentage of Building Perimeter	Open Space: 0 to less than 20 Feet	20 to less than 25 Feet	25 to less than 30 Feet	30 Feet or greater
0 to less than 25	0	0	0	0
25 to less than 50	0	0.17	0.21	0.25
50 to less than 75	0	0.33	0.42	0.50
75 to 100	0	0.50	0.63	0.75

a. Interpolation is permitted.



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Allowable Area Determination Section 506.2

- Determination of the allowable area of a building differs depending on the conditions presented:
  - Single-occupancy buildings 506.2.1
  - Mixed-occupancy buildings 506.2.2



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Alternative Application of Allowable Heights and Areas

- The following conditions permit the allowable height and area to be applied to portions of buildings through the provisions addressing:
  - Fire walls
  - Horizontal building separations (podium buildings)
  - Two or more buildings on the same lot



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Fire Walls Section 503.1

- Each portion of a building separated by one or more complying fire walls to be considered a separate building for:
  - Building area limitations
  - Building height limitations
  - Type of construction classification



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Fire Walls
Sections 706.2 - 706.4

- Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions.
- Fire walls shall be constructed of noncombustible materials
  - Except in buildings of Type V construction.
- Fire walls shall have a minimum fire-resistance rating per Table 706.4.

TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, U	3[b]
F-1, H-3[b], H-5, M, S-1	3
H-1, H-2	4[b]
F-2, S-2, R-3, R-4	2

a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.
b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.7 and 415.8.



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Horizontal Building Separation
Section 510.2

- The benefit of Section 510.2 is the ability to create two separate buildings, one above the other, for the purpose of applying several specific code provisions independently to each building.
- The allowance is similar in application to the use of a fire wall, but in a vertical arrangement rather than horizontal.



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Horizontal Building Separation
Section 510.2

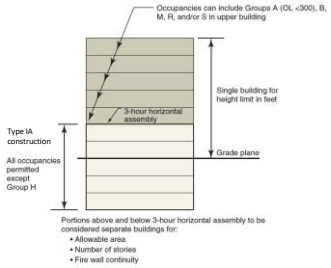
Referred to as “podium” or “pedestal” buildings, they may be viewed as separate buildings above and below the required fire separation for these purposes:

- **Determination of allowable area limits.**
- **Continuity of fire walls.**
- **Limitation on number of stories.**
  - Allowable height in feet measured from grade plane.
- **Type of construction.**



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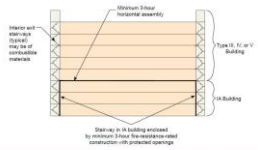
Horizontal Building Separation Section 510.2



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Stairway Construction Section 510.2, #4

- Stairway construction in Type IA (lower) portion of podium buildings permitted to be of combustible materials where two conditions exist:
  - Upper building is of Type III, IV or V construction, and
  - Stairway in lower building enclosed by minimum 3-hour fire-resistance-rated construction (shaft enclosure) with protected openings.

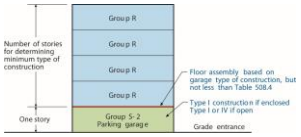


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Parking Beneath Group R Section 510.4

- Where parking is limited to the first story, the number of stories used in the determination of the minimum type of construction may be measured from the floor above the garage.

The benefits provided by Section 510.4 are the allowance for 1) an additional story above grade plane without requiring a higher type of construction, and 2) two types of construction in the same structure.



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Type IIIA Buildings Sections 510.5

- Type IIIA buildings (Groups R-1 and R-2) — the maximum height is increased by one story and 10 feet (to 6 stories and 95 feet), if:
  - The floor construction above a basement, if applicable, is fire-resistance rated a minimum of 3 hours.
  - The floor area is subdivided into maximum 3,000 square foot areas by minimum 2-hour fire-resistance-rated fire walls.



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Open Parking Garage Beneath Groups A, I, B, M and R Section 510.7

- Applies to open parking garages only.
- If in compliance, the areas above and below the horizontal separation are permitted to be regulated for allowable height and area as separate buildings.
- Specific fire separation and means of egress requirements have been established to address any reduction in construction type.



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Buildings on the Same Lot Section 503.1.2

If two or more buildings are located on the same lot, they must be:

- Regulated as separate buildings in accordance with Section 705.3, or
- Considered as portions of one building.



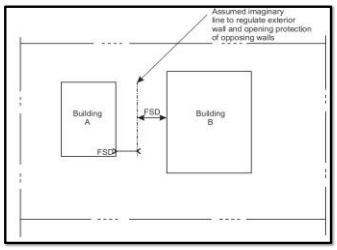
60

Buildings on the Same Lot Section 503.1.2

- If viewed as separate buildings, an imaginary line (determined by the designer) must be assumed between the buildings to determine exterior wall and opening protection.
  - This approach is consistent with the regulation of buildings on adjacent lots insofar as fire separation distance is concerned.
- Under this approach, allowable height, allowable area and type of construction are addressed independently for each building.

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Buildings on the Same Lot Section 503.1.2

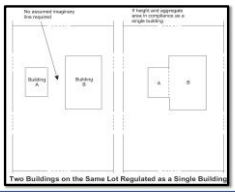


Assumed Imaginary Line Between Two Buildings on the Same Lot

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Buildings on the Same Lot Section 503.1.2

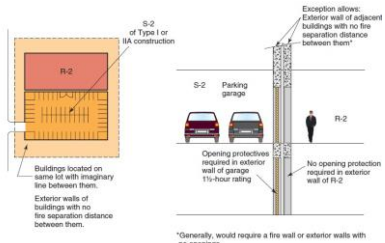
- If considered as a single building, the height of each building and the aggregate area of the buildings must not exceed the limitations of Sections 504 and 506.
  - Other provisions of the code applicable to the aggregate building shall also apply to each building individually.



Two Buildings on the Same Lot Regulated as a Single Building

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Buildings on the Same Lot Section 705.3, Exception 2



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Type of Construction — Application

- Once a type of construction has been chosen, and such construction type complies with the IBC for allowable height and area based on the occupancy or occupancies within the building, the building elements shall comply with the requirements of Chapter 6.
  - Additional provisions located throughout the code may also be selectively applied as directed by Chapter 6.

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Type of Construction Section 602.1

- A building shall be assigned a type of construction as defined in Sections 602.2 through 602.5 addressing five general types of construction:
  - Type I
  - Type II
  - Type III
  - Type IV
  - Type V

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Type of Construction Section 602.1

- In addition, the building elements shall have a fire-resistance rating not less than that established in Table 601.
- The twelve types of construction set forth in the code are defined by a combination of:
  - The construction details set forth for Type I, II, III, IV and V construction, and
  - The fire-resistance ratings set forth in Table 601.



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Type of Construction—Sidebar

- As a reminder, a building must be classified as a single type of construction only.
- Unlike mixed-occupancy conditions where multiple uses occur, the type of construction must be established based on full compliance with the minimum requirements for the intended construction type.



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Type of Construction Table 601

- Building elements addressed in Table 601 for fire-resistance include:
  - Primary structural frame members
  - Bearing walls (both interior and exterior)
  - Floor construction
  - Roof construction



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Type of Construction Section 602

- Since the provisions for type of construction primarily address the structural integrity of building elements under fire conditions, nonbearing walls are not regulated for fire resistance due to construction type.
- However, limitations on the use of combustible materials do apply to nonbearing walls and partitions (both interior and exterior).



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Type III Construction Section 602.3

- In Type III construction, exterior walls must be constructed of noncombustible materials.
  - FRT wood framing and sheathing permitted within exterior walls assemblies of 2-hour rating or less.
- The interior structural elements may be combustible and/or noncombustible.



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Type III Construction Section 602.3

- IIIA: Elements are protected (fire-resistance rated) in accordance with Table 601.
- IIIB: Elements, other than exterior bearing walls, are not required to be protected.



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Type V Construction Section 602.5

- Typically, the structural members and exterior walls of a Type V building are standard wood-frame construction.
  - For Type VA construction, building elements are to be protected minimum 1 hour in accordance with Table 601.
  - For Type VB construction, building elements are not required to be protected.

73

Type of Construction Table 601

TABLE 601 Fire-Resistance Rating Requirements for Building Elements (Hours)

Building Element	Type I A	Type I B	Type II A	Type II B	Type III A	Type III B	Type IV A	Type IV B	Type IV C	Type IV HT	Type V A	Type V B
Primary structural frame[f]	3[a,b]	2[a,b,c]	1[b,c]	0[c]	1[b,c]	0	3[c]	2[c]	2[c]	HT	1[b,c]	0
Bearing walls												
Exterior[e,f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[c]	2[c]	1	0	1	0	3	2	2	1/HT[i]	1	0
Nonbearing walls and partitions Exterior	See Table ~~602~~ 705.5											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1½[h]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	1½	1	1	HT	1[b,c]	0

74

Location on Lot

Module 4

75

Exterior Wall Ratings Section 705.5

- Section 705.5 and Table 705.5 regulate fire resistance of exterior walls because of proximity to adjacent lot lines or other buildings on the same lot
  - Fire separation distance is determined to be "distance measured from building face to closest interior lot line, to centerline of street, alley or public way, or to imaginary line between two buildings on lot. Distance to be measured at right angles from face of wall"

76

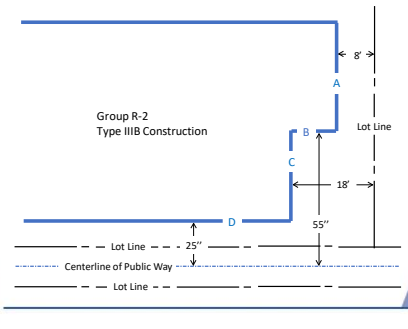
Fire Ratings of Exterior Walls Table 705.5

TABLE 705.5
Fire-resistance Ratings for Exterior Walls Based on Fire Separation Distance

FIRE SEPARATION DISTANCE = x (FEET)	TYPE OF CONSTRUCTION	GROUP R-2 (hours)
X < 10	All	1
10 ≤ X ≤ 30	IIB, VB Others	0 1
X ≥ 30	All	0

