2021 IBC® Transition from the 2015 IBC

Based on the 2018 and 2021 International Building Codes® (IBC®)

ICC LEARNING center

- **Identify changes** between the 2015 and 2021 IBC

- Includes those **changes** that occurred in the 2018 and 2021 editions of the IBC

Objectives

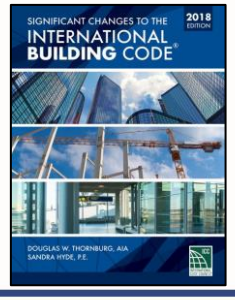
- **Identify** the differences between the 2021 IBC and the 2015 edition
- **Determine** if the change is an addition, deletion, modification or clarification
- **Identify** changes in format and technical requirements
- **Explain** the intent and application of the changes

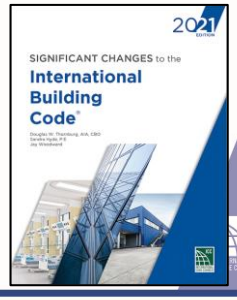
Topics

- Administration, Chapters 1 and 2
- Building Planning, Chapters 3 through 6
- Fire Protection, Chapters 7 through 9
- Means of Egress, Chapter 10
- Accessibility, Chapter 11
- Building Envelope, Structural Systems, and Construction Materials, Chapters 12 through 26
- Building Services, Special Devices, and Special Conditions, Chapters 27 through 34

Selection of Topics

- Provisions addressed based primarily on:
  - **Frequency of application**
  - **Special significance**
  - **Change in application**
- Featured code changes have been selected from:
  - 2018 and 2021 IBC Significant Nonstructural Changes seminar
  - 2018 and 2021 IBC Significant Structural Changes seminar
- For additional code change **commentary**, see 2018 and 2021 editions of the ICC publication **Significant Changes to the International Building Code**





Marginal Markings within the 2021 International Building Code

- **Solid vertical lines** in the margins within the body of the code indicate a **technical change** from the requirements of the 2018 edition
- **Deletion indicators in the form of an arrow** are provided in the margin where an entire section, paragraph, exception or table has been **deleted** or an item in a list of items or a table has been deleted
- **A single asterisk** [*] placed in the margin indicates that text or a table has been **relocated** within the code
- **A double asterisk** [**] placed in the margin indicates that the text or table immediately following it has been **relocated** there **from elsewhere** in the code

Course Icons

Addition

Deletion

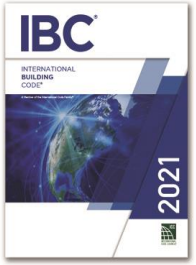
Modification

Clarification

Tips

Guide to a successful class:

- Slides contain some text and iconic images to help you learn
- Text and commentary is in the handout
- Follow along in the course handout
- Ask Questions, ask questions, **ASK QUESTIONS**!!!!



Part 1
Administration
Chapters 1 and 2

ICC LEARNING center

110.3.7 Inspection of Weather-Exposed Balconies

2018
2021

- Waterproofing **inspection** of balconies and similar elevated walking surfaces that are **exposed to moisture**, and thus structural damage, now **required**
- Waterproofing **inspection** is now specifically **limited** to surfaces that are “weather-exposed”
- Defined term “**weather-exposed surfaces**” is:
  - Limited to water, snow and similar elements that are **weather-related** (initially included irrigation water)
  - **Prescriptively** established as covered areas **not significantly set back** from the edge of the overhead projection (in general, at least **twice the clear height** under the projection)

110.3.7 Inspection of Weather-Exposed Balconies

2018
2021

- **Defined** term "**weather-exposed surfaces**" is:
  - **For example**, a wall beneath an unenclosed roof area is not considered as weather-exposed provided the wall is **located a horizontal distance** from an exterior opening equal to **no less than twice the height of the opening.** Thus, a balcony floor that is roofed above with a vertical clearance of 8' could be considered as weather-exposed unless it is located at least 16' inside the leading edge of the roof line.
  - The definition specifically refers to surfaces **exposed to** the **weather**, the required inspection is no longer mandated where irrigation features, primarily lawn sprinkler systems, are the sole source of water exposure to the elevated surface. **Only where rain, snow or a similar weather event impacts an exterior surface is the inspection required.**

Chapter 2
Definitions

202 Definition of Atrium

2021

- Atrium definition has been **simplified** to address only two conditions:
  - Vertical space **enclosed** at the top, **and**
  - Connects **three or more** stories in all occupancies **other than Groups I-2** and **I-3** (two stories)
- Other text has been **deleted** or **relocated** to **Chapter 7**
- Primary significance is **increase** of threshold from **two to three stories** for most occupancies, however no change in application will typically occur
- **Intended** result is to eliminate confusion with allowance in **Section 712.9** permitting two-story opening conditions without regulation as an atrium

202 Definition of Change of Occupancy

2021

- Change of occupancy now occurs where code requires a **greater degree** of safety, accessibility, structural strength, fire protection, means of egress, ventilation or sanitation than exists in current building
- Applies where there is a **change in**:
  - Occupancy **classification**
  - **Purpose** or **level** of **activity**
- Previously, a change in occupancy occurred if there was a change in application of the code requirements
  - Did not limit the areas of code addressed or that it only applied where a higher risk to life safety or occupant welfare occurred

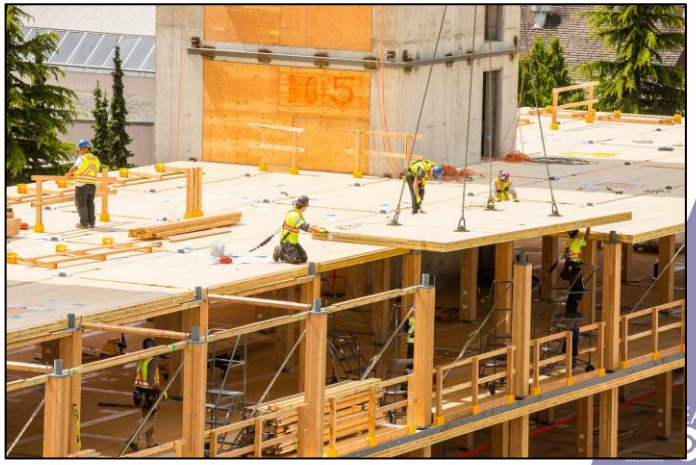
202 Definition of Greenhouse

2018

- Structure of **thermally-isolated** area of building that maintains a specialized sunlit **environment**
- **Focus** is on the cultivation, protection and maintenance of **plants** rather than the structure itself or the presence of plants