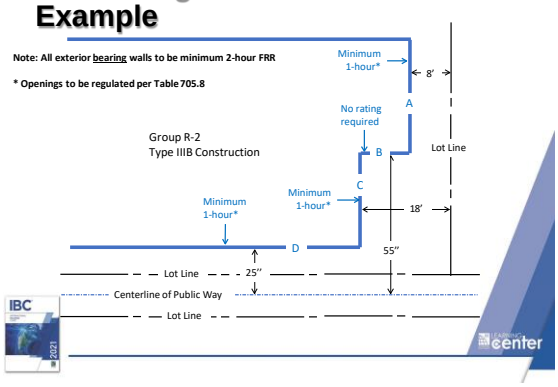
77

Fire Ratings of Exterior Walls Example



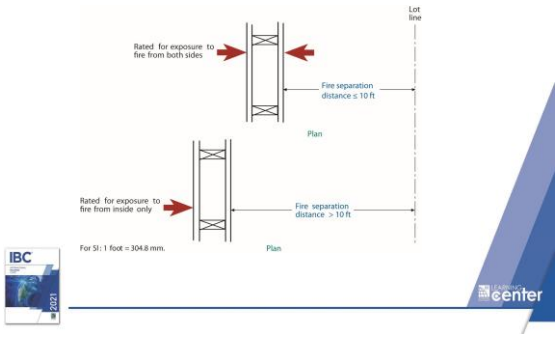
78

Fire Ratings of Exterior Walls Example



79

Fire-resistance Ratings Section 705.5



80

Maximum Area of Exterior Openings Table 705.8

TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA*
0 to less than 3[a, c, h]	Unprotected, Nonsprinklered (UP, NS)	Not Permitted[d]
	Unprotected, Sprinklered (UP, S)[f]	Not Permitted[d]
	Protected (P)	Not Permitted[d]
3 to less than 5[g, h]	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S)[f]	15%
	Protected (P)	15%
5 to less than 10[e, f, i]	Unprotected, Nonsprinklered (UP, NS)	10%[b]
	Unprotected, Sprinklered (UP, S)[f]	25%
	Protected (P)	25%
10 to less than 15[e, f, g, i]	Unprotected, Nonsprinklered (UP, NS)	15%[b]
	Unprotected, Sprinklered (UP, S)[f]	45%
	Protected (P)	45%
15 to less than 20[f, g, i]	Unprotected, Nonsprinklered (UP, NS)	25%
	Unprotected, Sprinklered (UP, S)[f]	75%
	Protected (P)	75%
20 to less than 25[f, g, i]	Unprotected, Nonsprinklered (UP, NS)	45%
	Unprotected, Sprinklered (UP, S)[f]	No Limit
	Protected (P)	No Limit

(continued)

81

Openings in Exterior Walls Section 705.8.1, Exception 2

- Buildings whose exterior wall, exterior nonbearing wall and exterior structural frame are not required to be fire-resistance rated (by Tables 601 and 705.5) are permitted to have unlimited unprotected openings.

82

Projections Sections 705.2 and 1405

- Cornices, eave overhangs, exterior balconies and similar projections extending beyond the floor area shall conform to the requirements of Sections 705.2 and 1405.

83

Projection Limits at Exterior Walls Section 705.2

- Cornices, eave overhangs, exterior balconies and similar projections extending beyond the floor area shall conform to the requirements of Sections 705.2 and 1405.
- Table 705.2 sets forth the limitations regarding the permitted extent of projections.

TABLE 705.2
MINIMUM DISTANCE OF PROJECTION

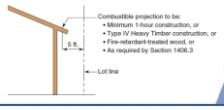
FIRE SEPARATION DISTANCE (FSD) (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	Two-thirds of FSD
5 or greater	40 inches

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

84

Projections
Section 705.2

- Projections from walls of Type III, IV or V construction shall be of any approved material
- Combustible projections extending to within 5 feet of fire separation distance line shall be:
  - 1-hour fire-resistance-rated construction, or
  - heavy-timber construction, or
  - fire-retardant-treated wood, or
  - as permitted by Section 705.2.3.1



85

Special Detailed Requirements

Module 5

86

Dwelling Unit Separations
Sections 420.2, 420.3

- Walls separating dwelling units from other units and other occupancies shall be constructed as fire partitions.
  - Fire partitions are regulated by Section 708
- Floor and floor/ceiling assemblies separating dwelling units from other units and other occupancies shall be constructed as horizontal assemblies.
  - Horizontal assemblies are regulated by Section 711
- Minimum 1-hour ratings (1/2 hour permitted in Type IIB, IIIB and VB buildings w/NFPA 13 sprinkler system)

87

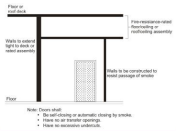
Incidental Uses
Section 509

- The most probable use within an apartment building that would be regulated as an incidental use would be a common laundry room greater than 100 square feet in floor area.
- Based on a sprinklered building, the laundry room would need to be separated from the remainder of the building by construction capable of resisting the passage of smoke.

88

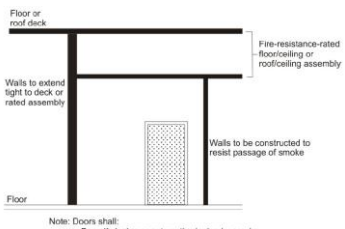
Protection
Section 509.4.2

- In addition to smoke-resistant construction, the incidental use shall have:
  - Doors that are automatic or self closing (no openings).
  - Smoke dampers on any air transfer openings in walls.
- Other:
  - Need not be fire-resistance rated.
  - Not required to be built as smoke partition (Section 710).



89

Protection
Section 509.4.2



90

Sound Transmission Section 1206.2

- Walls, partitions and floor-ceiling assemblies separating dwelling units from each other, and from public or service areas, to have a sound transmission rating for **airborne noise**.
- The sound transmission class shall be a minimum of 50, or 45 if field tested.
- As an alternate, the sound transmission class may be established by engineering analysis based on a comparison of assemblies that have ratings as determined by test procedures



91

Sound Transmission Section 1206.2

- Penetrations for openings in such assemblies, such as for piping, electrical boxes, recessed cabinets, bathtubs, soffits and ducts to be sealed, lined, insulation or otherwise treated to maintain the required ratings
  - Requirement does not require to entrance doors.



92

Sound Transmission Section 1206.3

- To address **structure-borne sound**, floor-ceiling assemblies between dwelling units, or between units and public or service areas, to have an impact insulation class rating.
- The impact insulation class rating shall be a minimum of 50, or 45 if field tested.
- As an alternate, the sound transmission class may be established by engineering analysis based on a comparison of assemblies that have ratings as determined by test procedures



93

Means of Egress

Module 6

94

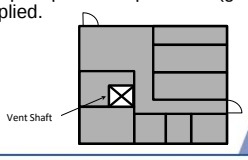
Occupant Load (OL) Section 1004

- Occupant load is used throughout the IBC to determine the application of a provision, particularly when addressing:
  - Means of egress
  - Fire protection features
  - Occupancy classification
  - Plumbing fixture count
- Occupant load is determined based on:
  - Fixed seating conditions, or
  - Conditions where fixed seating is not provided.

95

Occupant Load (OL) Section 1004

- Occupant load is used throughout the IBC to determine the application of a provision, particularly when addressing the means of egress.
- Table 1004.5 identifies maximum floor area allowances per occupant for areas without fixed seating.
- For “Residential” uses in Table 1004.5, an occupant load factor of one occupant per 200 square feet (gross floor area) is to be applied.



96

Occupant Load (OL) Section 1004

- The occupant load as calculated based on Table 1004.5 may be decreased or increased to better represent the maximum anticipated number of occupants.
- Reduction in calculated occupied load permitted where:
  - Approved by building official, and
  - Actual number of occupants can be determined.



97

Minimum Width vs. Required Capacity

- All portions of means of egress to be sized per Section 1005.
- Minimum size of egress system to be based upon the greater of:
  - Component width (minimum width), and
  - Calculated width (required capacity)
- Component width almost always governs in means of egress design for residential buildings.



98

Minimum Width vs. Required Capacity

- "Minimum width" is based on specific component under consideration, such as:
  - Aisles and corridors: Table 1020.3
  - Doorways: Section 1010.1.1
  - Stairways: Section 1011.2
- "Required capacity" is determined through calculations per Section 1005.3.



99

Egress from Spaces Section 1006.2

- Two means of egress are required from dwelling units and other Group R-2 spaces where:
  - the design occupant load exceeds 20 occupants, or
  - the common path of travel exceeds 125 feet.
- Common path of travel is that portion of 'exit access' travel measured from the most remote point of each area or space to that point where the occupants have separate and distinct access to two exits or exit access doorways.

100

Minimum Number of Exits from Stories and Occupied Roofs Section 1006.3.3

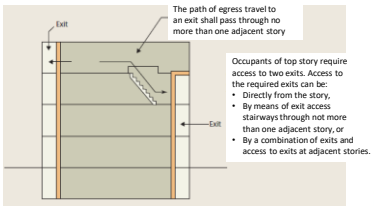
- Each story and occupied roof to have minimum number of exits, or access to exits, as set forth in Table 1006.3.3.

TABLE 1006.3.3
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY

OCCUPANT LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM STORY
1-500	2
501-1,000	3
More than 1,000	4

101

Egress from Stories and Occupied Roofs Section 1006.3.2



102

Single Exits
Section 1006.3.4

- A single exit or access to a single exit permitted where in compliance with Table 1006.3.4(1).

TABLE 1006.3.4(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2[a, b]	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

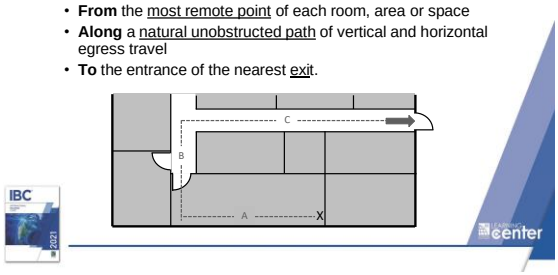
For SI: 1 foot = 304.8 mm.
NP = Not Permitted.
NA = Not Applicable.
a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.
b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.4(2).



103

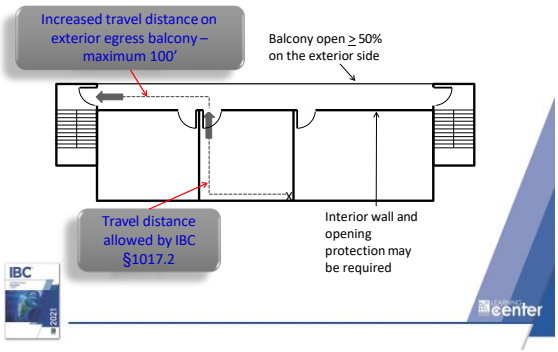
Exit Access Travel Distance
Section 1017

- Travel distance is limited to 250 feet in Group R-2 occupancies
- Travel distance is measured:
  - **From** the <u>most remote point</u> of each room, area or space
  - **Along** a <u>natural unobstructed path</u> of vertical and horizontal egress travel
  - **To** the entrance of the nearest <u>exit</u>.



104

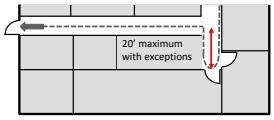
Exterior Egress Balcony Increase
Section 1017.2.1



105

Dead Ends in Corridors
Section 1020.5

- Where **more than one exit or exit access doorway is required** from a corridor, dead-ends within the corridor system are limited in length.
- General limitation on dead-end corridors is 20 feet.
- Where building is fully sprinklered **(NFPA 13 system only)**, maximum dead conditions of 50 feet are permitted in Group R-2 occupancies.



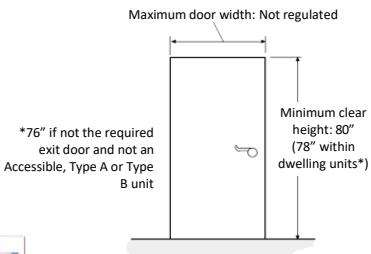
106

Size of Doors
Section 1010.1.1

- Minimum required clear door opening width of 32 inches not regulated for:
  - Non-egress doors in Groups R-2 and R-3
  - Doors to storage closets less than 10 square feet in area
  - Interior doors in a dwelling unit or sleeping unit that is not required to be an Accessible, Type A or Type B unit
- Required clear door opening width reduced from 32":
  - 31.75" for accessible doors in Type B dwelling units

107

Size of Doors
Section 1010.1.1



108

Door Swing
Section 1010.1.2

- Egress doors shall be of a side-hinged swinging, pivoted or balanced door type, except for:
  - Doors within or serving individual dwelling units of Group R-2



Door Operations
Section 1010.2

- Egress doors shall be “readily openable from the egress side without the use of a key or special knowledge or effort.
- This requirement is modified for Group R-2 occupancies:
  - Doors from individual dwelling units with occupant load of 10 or less are permitted to be equipped with night latch, dead bolt or security chain.
  - Locking devices permitted on doors to balconies, decks or other exterior spaces serving individual dwelling units.



Bolt Locks
Section 1010.2.5

- Manually operated surface-mounted bolts and manually operated flush bolts are prohibited.
- **Exceptions:**
  - Doors in individual dwelling units or sleeping units that are not required for egress
  - The “inactive” leaf of a pair of doors that serve a storage or equipment room



Minimum Corridor Width Table 1020.3

TABLE 1020.3
MINIMUM CORRIDOR WIDTH

OCCUPANCY	MINIMUM WIDTH (inches)
Any facility not listed in this table	44
With an occupant load of less than 50	36
Within a dwelling unit	36

112

Corridor Fire-Resistance Rating Table 1020.2

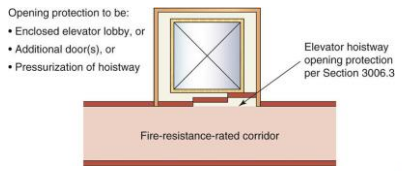
TABLE 1020.2
CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system
R	Greater than 10	Not Permitted	0.5[c]/1[d]

113

Hoistway Openings at Rated Corridors Section 3006.2.1

- Hoistway openings to be protected where corridors to be fire-resistance-rated per Section 1020.2



114

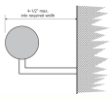
Stairways
Sections 202 and 1011.1

- **Stair.** A change in elevation, consisting of one or more risers.
- **Stairway.** One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.
- All stairways that serve occupied portions of a building must comply with stairway provisions in Section 1011

115

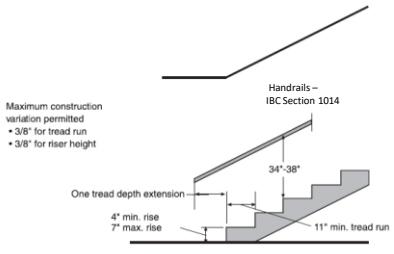
Width and Projections
Section 1011.2, 1014.8

- Minimum stairway width of 44 inches required
  - Stairways serving an occupant load < 50 to have minimum width of 36 inches
- In addition, required capacity of stairway to be determined by Section 1005.1
- Projections into the required width not to exceed 4½ inches at or below the handrail height.
  - Projections not limited above minimum headroom height of 80 inches



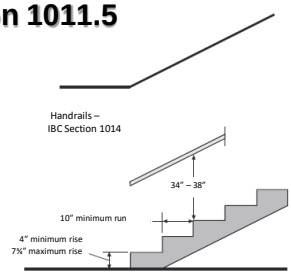
116

Stair Treads and Risers
Section 1011.5



117

Stair Treads and Risers Section 1011.5



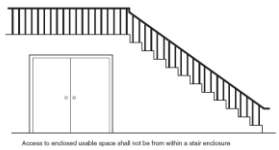
Section 1011.5.2, Exception 3:
Within dwelling units in R-2

For SI: 1 inch = 2.54 mm

118

Enclosures Under Interior Stairways Section 1011.7.3

- Walls and soffits within enclosed usable spaces under stairways to be protected 1-hour, or 2 hours for a 2-hour interior exit stairway.
  - Only ½" gypsum board protection required within individual dwelling units of Group R-2



119

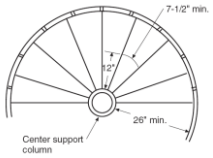
Enclosures Under Exterior Stairways Section 1011.7.4

- Usable space under exterior exit stairways is to be completely enclosed in minimum 1-hour fire-resistance-rated construction.
- The open space under exterior stairways shall not be used for any purpose.

120

Spiral Stairways
Section 1011.10

- Spiral stairways can be used as a part of the means of egress if located within a dwelling unit.



121

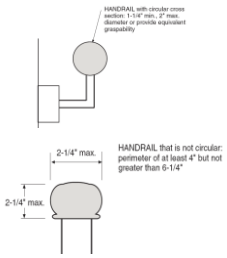
Handrails
Section 1011.11

- Flights of stairs to have handrails on each side, except:
  - Decks, patios and walkways may have a single change of elevation without handrails if landing depths on each are compliant.
  - Within dwelling units, a handrail is permitted on only one side.
  - Within dwelling units in Group R-2, room elevation changes of 3 or fewer risers do not require handrails.

122

Handrail Graspability – Type I
Section 1014.3.1

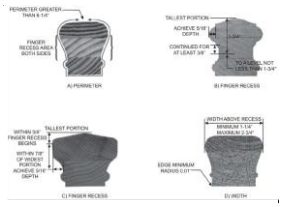
- Required handrails to be Type I or provide equivalent graspability.
- Type II handrails also permitted for:
  - Individual dwelling units of Group R-2
  - Group U accessory to individual Group R-2 units



123

Handrail Graspability – Type II
Section 1014.3.2

- Type II handrails only permitted within dwelling units of Group R-2, and in Group U accessory to individual Group R-2 units.



124

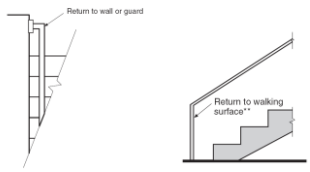
Handrail Continuity and Clearance
Sections 1014.4

- Handrail gripping surfaces to be continuous without interruption by newel points or other obstructions
  - Handrail or balusters attached to bottom of handrail are not considered obstructions if no projections beyond handrail width within 1½ inches of bottom of handrail.
- Within dwelling units:
  - Handrails permitted to be interrupted by a newel post at a turn or landing, and
  - Use of a volute, turnout, starting easing or starting newel is permitted over the lowest tread.

125

Handrail Extensions
Section 1014.6

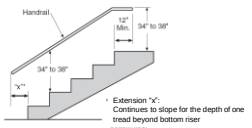
- Handrails shall return to a wall, guard or walking surface, or shall be continuous to the handrail to an adjacent flight of stairs.



126

Handrail Extensions
Section 1014.6

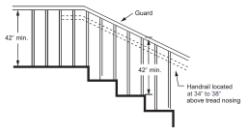
- Where handrails are not continuous between flights, they shall extend:
  - At least 12 inches beyond top riser
  - At slope for depth of one tread beyond bottom riser
- Handrails within a dwelling unit not required to be accessible need only extend from the top riser to the bottom riser.



127

Guards
Section 1015

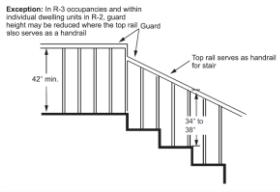
- Guards to be located along open sides of walking surfaces located more than 30 inches above grade or floor below.
- Guards to be adequately attached per Section 1607.9.
- Required guards to be a minimum of 42 inches in height, measured vertically:
  - From the adjacent walking surfaces
  - On stairways



128

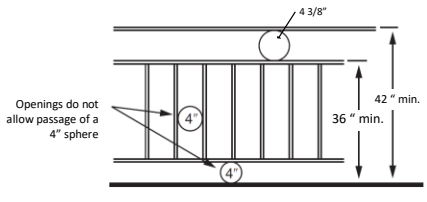
Guard Height
Section 1015.3

- Within individual dwelling units of Group R-2 occupancies, guards on the open sides of stairs to have a minimum height of 34 inches measured vertically above line connecting nosing of treads.
  - Top of guard may also serve as handrail



129

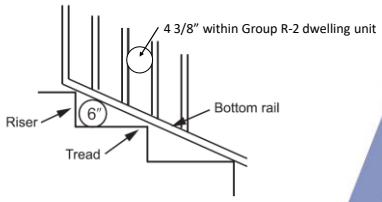
Guard Opening Limitations Section 1015.4



130

Guard Opening Limitations Section 1015.4

- Required guards shall not have openings that allow passage of a 4-inch sphere, with exceptions.



131

Window Openings Section 1015.8

- Windows in Group R-2 buildings, including within dwelling units, to comply with one of four methods to address fall prevention.
- Applicable where top of the sill of an operable window opening is located < 36 inches above the finished floor and > 72 inches above the surface below on the exterior of the building.