202 Definition of Mass Timber 2021

- Mass timber is considered as structural elements of **Type IV** construction primarily of solid, built-up, panelized or engineered wood products that meet **minimum cross-section dimensions**
- Single term represents both:
  - Heavy-timber designated as **Type IV-HT** which includes various types of members where fire-resistance is based on minimum **dimensions**
  - Mass timber used in new **Types IV-A, IV-B and IV-C** that must have a fire-resistance rating

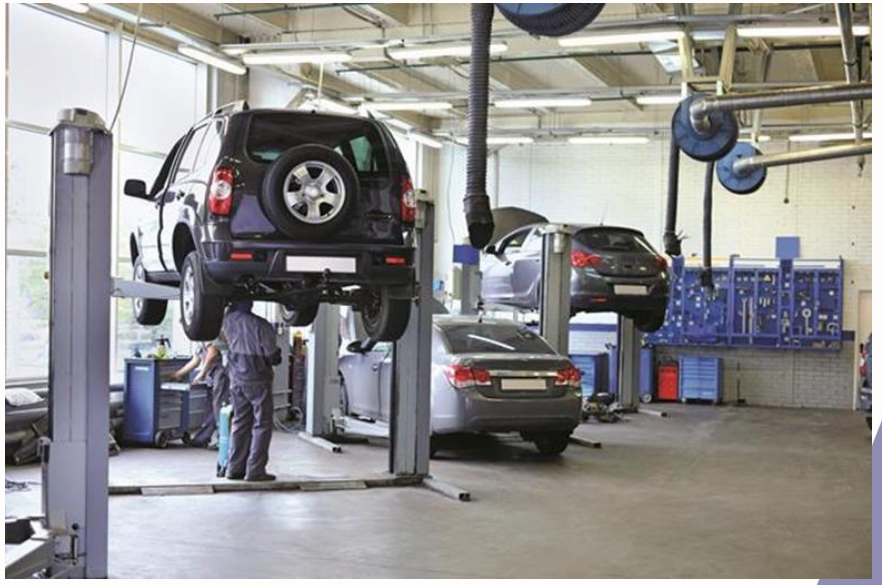


202 Definition of Mass Timber 2021

- **New** definition of **noncombustible protection** addresses the **passive fire protection** required for mass timber
- Depending on the building's type of construction, mass timber may have a fire-resistance rating obtained:
  - By its own fire-resistive rating
  - Through a **combination** of the inherent **mass timber** fire-resistance **plus protection** with noncombustible insulating materials
  - Entirely by the noncombustible protection
- The use of noncombustible protection recognizes its value in **delaying** the **combustion** of mass timber members

202 Definition of Repair Garage 2018

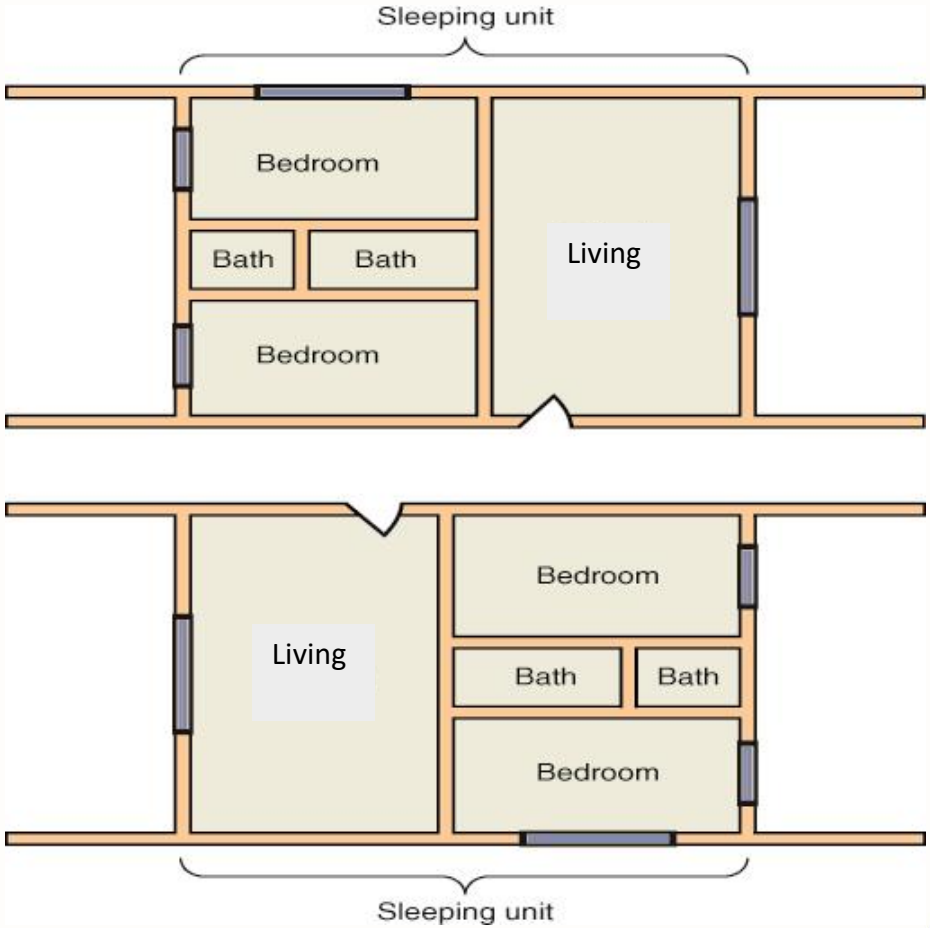
- Motor vehicle:
  - Servicing
  - Repair
  - Maintenance-related functions:
    - Oil change
    - Lubrication
    - Muffler & battery replacement
    - Tire exchange



202 Definition of Sleeping Unit

2018

- **Clarifies** bedrooms within residential unit **not** to be considered as sleeping units
- Consistent with dwelling unit provisions