132

Window Openings
Section 1015.8

- Acceptable methods include operable windows provided with:
  - Window fall prevention devices complying with ASTM F2006 (nonemergency escape openings)
  - A means where openings will not allow passage of a 4-inch sphere when window is in its largest opened position
  - Window fall prevention devices complying with ASTM F2090 (with emergency escape release mechanisms)
  - Window opening control devices complying with ASTM F2090



133

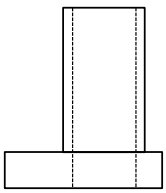
Exit Access Stairways
Section 1019.3

- Exit access stairways that serve floor levels within a single story, such as mezzanines, are not required to be enclosed.
- Exit access stairways serving multiple stories shall be enclosed, except:
  - When serving or atmospherically communicating between two stories (such interconnected stories shall not be open to other stories)
  - When connecting ≤ 4 stories within an individual dwelling unit or sleeping unit in a Group R-2 occupancy



134

Interior Exit Stairways
Section 1023.2



- Enclosure construction:
  - ≥ 4 stories: Minimum 2-hour fire-resistance
  - < 4 stories: Minimum 1-hour fire-resistance
  - Not less than floor assembly penetrated, but need not be more than 2 hours
- Door assemblies:
  - Self-closing or automatic-closing
  - Minimum 1-hour rating for 1-hour enclosures
  - Minimum 1½-hour rating for 2-hour enclosures



135

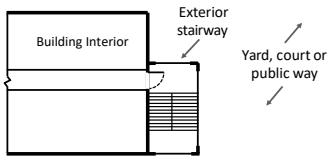
Interior Exit Stairway Openings Section 1023.4

- Opening protectives to comply with Section 716.
- Other than exterior openings permitted to be unprotected, openings in interior exit stairways limited to:
  - Egress doors into the enclosure from normally occupied spaces, and
  - Egress from the enclosure.
- Elevators shall not open into interior exit stairways.

136

Exterior Exit Stairways Section 1027.2

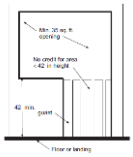
- Exterior exit stairways serving as a portion of the means of egress are:
  - Limited to buildings ≤ 6 stories above grade plane



137

Exterior Exit Stairways Section 1027.3

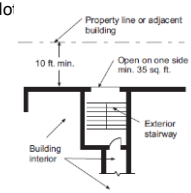
- Exterior exit stairways shall be open on at least one side, except for required structural elements, handrails and guards.
- Openings are to be located at each:
  - Floor level, and
  - Intermediate landings



138

Exterior Exit Stairways Section 1027.5

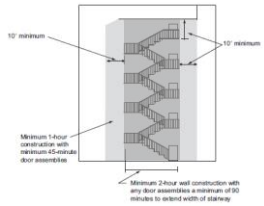
- Exterior exit stairways are to have a minimum fire separation distance of 10 feet from:
  - Adjacent lot lines
  - Other portions of building
  - Other buildings on same lo



139

Exterior Stairways Protection Section 1027.6

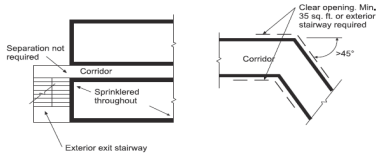
- Exterior exit stairways to be separated from the interior of the building per Section 1023.2.



140

Open-ended Corridors Section 1027.6, Exception 3

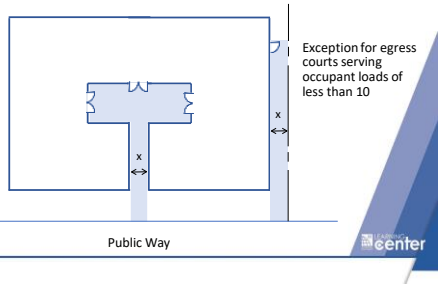
- Separation is not required for complying open-ended corridors.
  - The building, including open-ended corridors and stairways, to be sprinklered throughout.



141

Egress Courts Section 1029

- Where X is less than 10 feet in width, exterior wall to be minimum 1-hour with minimum 45-minute openings to height of 10 feet or roof height, whichever is less



142

Fire and Smoke Protection Features

Module 7

143

Fire and Smoke Protection

- The most common fire-resistance-rated separation elements that occur in apartment buildings include:
  - Fire walls
  - Fire partitions
  - Horizontal assemblies
- Such elements typically include penetrations, door and window assemblies, and duct and air openings.

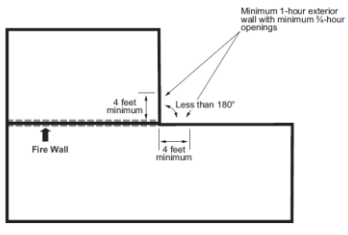
144

Fire Walls
Section 706.2

- In addition to the provisions addressing structural stability, fire walls are regulated for:
  - Horizontal continuity
  - Horizontal projecting elements
  - Vertical continuity
  - Stepped buildings

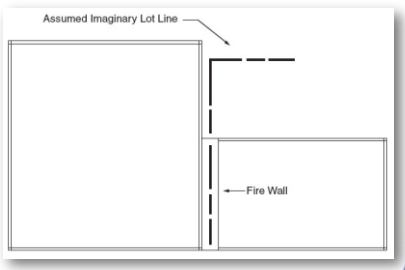
145

Fire Wall Continuity at Exterior Walls
Section 706.5.1, #1



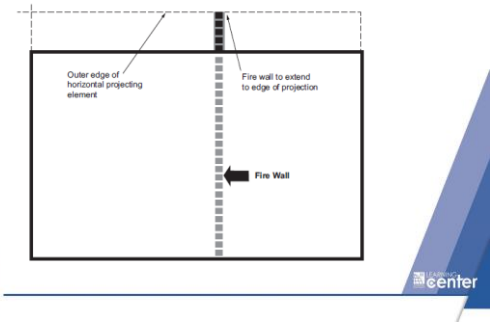
146

Fire Wall Continuity at Exterior Walls
Section 706.5.1, #2



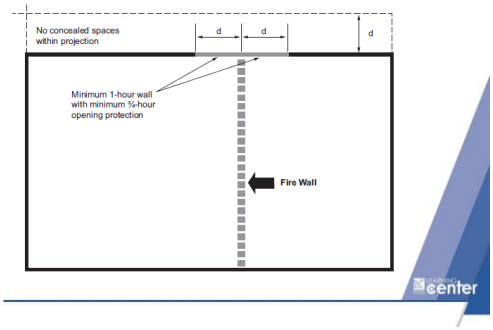
147

Horizontal Projecting Elements Section 706.5.2



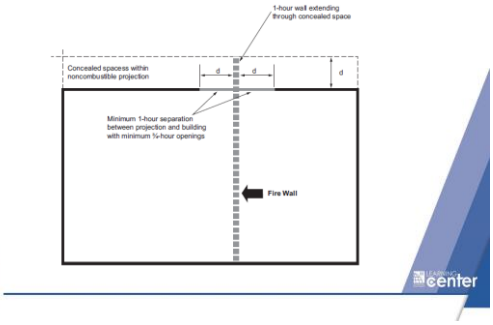
148

Horizontal Projecting Elements Section 706.5.2, Exception 1



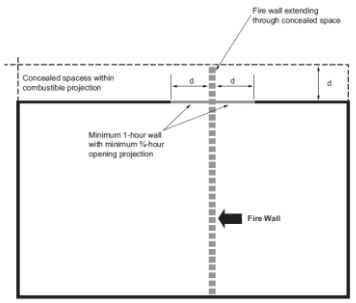
149

Horizontal Projecting Elements Section 706.5.2, Exception 2



150

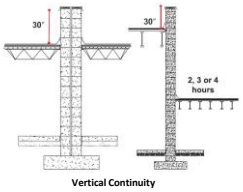
Horizontal Projecting Elements
Section 706.5.2, Exception 3



151

Vertical Continuity
Section 706.6

- Fire walls must extend ≥ 30 inches above the roof surface unless an alternate means of roof protection is provided.

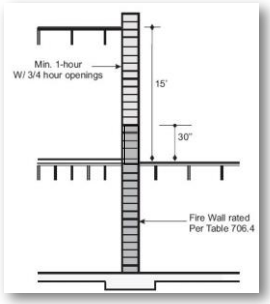


Vertical Continuity

For SI: 1 foot = 304.8 mm

152

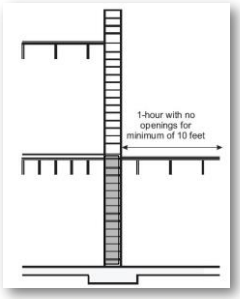
Stepped Buildings
Section 706.6.1



153

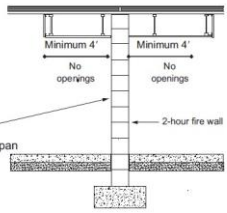
Stepped Buildings
Section 706.6.1, Exception

Roof Protection for Stepped Building



154

Vertical Continuity
Section 706.6, Exception 2

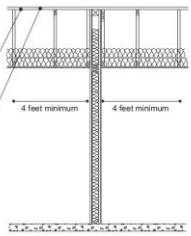


- Roof of same height
- Two-hour FW
- One-hour, 4 foot entire span span and supporting elements
- No roof openings within 4 ft of FW

For SI: 1 foot = 304.8 mm.

155

Vertical Continuity
Section 706.6 – Exception 4



- Building care of Type III, IV, or V construction.
- No roof openings occur within 4 feet of fire wall.
- Minimum Class B roof covering.
- For a minimum of 4 feet on each side of the fire wall, sheathing or deck constructed of FRT plywood or 5/8-inch Typex gypsum board installed directly below sheathing or deck

For SI: 1 foot = 304.8 mm.

156

Fire Partitions
Section 708.1

- In addition to other applications, fire partitions are wall assemblies that:
  - enclose fire-resistance-rated corridors,
  - separate dwelling units in residential uses,
  - protect egress balconies and
  - separate elevator lobbies from the remainder of the story in buildings that require elevator lobbies.

157

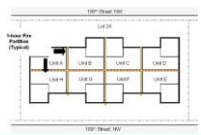
Fire Partitions
Section 708

- Corridors in Group R-2 occupancies to be fire-resistance rated in accordance with Table 1020.2.
  - Rating not required for corridors contained within dwelling units.
- Where occupant load served by corridor exceeds 10, the corridor to have a minimum fire-resistance rating of ½-hour where building is equipped with an NFPA 13 or 13R sprinkler system.

158

Fire Partitions
Section 708

- Fire partitions are used to isolate dwelling units from other portions of the building per Section 420.2.
- Such fire partitions to have a minimum 1-hour fire-resistance rating, except:
  - Dwelling unit separations in buildings of Types IIB, IIIB and VB construction may be ½-hour-rated assemblies where the building is equipped throughout with an NFPA 13 sprinkler system.



159

159

Continuity
Section 708.4

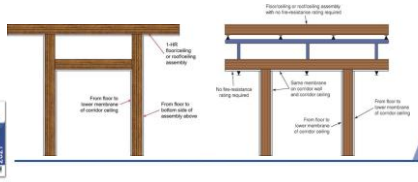
- Fire partitions shall extend from the top of the foundation or the floor/ceiling assembly below.
- For continuity purposes, there are two general options for terminating a fire partition. It shall extend to the underside of:
  1. the floor or roof sheathing, deck or slab above, or
  2. a floor/ceiling or roof/ceiling assembly having a fire-resistance rating not less than the rating of the fire partition.



160

Corridor Continuity
Section 708.4, Exceptions 2.1 & 2.2

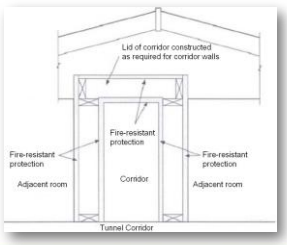
- For fire partitions serving as corridor walls, additional continuity options are provided where the corridor ceiling membrane is equivalent to the corridor wall membrane.



161

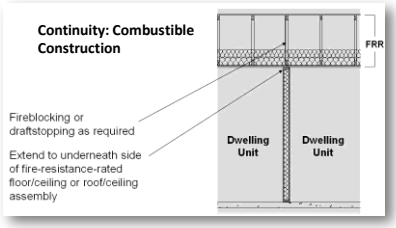
Corridor Continuity
Section 708.4, Exception 3

- "Tunnel construction" is also a permissible means to obtain corridor continuity.



162

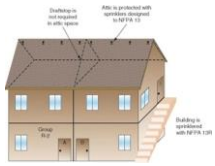
Fireblocks and Draftstops Section 708.4.2



163

Fireblocks and Draftstops Section 708.4.2, Exception 1

- Fireblocking and/or draftstopping not required at partition line in the buildings equipped with NFPA 13 or 13R sprinkler system where attic is protected with NFPA 13 system.



164

Fireblocks and Draftstops Section 708.4.2, Exceptions 2 & 3

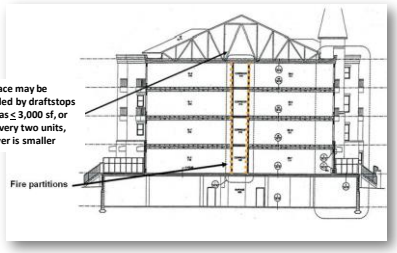
2. Draftstopping only required above one corridor wall when corridor walls provide dwelling unit separation.

3. Fireblocking and draftstopping not required in Group R-2 occupancies having 3 or fewer dwelling units.

165

Attic Space Draftstops Section 708.4.2, Exception 4

Applicable to Group R-2 occupancies ≤ 4 stories and ≤ 60 feet in height above grade plane.



166

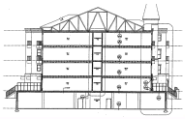
Horizontal Assemblies Section 711

- Horizontal assemblies are required by various provisions of the code:
  - Type of construction requirements
  - Dwelling unit separations
  - Separated occupancies
  - Incidental use separations
  - Horizontal exit alternative

167

Fire-resistance Rating Section 711.2.4.3

- Floor assemblies separating dwelling units shall be a minimum of 1-hour fire-resistance-rated construction.
  - Dwelling unit separations in buildings of Types IIB, IIIB and VB construction to have fire-resistance ratings of not less than ½-hour in buildings equipped throughout with an automatic sprinkler system in accordance with NFPA 13.



168

Continuity and Supporting Construction Section 711.2.2 & 711.2.3

- Horizontal assemblies are to be continuous without vertical openings, except as permitted by Section 712 (Vertical Openings).
- Construction supporting a horizontal assembly shall be protected to afford the required fire-resistance rating of the horizontal assembly supported, except for those horizontal assemblies in Type IIB, IIIB and VB buildings, at:
  - Dwelling unit separations, and
  - Incidental use separations as specified in Table 509.1, provided the required fire-resistance rating does not exceed 1 hour



169

Vertical Openings Section 712.1

- Vertical openings must be protected with at least one of the methods in Sections 712.1.1 through 712.1.16, including:
  - Vertical openings are permitted when contained within a shaft enclosure that complies with the provisions of Section 713.



  - Unconcealed vertical openings that occur totally within an individual dwelling unit, where connecting no more than four stories, are permitted.



170

Two-story Openings Section 712.1.9 & 712.1.12

- In Group R-2 occupancies, a floor opening is permitted where all of the following conditions are met:
  - Does not connect more than two stories.
  - Is not concealed within construction of a wall or floor/ceiling assembly.
  - Is not open to a corridor
  - Is separated from other floor openings and air transfer openings by construction equal to shaft construction.
- In Group R-2 occupancies, exit access stairways that serve, or atmospherically communicate between, only two stories are not required to be enclosed.



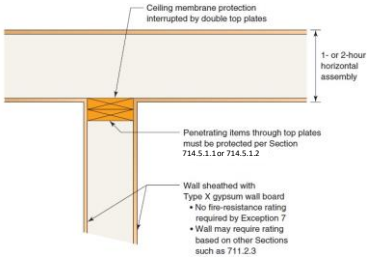
171

Horizontal Assemblies Section 714.5

- Penetrations of horizontal assemblies are regulated for:
  - Floors.
  - Floor/ceiling assemblies.
  - Ceiling membranes of roof/ceiling assemblies.
- Requirements are applicable to:
  - Fire-resistance-rated assemblies.
  - Nonfire-resistance-rated assemblies.

172

Horizontal Assembly Continuity Section 714.5.2, Exception 7



173

Section 716 – Opening Protectives

- Section 716 regulates two types of opening protectives: fire door and shutter assemblies, and fire-protection-rated glazing.
- Opening protectives regulated by this section shall be installed in accordance with NFPA 80.



174

Table 716.1.(2)

TABLE 716.1(2)
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE[c]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c,e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	See Note b	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	2	1½	100 sq. in.	≤ 100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	2	Not Permitted	W-120
	1½	1½	100 sq. in.	≤ 100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	1½	Not Permitted	W-90
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1½	100 sq. in.[c]	≤ 100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120
Horizontal exits in fire walls[d]	4	3	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-180	Not Permitted	3	Not Permitted	W-180



Table 716.1(2), (cont.)

TABLE 716.1(2)
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE[c]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c,e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire barriers having a required fire-resistance rating of 1 hour. Enclosures for shafts, exit access stairways, exit access ramps, interior exit stairways and interior exit ramps; and exit passageway walls	1	1	100 sq. in.	≤ 100 sq. in. = D-H-60 >100 sq. in.= D-H-T-W-60	Not Permitted	1	Not Permitted	W-60
					Fire protection			
Other fire barriers	1	¾	Maximum size tested	D-H	¾		D-H	
Fire partitions: Corridor walls	1	¾[a]	Maximum size tested	D-20	¾[a]		D-H-OH-45	
	0.5	¾[a]	Maximum size tested	D-20	½		D-H-OH-20	
Other fire partitions	1	¾	Maximum size tested	D-H-45	¾		D-H-45	
	0.5	½	Maximum size tested	D-H-20	½		D-H-20	

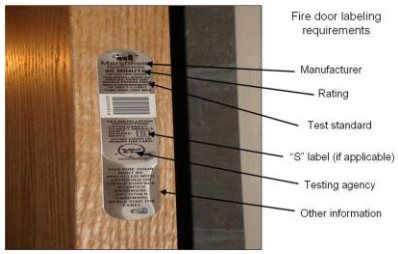


Door Assemblies in Corridors Section 716.2.2.1

- Fire door assemblies required to have a minimum fire protection rating of 20 minutes where located in corridor walls or smoke-barrier walls shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test.
- In addition, fire door assemblies in corridors and smoke barriers shall also meet the requirements for a smoke- and draft-control door assembly tested in accordance with UL 1784.



Fire Door Labeling Requirements Section 716.2.9.1



178

Smoke and Draft Control Door Labeling Requirements Section 716.2.9.3

- Smoke- and draft-control doors that comply with UL 1784 shall be labeled to indicate the fire protection rating and other requirements of Section 716.2.9.1.
- In addition, the fire rating label on the door shall show the letter "S" to indicate compliance with UL 1784 and to verify that the door and frame assembly are in compliance where listed or labeled gasketing is installed.

179

Safety Glazing Section 716.1.2.1

- Fire-protection-rated glazing installed in hazardous locations as identified by Section 2406 shall also meet the requirements for safety glazing.
- Safety glazing in doors must meet the test requirements of CPSC 16 CFR Part 1201.
  - Glazing complying only with ANSI Z97.1 is not acceptable as a safety glazing material in doors, including fire doors.

180

Door Closing
Section 716.2.6.1

- Fire doors shall be latching and self-closing or automatic closing.
- Automatic-closing devices, actuated by smoke detection, are required for cross-corridor doors installed in a horizontal exit wall (see Section 1026.3).

181

Fire Window Assemblies
Table 716.1(3)

TABLE 716.1(3)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP[a]	W-XXX[b]
Fire barriers	>1	NP[a]	W-XXX[b]
	1	NP[a]	W-XXX[b]
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7),[c] Mixed occupancy separations (Section 707.3.9)	1	3/4	OH-45 or W-60
Fire partitions	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30

182

Fire Window Assemblies
Table 716.1(3) (cont.)

TABLE 716.1(3)
FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP[a]	W-XXX[b]
Fire barriers	>1	NP[a]	W-XXX[b]
	1	NP[a]	W-XXX[b]
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), Mixed occupancy separations (Section 707.3.9)	1	3/4	OH-45 or W-60
Fire partitions	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Smoke barriers	1	3/4	OH-45 or W-60
Exterior walls	>1	1 1/2	OH-90 or W-XXX[b]
	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Party wall	All	NP	Not Applicable

NP = Not Permitted.
a. Not permitted except fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3.
b. XXX = The fire rating duration period in minutes, which shall be equal to the fire-resistance rating required for the wall assembly.