Part 2
Building Planning
Chapters 3 through 6

Chapter 3

Use and Occupancy Classification

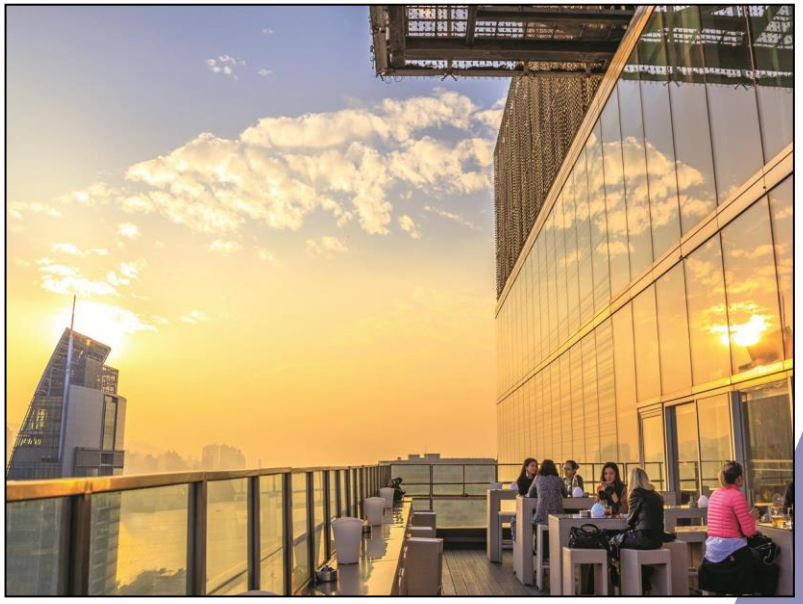
ICC LEARNING center

302.1 Classification of Outdoor Areas

2018

Clarifies:

- Outdoor areas and occupied roofs are assigned an occupancy classification
- Classification based on use it most nearly resembles
- See **503.1.4** for height, area and use limits



303.4 Assembly Use of Greenhouses Classification

2018

- Where the use of the greenhouse is **assembly** in nature due to public access for the **viewing** of plants, classification as a **Group A-3** occupancy is appropriate

306.2 Group F-1 Occupancy Classification

2021

- **Two new items added** to listing of **Group F-1** occupancies
- **Energy storage systems (ESS)** in dedicated-use buildings:
  - **Administrative/support areas** without ESS permitted where **≤10%** of floor area of the story where located
  - In **mixed-occupancy buildings**, ESS to be classified the **same** as major occupancy
  - Previously would often be classified as Group H-2, however **new IFC provisions** reduce potential hazards to allow for a reduction in occupancy classification
- **Water/sewer treatment plants**
  - Typically contain materials in use that would warrant a Group H classification should **MAQs** be exceeded

307.1.1 Uses Not Classified as Group H

2018
2021

- Two new items have been **added** to the list of uses that store, use and/or handle hazardous materials but are **not** to be classified as **Group H:**
  - Distilling or brewing of alcohol beverages
  - Storage of beer, distilled spirits and wines in barrels and casks
- **Removal** of Group H status applicable regardless of **alcohol content** and **quantity** of liquid
- **IFC** has **added** additional requirements to address hazards, including automatic sprinkler systems in **Group F-1** and **S-1** fire areas where such liquids are located
- **Clarifications** also occurred addressing aerosols and stationary storage battery systems

309.1 Mercantile Use of Greenhouses Classification

2018

- Where a greenhouse is provided with **public access** for the purpose of the **display** and **sale** of plants, a **Group M** occupancy shall be assigned

310.3, 310.4 Classification of Congregate Living Facilities

2018

- All **non-transient** congregate living facilities with **≤16** occupants to be classified as **Group R-3**, including:
  - Dormitories
  - Fraternity and sorority houses
  - Convents
- **Group R-3 lodging houses** to now have **≤10** occupants

310.4.2 Owner-Occupied Lodging Houses

2018
2021

- **Owner-occupied** lodging houses permitted to comply with **IRC** where:
  - **≤5** guest rooms,
  - **<10** total occupants, **and**
  - **Sprinklered** (NFPA 13D or IRC P2904 system)

311.1.1 Classification of Accessory Storage Rooms

2018

- Room or space used for storage **accessory** to another occupancy to be classified as part of that occupancy

311.2, 311.3 Alcoholic Beverage Storage

2021

- **Storage** of alcoholic beverages with **>16%** alcohol content now classified as **Group S-1** occupancy
  - Previously not specifically addressed
- Where alcohol content **≤16%,** classification continues to be **Group S-2:**
  - **Limit** that containers be only metal, glass or ceramic has been **deleted** to allow for wooden barrels and casks
  - **IFC** safeguards no longer warrant restriction to only non-combustible containers

312.1.1 Group U Occupancies

2018
2021

- **Group U** classification now only **applies** to greenhouses where not classified as another occupancy
- Fences to now be classified as Group U where **>7'** in height
  - Previously based on height **>6'**

Chapter 4

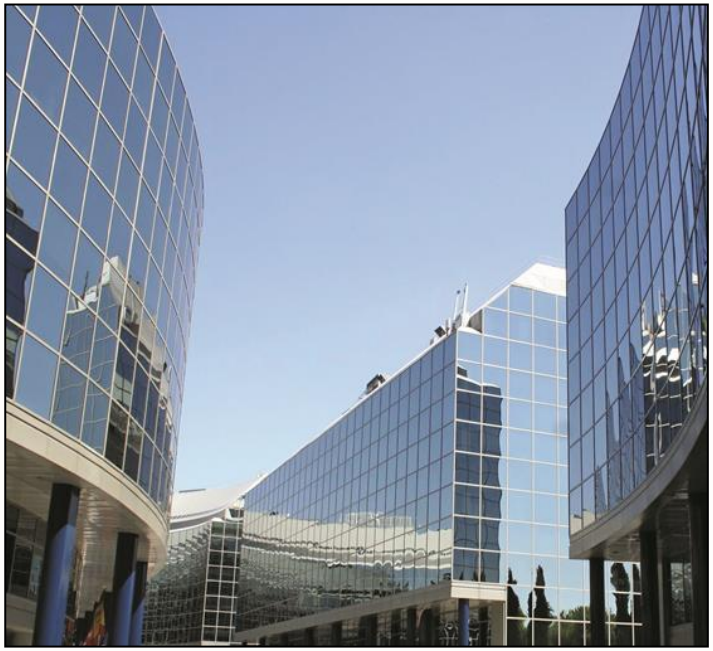
Special Detailed Requirements Based on Use and Occupancy

ICC LEARNING center

403.2.1.1 Type of Construction in High-Rise Buildings

2018

- **Type IB** high-rise buildings containing **Group H-2, H-3 or H-5** occupancy **not** permitted to be regulated as **Type IIA** for fire-resistance ratings



- Reduction in the minimum required fire-resistance ratings for certain building elements of high-rise buildings is due to the **high physical hazard level** such uses pose

404.5 Smoke Control in Atriums

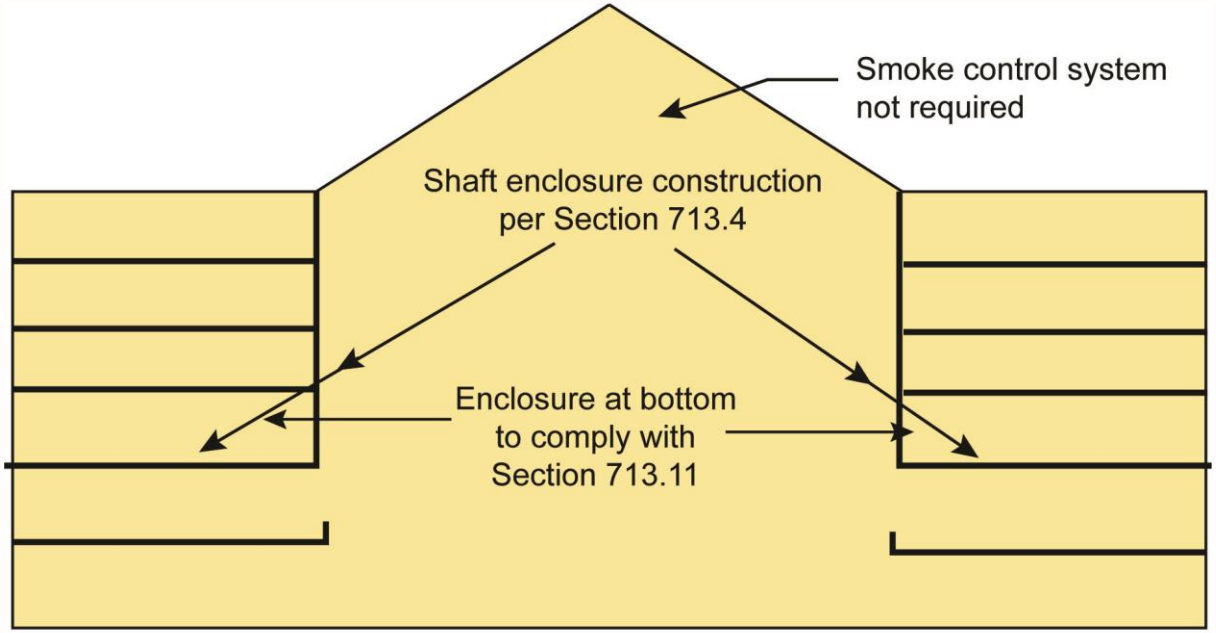
2021

- **New allowance** permits a combination vertical opening condition consisting of both an atrium and a shaft enclosure **without** the requirement for a smoke control system
- Smoke control system **not** required for atriums connecting **>2** stories where:
  - Only the **two lowest stories** permitted to be **open** to the atrium **and**
  - All **stories above** the lowest two stories to be **separated** from the atrium in accordance with shaft enclosure provision
- Intended to **prevent the migration of smoke** throughout interconnected stories of a building via the atrium

404.5 Smoke Control in Atriums

2021

- Recognizes that the **combination** of shaft enclosure and atrium condition provides the necessary degree of separation expected between multiple stories

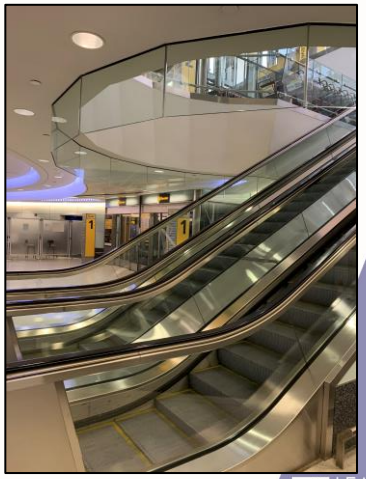


ATRIUM CONDITION

404.6 Horizontal Assemblies in Atriums

2021

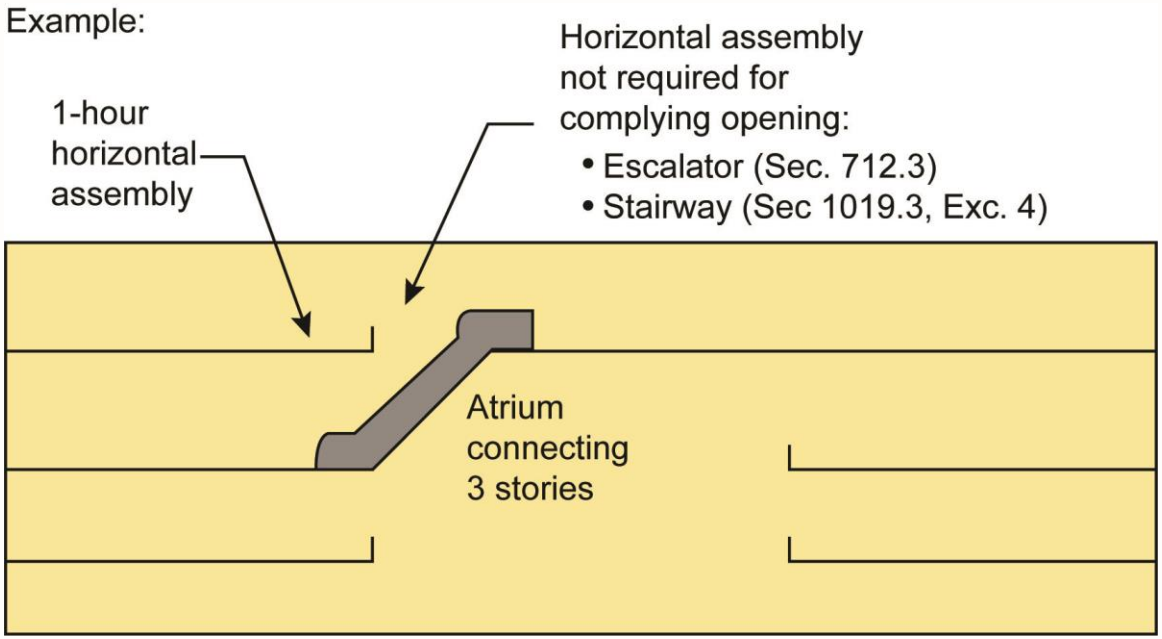
- Horizontal assembly at atrium may be **interrupted** by complying openings for escalators and exit access stairways
- Unless specifically excepted, the **boundary** of an atrium must provide a **full separation** from surrounding spaces (**≥1-hr.** fire barriers and horizontal assemblies)
- **Allows** for vertical penetration of atrium boundary where:
  - Opening **protected** by closely spaced sprinklers and a draft curtain
  - Area of opening **does not exceed twice the horizontal projected area** of the escalator
  - Openings **do not connect >4 stories**, **except** in **Group B** and **M** occupancies