183

Ducts and Air Transfer Openings Section 717

- Fire dampers, smoke dampers and combination fire/smoke dampers protect openings created by duct penetrations and air transfer openings in those fire-resistance-rated assemblies required to be protected.
- Ceiling radiation dampers protect duct penetrations, which only penetrate the ceiling membrane of a fire-resistance-rated assembly.



184

Ducts Penetrations Without Dampers Section 717.1.2

- Ducts that penetrate fire-resistant-rated wall assemblies and are not required to have fire dampers or smoke dampers shall comply with the provisions of Section 714.3 through 714.4.3 and are regulated as penetrations.
- Ducts that penetrate horizontal assemblies not contained in a shaft and not protected by damper shall comply with penetration protection requirements of 714.5 through 714.6.2.
- Spaces around duct penetrations of non-rated floor assemblies shall comply with Section 717.6.3.



185

Damper Installation Section 717.2

- Fire dampers, smoke dampers, combination fire/smoke damper, corridor dampers and ceiling radiation dampers shall be installed in accordance with Section 717, the manufacturer's instructions and the damper's listing.



186

Section 717.3 – Damper Ratings

- Fire dampers shall have the minimum rating specified in Table 717.3.2.1.

TABLE 717.3.2.1
FIRE DAMPER RATING

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hours)
Less than 3-hour fire-resistance-rated assemblies	1.5
3-hour or greater fire-resistance-rated assemblies	3

- Smoke damper leakage ratings to be Class I or II.
- Corridor damper ratings to have:
  - Minimum 1-hour fire-resistance rating
  - Class I or II leakage rating



187

Fire Walls
Section 717.5.1

- Ducts and air transfer openings permitted in fire walls in accordance with Section 706.11 shall be protected with listed fire dampers installed in accordance with their listing.
- Where the fire wall serves as a horizontal exit, listed smoke dampers are also required at those points where any ducts or air transfer openings penetrate the fire wall.
  - Also applicable to fire barriers.



188

Shaft Enclosures
Section 717.5.3

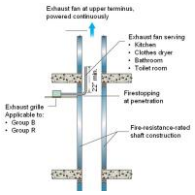
- Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.



189

Shaft Enclosures
Section 717.5.3, Exceptions 1 & 2

- Fire dampers are not required at penetrations of shafts where:
  - Steel exhaust subducts extend at least 22 inches vertically in exhaust shafts provided there is continuous airflow upward to the outside.
- Where a Group R-2 is equipped throughout with an NFPA 13 system, smoke dampers are not required where 3 conditions are met.



190

Shaft Enclosures
Section 717.5.3, Exception 5

- Fire dampers and combination fire/smoke dampers are not required in kitchen and clothes dryer exhaust systems where dampers are prohibited by the IMC.

191

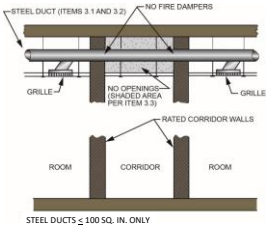
Fire Partitions
Section 717.5.4, Exception 1

- Ducts and air transfer openings that penetrate fire partitions shall be protected with listed fire dampers installed in accordance with their listing.
- Where ducts and air transfer openings penetrate fire partitions, fire dampers are not required where Exception 1 applies:
  - Corridor walls in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and the duct is protected as a through penetration in accordance with Section 714.

192

Fire Partitions
Section 717.5.4, Exception 3

- Where ducts and air transfer openings penetrate fire partitions, fire dampers are not required where Exception 3 applies:



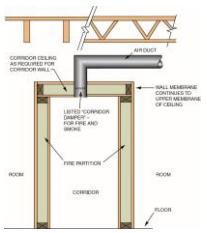
193

Fire Partitions
Section 717.5.4, Exception 4

- Wall is penetrated by a:
  - Ducted HVAC system;
  - In areas other than Group H or I; and
  - The building is sprinklered throughout – NFPA 13 or 13R
- Also applicable to 1-hour fire barriers

194

Corridors
Section 717.5.4.1, #1



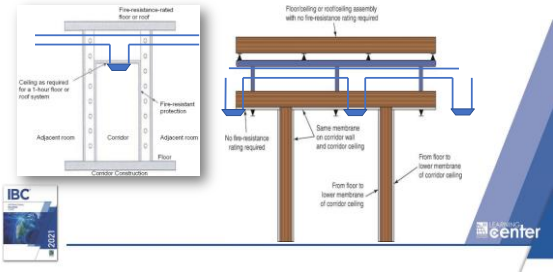
A "corridor damper" is required where the ceiling of the enclosure is constructed as a wall (708.4, Exception 3) and is penetrated

- Corridor dampers are tested for this specific application – both fire and smoke tested (Not ceiling radiation or horizontal damper)

195

Corridors
Section 717.5.4.1, #2

- Provide a ceiling radiation damper at penetration of ceiling membrane of fire-resistance-rated floor-ceiling or roof ceiling assembly, or as permitted by Section 708.4, Exc. 2.



196

Corridors
Section 717.5.4.1, #3

- Where smoke and draft control doors are required in corridor fire partitions, any duct or air transfer opening that penetrates the corridor enclosure shall be protected with listed smoke damper.

197

Corridors
Section 717.5.4.1, Exceptions

- Smoke dampers are not required at the point a duct or air transfer opening penetrates a corridor where the duct is constructed of steel not less than 0.019-inch (26 gage steel; 28 gage galvanized) in thickness and there are no openings serving the corridor.

198

Horizontal Assemblies Section 717.6

- Penetrations by ducts and air transfer openings of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with Section 713 or shall comply with Sections 717.6.1 through 717.6.3.



199

Horizontal Assemblies Section 717.6.1, Exception

- A duct is permitted to penetrate three floors or less without a fire damper at each floor provided all the following are met:
  - Duct within wall cavity;
  - Minimum 26 gage in thickness;
  - Duct opens to only one dwelling or sleeping unit, and duct is continuous from the unit to exterior;
  - Maximum 4-inch diameter duct with maximum total area of 100 square inches per 100 square feet of floor area;
  - Annular space protected to prevent the passage of flame and hot gases; and
  - Grille openings located in floor/ceiling or roof/ceiling assembly shall be protected with ceiling damper.



200

Membrane Penetrations Section 717.6.2

- Ducts and air transfer openings constructed of approved materials that penetrate the ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with one of the following:
  1. Shaft enclosure in accordance with Section 713.
  2. Listed ceiling radiation damper installed at the ceiling line where a:
     - Duct penetrates the ceiling.
     - Diffuser with no duct attached penetrates the ceiling.



201

Nonfire-resistance-rated Floor Assemblies
Section 717.6.3

- Duct systems of approved materials that penetrate nonfire-resistance-rated floor assemblies shall be protected by any of the following methods:
  - Shaft enclosure in accordance with Section 713.
  - Where duct only connects two stories, protection of annular space around penetrating duct with approved noncombustible material that resists the free passage of flame and products of combustion.
  - Where duct connects a maximum of three stories, protection of annular space around penetrating duct with approved noncombustible material that resists the free passage of flame and products of combustion; and a fire damper is installed at each floor line.



202

Fire Protection

Module 8



203

Standpipe Systems
Section 905

- Standpipe systems are basically “indoor fire hydrants” to supply water through attached hoses and nozzles to firefighters and occupants
- Such systems include the piping and outlets necessary to provide a water supply throughout a building
- There are 3 classes of standpipes:
  - Class I – 2½ -inch connections
  - Class II – 1½-inch connections
  - Class III – Both 1½-inch and 2½-inch connections



204

Standpipe Systems Section 905

- Standpipe systems are typically required based upon building height
- Class III standpipe systems shall be installed throughout the building where any of the following conditions exist:
  - Four or more stories are above or below grade plane, or
  - Floor level of highest story is located > 30 feet above the lowest level of fire department vehicle access, or
  - Floor level of lowest story is located > 30 feet below the highest level of fire department vehicle access



205

Standpipe Systems Section 905

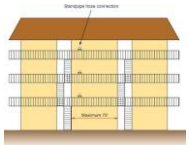
- Exception 1 of Section 905.3.1 allows the installation of Class I standpipes where building is sprinklered throughout with either an NFPA 13 or 13R system
  - Class I standpipes are also allowed in parking garages



206

Standpipe Systems Section 905 –

- Where a Class I standpipe system is required, the standpipe hose connections shall be located:
  - In every required interior exit stairway for each story above and below grade plane
    - Hose connections shall be located at each main floor landing unless otherwise approved by the fire code official
    - A single hose connection permitted where installed in open corridor or breezeway between open stairs that are ≤ 75' apart





207

Portable Fire Extinguishers Section 906

- Portable fire extinguishers are to be installed throughout Group R-2 occupancies in accordance with Section 906 and NFPA 10
  - As an option, an extinguisher having a minimum rating of 1-A:10-B:C is to be provided in each dwelling unit, as well as special hazard areas designated in Items 2-6 of Section 906.1



208

Carbon Monoxide Detection Section 915

- Carbon monoxide detection to be provided in Group R-2 occupancies where any of following conditions exist:
  - In dwelling units that contain a fuel-burning appliance or a fuel-burning fireplace, and
  - In dwelling units served by a fuel-burning, forced-air furnace
    - Not required if carbon monoxide detector is provided in first room or area served by main duct leaving the furnace, and alarm signals are automatically transmitted to an approved location



209

Carbon Monoxide Detection Section 915

- Carbon monoxide detection is to be provided dwelling units in Group R-2 occupancies where any of following conditions exist:
  - Where Group R-2 building contains fuel-burning appliances or fuel-burning fireplaces, except where:
    - There are no communicating openings between the fuel-burning appliance or fuel-burning fireplace and the dwelling unit, or
    - A carbon monoxide detector is located in an approved location between the fuel-burning appliance or fuel-burning fireplace and the dwelling unit, or
    - A carbon monoxide detector is located on the ceiling of the room containing the fuel-burning appliance or fuel-burning fireplace