404.6 Horizontal Assemblies in Atriums

2021

- **New allowance** recognizes that complying floor openings for escalators (**Section 712.3** and exit access stairways (**Section 1019.3, Exception 4**) are permitted in a horizontal assembly that **isolates atrium** from other stories in the building



406.1 Motor Vehicle-Related Occupancies

2018
2021

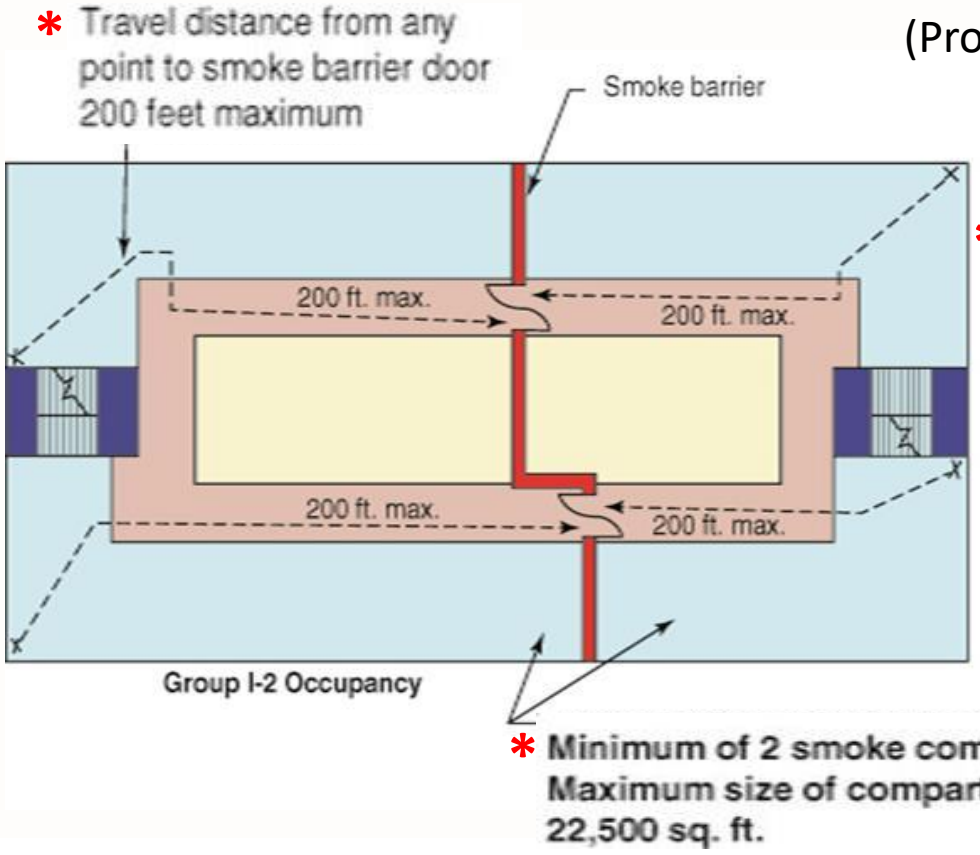
- **Reorganization** includes **grouping** of requirements that apply to all motor-vehicle-related uses into a single general design section
- Mechanical-access garages now addressed
  - Provisions similar to those for rack storage systems

407.5 Maximum Smoke Compartment Size

2018

- Applicable to **Group I-2**, **Condition 2** occupancies

(Providing nursing &medical care)



* Maximum smoke compartment size permitted to be increased to 40,000 sq. ft. where:
  - All patient sleeping rooms within compartment configurated for single patient occupancy, or
  - Compartment contains no patient sleeping rooms

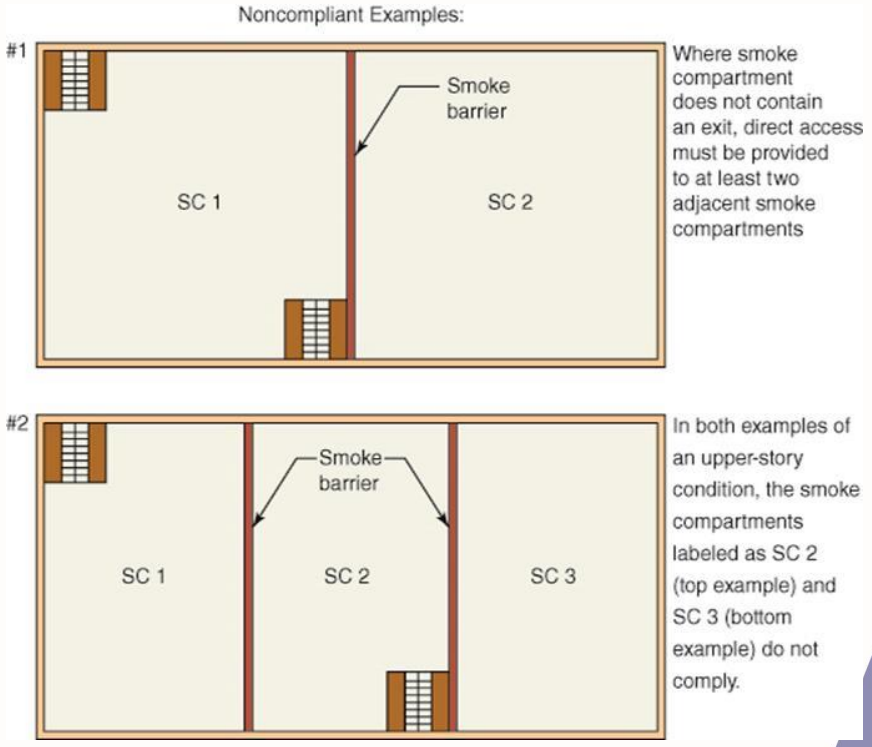
- **Modified** to only include compartments containing single-patient sleeping rooms and suites, as well as those compartments without patient sleeping rooms

407.5.4 Required Egress from Smoke Compartments

2018

- In **Group I-2** occupancies, any **smoke compartment** that does not have an exit from the compartment must now provide **direct access** to a minimum of **two adjacent** smoke compartments

NON-COMPLIANT EXAMPLES



411.5 Puzzle Rooms

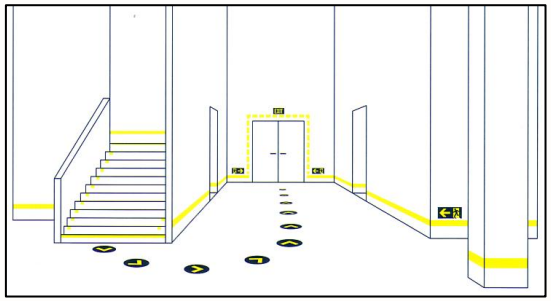
2021

- Puzzle rooms now regulated as **special amusement** areas, requiring compliance with all fire- and life-safety provisions of **Section 411**
- In addition, special exiting requirements have been **added** to solely address puzzle rooms:
  - Per **Chapter 10**, **or**
  - Alternate design **approved** by building official, **or**
  - **Exit** to be **open** and **readily available** upon activation by fire alarm system, sprinkler system, or manual control at constantly attended location

411.5 Puzzle Rooms

2021

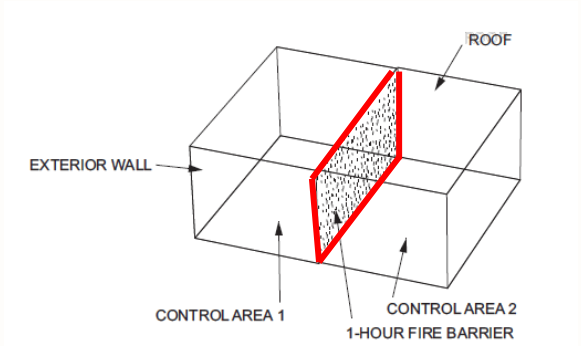
- Puzzle rooms, as well as all other special amusement areas, must **also meet** the following criteria:
  - Classified as **Group A** or **B** occupancy, based upon occupant load
  - Fire protection systems required, including:
    - Automatic sprinkler system (with exception)
    - Automatic smoke detection system
    - Emergency voice/alarm communication (**EVAC**) system
  - Special exit marking, including **approved** directional marking
  - **Class A** interior finishes



414.2.3 Fire Wall Use for Control Areas

2021

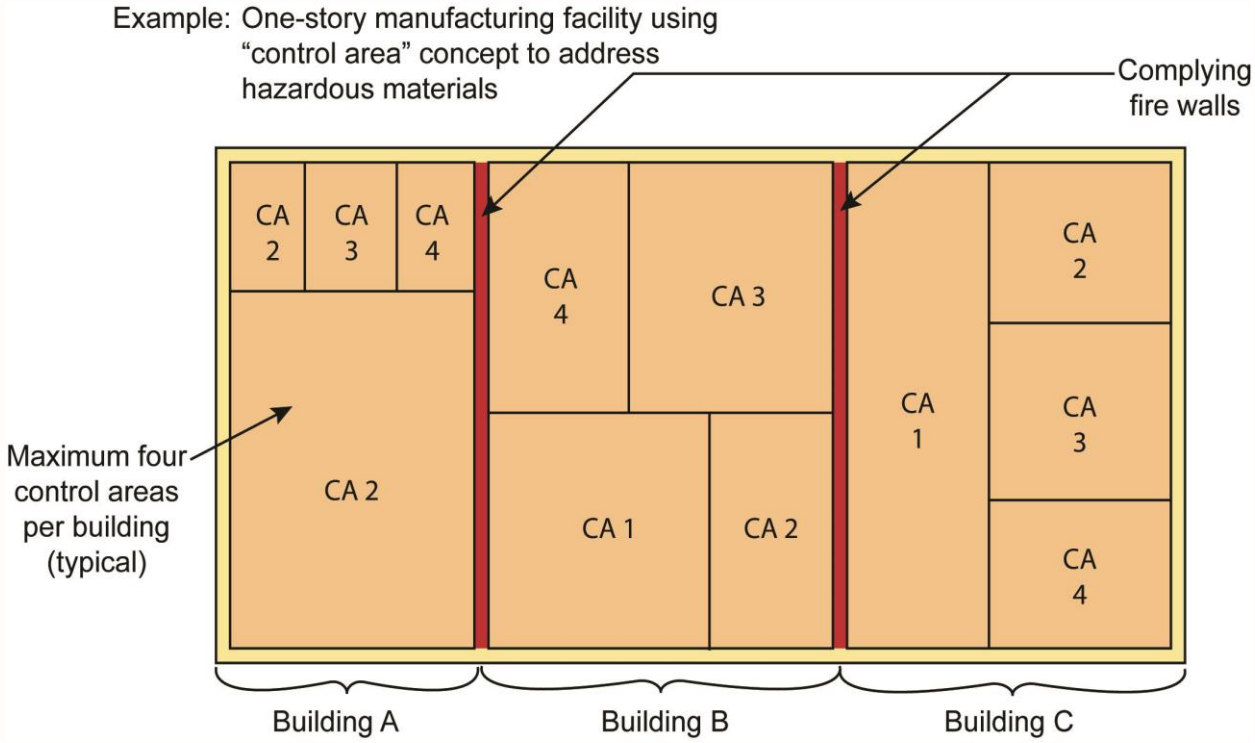
- **Primary purpose** of fire walls is to **create separate buildings** under one roof
- For purposes of determining the number of control areas in a building, each portion separated by one or more fire walls shall be considered a **separate building**:
  - Previously, the “separate building” allowance has been limited to allowable area, allowable height and type of construction
  - Fundamental method of maintaining a non-Group H condition is the creation of control areas
  - **Each** control **area** is regulated for **MAQs** rather than the building as a whole