210

Carbon Monoxide Detection Section 915

- Carbon monoxide detection is to be provided dwelling units in Group R-2 occupancies with attached private garages, except where:
  - No communicating openings between the private garage and the dwelling unit, or
  - Dwelling unit located more than one story above or below the private garage, or
  - Private garage connects to the building through an open-ended corridor, or
  - Carbon monoxide detector provided in an approved location between openings to a private garage and dwelling units
- Not applicable to complying opening parking garages and enclosed parking garages



211

Manual Fire Alarm Systems Section 907.2

- Minimum of one manual fire alarm box to be provided in approved location to initiate a fire alarm signal for fire alarm systems employing:
  - Automatic fire detectors, or
  - Waterflow detection devices
- Where other provisions allow elimination of alarm boxes due to sprinklers, single fire alarm box to be installed
- Single fire alarm box not required for:
  - Fire systems dedicated to elevator recall control and supervisory service
  - Group R-2 occupancies, unless required by fire code official as means of fire watch personnel to initiate an alarm during sprinkler system impairment event



212

Manual Fire Alarm Systems Section 907.2.9.1

- Manual fire alarm system that activates occupant notification system to be installed in Group R-2 occupancies where any of following conditions apply:
  - Any dwelling unit or sleeping unit located three or more stories above lowest level of exit discharge, or
  - Any dwelling unit or sleeping unit located more than one story below highest level of exit discharge of exits serving dwelling unit or sleeping unit, or
  - Building contains more than16 dwelling units or sleeping units



213

Manual Fire Alarm Systems Section 907.2.9.1, Exception 1

- Manual fire alarm system not required in Group R-2 occupancies where:
  - Building no more than two stories in height, and
  - All individual sleeping units and contiguous attic and crawl spaces separated from each other and public or common areas by minimum 1-hour fire partitions, and
  - Each individual sleeping unit has an exit directly to a public way, egress court or yard



214

Manual Fire Alarm Boxes Section 907.2.9.1, Exception 2

- Manual fire alarm boxes not required in Group R-2 occupancies where:
  - Building equipped with automatic sprinkler system, and
  - Occupant notification appliances automatically activate throughout notification zones upon sprinkler water flow



215

Manual Fire Alarm Systems Section 907.2.9.1, Exception 3

- Manual fire alarm system not required in Group R-2 occupancies where:
  - Building does not have interior corridors serving dwelling units, and
  - Building protected by automatic sprinkler system, and
  - Dwelling units to be:
    - Provided with means of egress door opening directly to exterior exit access that leads directly to exits, or
    - Served by open-ended corridors



216

Smoke Alarms
Section 907.2.11

- Single- or multiple-station smoke alarms to be installed in accordance with Section 907.2.11 in Group R-2 occupancies at all of the following locations:
  - On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms
  - In each room used for sleeping purposes
  - In each story within the unit, including basements
    - In units with split levels and without an intervening door between adjacent levels, alarm on upper level may also serve lower level provided lower level is less than one full story below the upper level

217

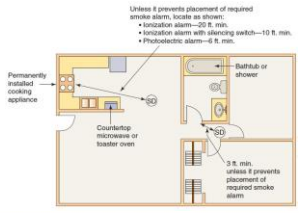
Smoke Alarms
Section 907.2.11

- Smoke alarms not to be installed near permanently installed cooking appliances unless it would prevent placement of a required smoke alarm, with a minimum required horizontal separation of:
  - 20 feet for ionization smoke alarms
  - 10 feet for ionization smoke alarms with an alarm-silencing switch
  - 6 feet for photoelectric smoke alarms

218

Smoke Alarms
Section 907.2.11

- Smoke alarms to be installed a minimum of 3 feet horizontally from the door opening of a bathroom that contains a bathtub or shower, unless it would prevent placement of a required smoke alarm.



219

Smoke Alarms
Section 907.2.11.7

- Smoke detectors provided as part of building fire alarm system to be an acceptable alternative to single- and multiple-station smoke alarms, and to comply with following:
  - Fire alarm system to comply with all applicable requirements in Section 907
  - Activation of smoke detector in a dwelling unit or sleeping unit to:
    - Initiate alarm notification in unit
    - Not activate alarm notification appliances outside of unit, provided that a supervisory signal generated and monitored



220

Smoke Alarms
Section 907.2.11.5

- Where multiple smoke alarms are required to be installed within a dwelling unit in a Group R-2, the smoke alarms shall be interconnected.
- Activation of one alarm shall activate all of the alarms in the individual unit.
  - Physical interconnection not required where listed wireless alarms are installed and all alarms sound upon activation of one alarm
- Alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.



221

Smoke Alarms
Section 907.2.11.6

- In new construction, required smoke alarms to receive primary power from the building wiring where such wiring is served by a commercial source.
- Alarms to be equipped with battery backup unless connected to an emergency electrical system per Section 2702
- Smoke alarms to emit a signal when the batteries are low.
- Wiring to be permanent without a disconnecting switch other than as required for overcurrent protection.



222

Accessibility Scoping

Module 9

223

2021 IBC - Philosophy 101

Everything must be accessible, and then allow for a degree of inaccessibility that is logical and reasonable.

224

Requirements

- Scoping Requirements:
- "What, Where and How Many"
- (2021 IBC and IEBC)



- Technical Requirements:
- "How"
- (ICC A117.1-2017)

(Not covered in this seminar)



225

Fair Housing Act

- Fair Housing Act regulates residential non-transient uses.
- Covers all housing built for first occupancy after March 13, 1991.
- Scoping and technical requirements found in the Fair Housing Accessibilities Guidelines (FHAG).

226

"Safe Harbor" means…

- Requirements in the document have been reviewed by HUD and meet or exceed the building construction requirements of the FHAG.
- Early editions of IBC and ICC A117.1 were first recognized by HUD.
- 2009, 2012, 2015 and 2018 IBC and 2009 ICC A117.1 have just recently been recognized by HUD.



227

Categories of Residential and Institutional Accessibility

- Dwelling units and sleeping units in residential and institutional occupancies regulated by the IBC are assigned and regulated in one of three categories:
  - Accessible units (not applicable to apartment buildings)
  - Type A units
  - Type B units

228

Type A Units

- Type A units:
  - Constructed wheelchair adaptable.
  - ICC A117.1 Section 1103.
- Type A units are only required by the IBC in apartment buildings.
- Accessibility provisions of FHAG do not require Type A units under any conditions.

229

Type B Units

- Type B units:
  - Consistent with Fair Housing Accessibility Guidelines.
  - Primarily addresses mobility-impaired persons
  - ICC A117.1 Section 1104.
- Type B units provide some limited degree of access and adaptability.
- Applicable to dwelling units.

230

Group R-2 Apartment Houses Section 1108.6.2.2.1

- In Group R-2 apartment houses containing more than 20 dwelling units, a minimum of 2%, but not less than one, to be a Type A unit.
  - Required number of Type A units permitted to be reduced per Section 1108.7.5 (exception based on design flood elevation).



231

Group R-2 Apartment Houses Section 1108.6.2.2.1

- All Group R-2 units on a site to be considered to determine total number of units and required number of Type A units.
  - Existing structures on a site do not contribute to the total number of units on a site.
- Type A units to be dispersed among the various classes of units.
  - Increase in number of Type A units not required in order to satisfy that all classes of units represented.



232

Group R-2 Apartment Houses Section 1108.6.2.2.2

- Where four or more dwelling units are located in a single structure, every unit to be a Type B dwelling unit.



233

Group R-2 Apartment Houses Section 1108.6.2.2.2, Exception

- Required number of Type B units permitted to be reduced per Section 1108.7:

  Generally, for nonelevator buildings:

  - One story w/Type B units required — Section 1108.7.1.1
  - Additional stories w/Type B units — Section 1108.7.1.2
  - Multistory units — Section 1108.7.2
  - Site impracticality — Section 1108.7.4
  - Design flood elevation — Section 1108.7.5

234

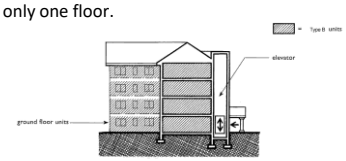
Group R-2 Apartment Houses Section 1108.6.2.2.2

- Required number of Type B units permitted to be reduced per Section 1108.7 in partial elevator buildings:
  - Multistory units — Section 1108.7.2
  - Elevator service to lowest story w/units — Section 1108.7.3

235

Exceptions Not Applicable Type A and B Units

- No exception for elevator buildings.
- Allowance for partial elevator service where:
  - Elevator provides accessible route only to lowest story contain dwelling units, or
  - Multistory unit provided with external elevator service to only one floor.



In Buildings with One or More Elevators: (Elevator Buildings) All Units are Covered

236

One Story w/Type B Required Section 1108.7.1.1

- Applicable only where elevator service not provided in building.
- At least one story containing dwelling units to be provided with accessible entrance.
- All units on such story to be Type B units.



Buildings with a Single Ground Floor

237

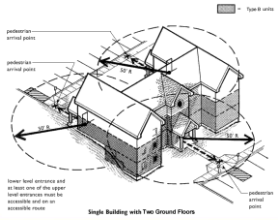
Additional Stories of Type B Section 1108.7.1.2

- Applicable only where elevator service not provided in building.
- Where stories have entrances not addressed by accessible entrance provisions of Sec. 1108.7.1.1, and entrances are adjacent to arrival points intended to serve units on such stories, all units served by that entrance on that story to be Type B.
  - Two conditions established to determine if arrival points are considered as adjacent:
    - Based on undisturbed site conditions, or
    - Based on planned finish grade conditions.

238

Additional Stories of Type B Section 1108.7.1.2, Condition 1 & 2

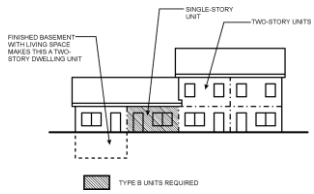
- Slopes of undisturbed site or planned finished grade do not exceed 10%, as measured between planned entrance and all vehicular or pedestrian arrival points within 50' of planned entrance.



239

Multistory Dwelling Units Section 1108.7.2

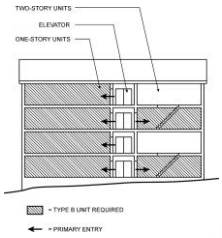
- Where elevator service not provided in multistory unit, such unit not required to be Type B.