414.2.3 Fire Wall Use for Control Areas

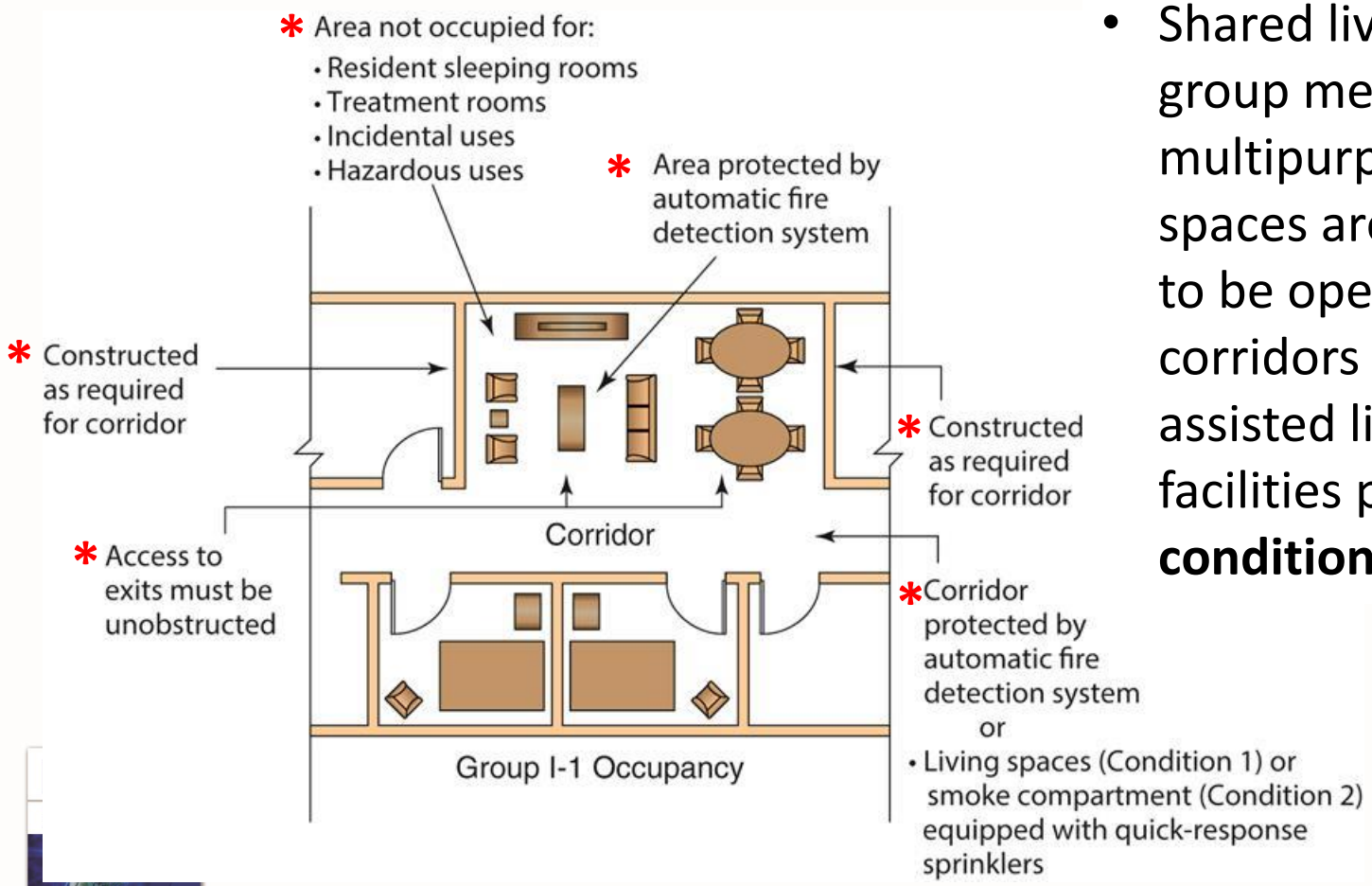
2021

- **New allowance** permits **additional quantities** of hazardous materials without classification as a Group H occupancy by **increasing the number of control areas** permitted in the structure



420.7 Corridor Protection in Assisted Living Units

2018

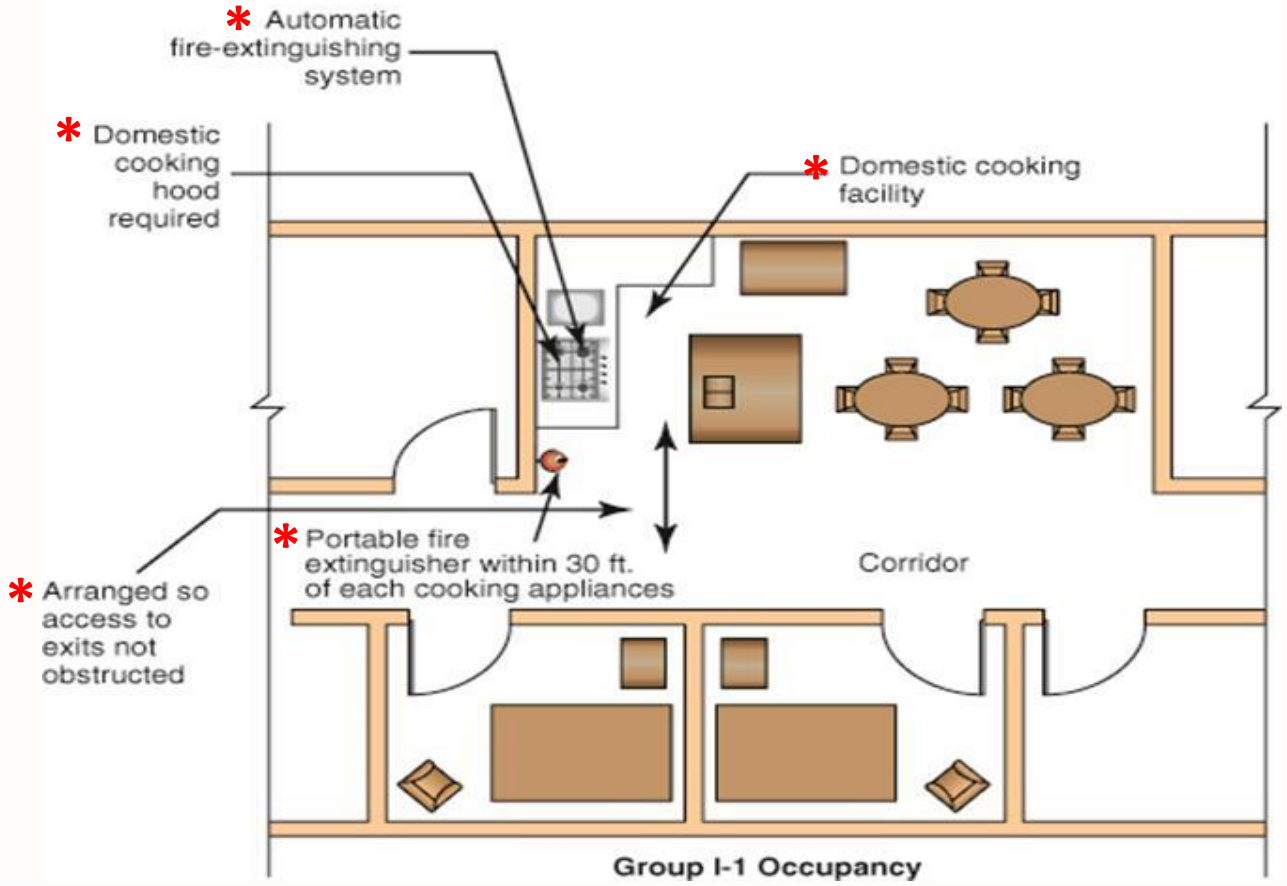


- Shared living spaces, group meeting spaces and multipurpose therapeutic spaces are now **permitted** to be open to fire-rated corridors in **Group I-1** assisted living housing facilities provided **specific conditions** are met