240

Multistory Dwelling Units Section 1108.7.2

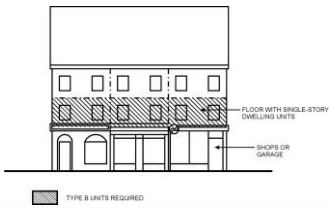
- Where multistory unit provided with external elevator service to only one floor, such floor to:
  - Be primary entrance to the unit, and
  - Be in compliance as a Type B unit, and
  - Include living area, kitchen and toilet facility if such areas are provided.



241

Elevator to Lowest Story w/Units Section 1108.7.3

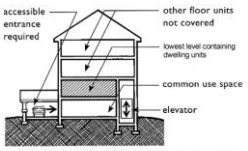
- Where elevator service provides an accessible route only to the lowest story containing dwelling units, only the units on that story are required to be Type B units.



242

Elevator to Lowest Story w/Units Section 1108.7.3

- Where elevator service provides an accessible route only to the lowest story containing dwelling units, the building is not considered as an 'elevator building'.



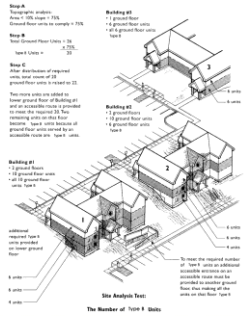
243

Site Impracticality
Section 1108.7.4

- Where multiple non-elevator buildings on a site, number of required Type B units permitted to be reduced to percentage equal to percentage of entire site having grades, prior to development, that are less than 10%, provided:
  - Minimum of 20% of units to be Type B units, and
  - Where slope between building entrance serving required units on story and pedestrian or vehicular arrival point no more than 8.33%, such units to be Type B, and
  - Where elevated walkway planned, slope between building entrance serving required units on story and pedestrian or vehicular arrival point no more than 10%, such units to be Type B, and
- Units served by an elevator are Type B units.

244

Site Impracticality
Section 1108.7.4



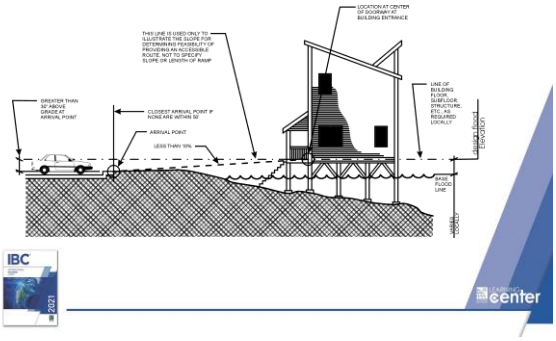
245

Design Flood Elevation
Section 1108.7.5

- Required number of Type A and B units in nonelevator building does not apply to site where required elevation of lowest floor or horizontal structural building members are at or above design flood elevation, resulting in two conditions:
  - More than 30" elevation difference between minimum required floor elevation at primary entrances and vehicular/pedestrian arrival points within 50 feet, and
  - Slope exceeding 10% between minimum required floor elevation at primary entrances and vehicular/pedestrian arrival points within 50 feet.
- Where arrival points not within 50 feet of primary entrances, closest arrival points to be used.

246

Design Flood Elevation
Section 1108.7.5



247

Site Arrival Points
Section 1104.1

- At least one accessible route within site to connect site arrival points to accessible building entrance served.
  - Other than buildings containing or serving Type B dwelling units, accessible route not required if only means of access is vehicular way not providing for pedestrian access.

248

Access Within a Site
Section 1104.2

- At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements and accessible spaces on the same site.
  - Accessible route not required if only means of access is vehicular way not providing for pedestrian access.
  - Accessible route to recreational facilities required to extent set forth in Section 1111.

249

Multistory Buildings
Section 1104.4

- At least one accessible route to connect each accessible story, mezzanine and occupied roof in multilevel buildings and facilities.
  - Stories, mezzanines or occupied roofs that do not contain accessible elements or other spaces as determined by Section 1108 (Dwelling Units and Sleeping Units) are not required to be served by an accessible route from an accessible level.



250

Location
Section 1104.5

- Accessible routes to coincide with or be located in same area as general circulation path.
- Where circulation path is interior, accessible route to be interior.
  - Accessible routes from parking garages contained within and serving Type B units not required to be interior.
- Where only one accessible route provided, route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.
  - Single accessible route permitted to pass through kitchen or storage room in a Type A or Type B dwelling unit.



251

Accessible Means of Egress
Section 1009

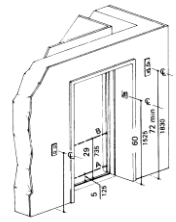
- General provisions for accessible means of egress applicable to Group R-2 occupancies, with following exceptions:
  - Areas of refuge not required at stairways in Group R-2 occupancies.
  - Two-way communication systems not required at the landing serving a private residence elevator.



252

Elevators

- ASME A17.1.
- ICC A117.1.
- Permitted to serve as part of the accessible route anywhere.
- 5 story buildings or higher, standby power for accessible means of egress.
- 4 stories or higher, at least one elevator sized for a stretcher.



NOTE: The automatic door reopening device is activated if an object passes through either line A or line B. Line A and line B represent the vertical locations of the door reopening device not requiring contact.

253

LULAs



Limited Use/Limited Application Elevators

- Considered a type of passenger elevator
- ASME A17.1.
- ICC A117.1.
- Application limited by product:
  - Limited capacity.
  - 25’ max. travel.
  - Slow speed.

254

Private Residence Elevator



- ASME A17.1.
- ICC A117.1.
- Application limited:
  - Limited capacity.
  - Serve or within an individual dwelling unit.
  - Slow speed.

255

Platform Lifts

- ASME A18.1.
- ICC A117.1.
- Permitted to be a portion of accessible route in Type A and Type B dwelling units.



256

Fire Alarms Section 907.5

- Where fire alarm system required in Group R-2 occupancies, system to initiate occupant notification upon activation, including:
  - Audible alarm notification appliances, and
  - Visible alarm notification appliances in public and common use areas.



257

Visible Alarms Section 907.5.2.3.3

- Each story containing dwelling units to be provided with capability to support visible alarm notification appliances per Chapter 11 of ICC A117.1.
- Such capability to accommodate wired or wireless equipment.
- Future capability to include one of the following:
  - Replacement of audible appliances with combination audible/visible appliances, or
  - Future extension of existing wiring from unit smoke alarm locations to required locations for visible appliances, or
  - Excess capacity to accommodate visible alarm appliances and at least one access point per story.



258

Common-use and Public-use Spaces Section 1108.3

- Group R-2 apartment buildings have multiple common-use and/or public use spaces.
- Such buildings and spaces to be regulated for accessibility under the general requirements and allowances for the individual occupancy assigned.
- Such buildings and facilities may include:
  - Parking garages and parking lots
  - Storage areas
  - Mailboxes



259

Accessible Parking Spaces Section 1106.2

- Based on number of parking spaces provided.
- Number of parking spaces required per zoning ordinances.
- For Group R-2 occupancies, accessible parking spaces to be provided in accordance with Section 1106.3.



260

Accessible Parking Spaces Section 1106.3

- In Group R-2 occupancies required to have Type A or Type B dwelling units, at least 2%, but not less than one, of each type of parking space provided to be accessible.
- Where at least one parking space is provided for each dwelling unit, at least one accessible space to be provided for each Type A unit.
- Accessible route from parking garages contained within and serving Type B units not required to be interior. (1104.5, Exception 1)



261

General Site Access Section 1104.2

As a general requirement, at least one accessible route is required to all recreational facilities on a site.

- Not required between accessible buildings, facilities, elements and spaces that have, as the only means of access between them, a vehicular way not providing for pedestrian access
- An accessible route to recreational facilities is only required as set forth in Section 1111



262

Scoping for Recreational Facilities Section 1111.2.2

Where recreational facilities serve a single building containing Type A or Type B units:

- 25%, but at least one, of each type of the recreational facilities shall be accessible, and
- Total number of accessible facilities to be determined based on every recreational facility of each type on the site



263

Scoping for Recreational Facilities Section 1111.2.3

Where recreational facilities serve multiple buildings containing Type A or Type B units on a single site:

- 25%, but at least one, of each type of recreational facilities shall be accessible, and
- Total number of accessible facilities to be determined based on every recreational facility of each type serving each building on the site.



264

Swimming Pools
Section 1111.4.14

- Swimming pools, wading pools, spas, cold baths and hot tubs required to be accessible by Sections 1111.2.2 and 1111.2.3 (facilities serving Type A and Type B units, in Group R-2 building) not required to provide accessible means of entry into the water.



265

Self-service Storage
Section 1109.3

- Self-service storage facilities, where provided, to have accessible individual spaces as follows:

TABLE 1108.3
ACCESSIBLE SELF-SERVICE STORAGE FACILITIES

TOTAL SPACES IN FACILITY	MINIMUM NUMBER OF REQUIRED ACCESSIBLE SPACES
1 to 200	5%, but not less than 1
Over 200	10, plus 2% of total number of units over 200

- Not required to dispersed by location.
- Dispersed by type.



266

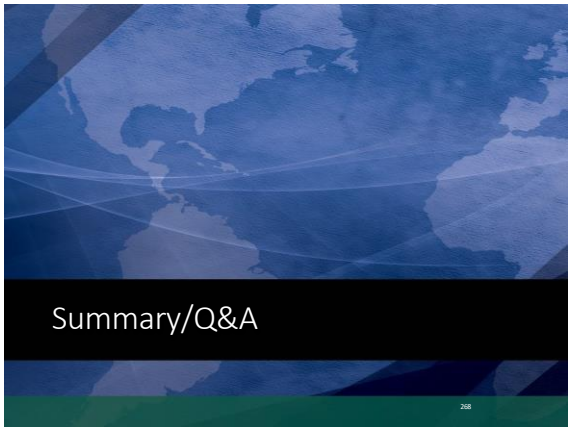
Mailboxes
Appendix Section E105.4

- Where mailboxes provided in an interior location, at least 5% but not less than one to be accessible.

- **Be aware:** According to HUD and Fair Housing, <u>all</u> mailboxes serving Fair Housing accessible units (Type B units) must be accessible. Section 1104.1.2 of the A117.1 standard does permit a 54-inch maximum reach range height for these additional accessible mailboxes.



267



268

Final Reflection

This slide will help the learner to reflect on the day and what they will take back to the job and apply.

- **What?** What happened and what was observed in the training?
- **So what?** What did you learn? What difference did this training make?
- **Now what?** How will you do things differently back on the job as a result of this training?



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