420.8, 420.9 Group I-1 Cooking Facilities and Appliances

2018
2021

* Appliances limited to ovens, cooktops, ranges, warmers and microwaves
* Fuel and electrical supply to cooking equipment be provided with shut-off accessible only to staff
* Timer to deactivate cooking appliances within 2 hours



420.11 Dormitory Cooking Facilities

2018

- Domestic cooking appliances for resident use now **regulated** same manner as **I-2, Condition 1** nursing homes
- Cooktops, ranges and ovens **not** permitted in sleeping rooms

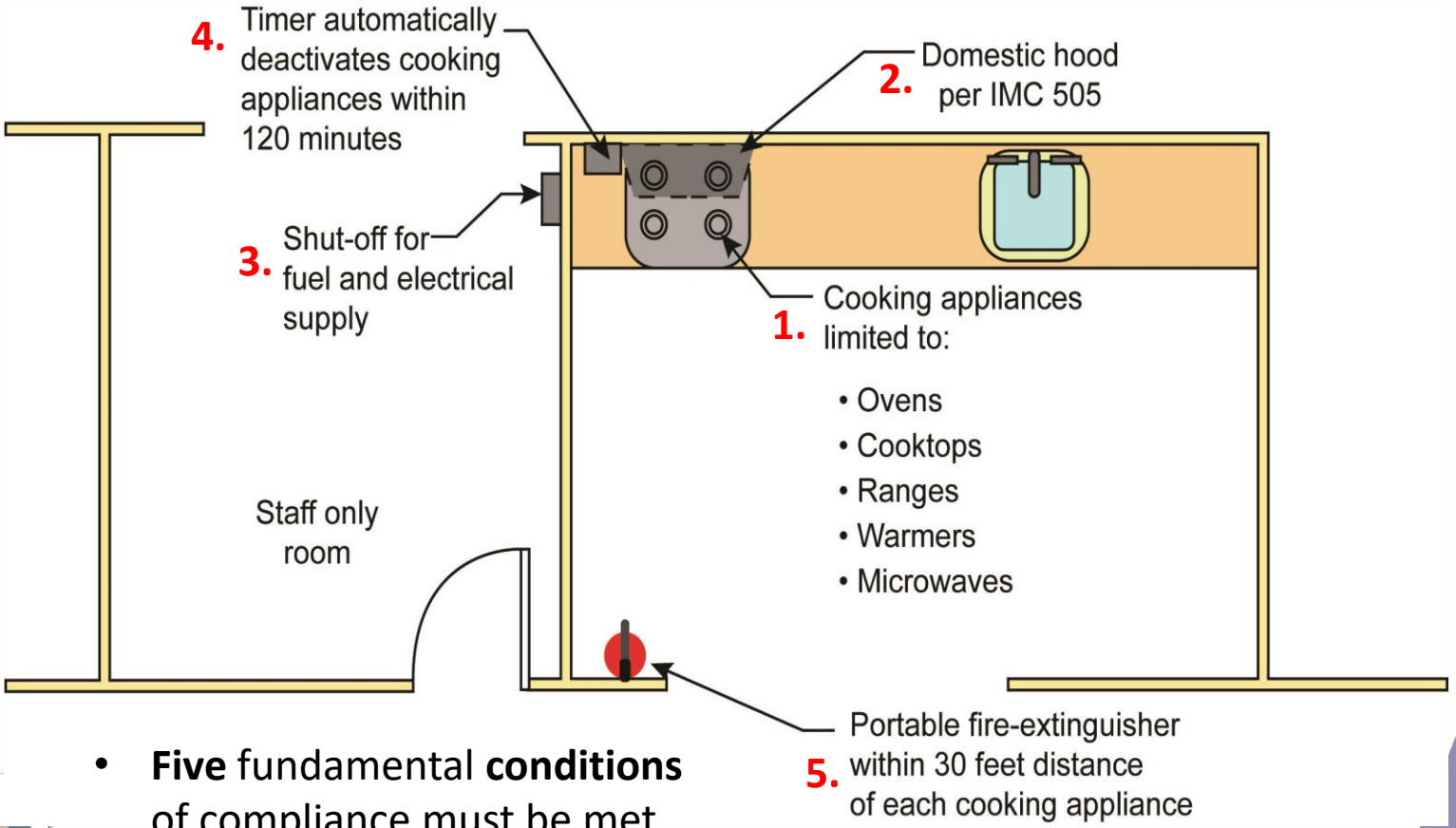
422.7 Cooking in Ambulatory Care Facilities

2021

- Ambulatory care facilities occasionally contain domestic cooking facilities for various uses, including:
  - Physical therapy activities
  - Nutrition counseling
  - Employee breakroom
- **Expands** the regulation of such activities in care facilities (Groups I-1 and I-2 continued to be regulated)
- Special conditions are placed on such facilities to create a **protect-in-place** environment
- **Five** fundamental **conditions** of compliance must be met to allow the installation of domestic cooking appliances

422.7 Cooking in Ambulatory Care Facilities

2021



- **Five** fundamental **conditions** of compliance must be met to allow the installation of domestic cooking appliances

424 Play Structures

2021

- **No longer limited** to structures used solely by children, such as climbing walls
- **New** requirements for structures **>600 sq.ft.** in area or **>10'** in height:
  - Interior finishes per **Table 803.13**
  - Designed in accordance with **Chapter 16**
    - Often unique structural **stability** and **anchorage** requirements that must be considered
- **Special investigation** to demonstrate adequate fire safety now required where area of play structure **>600 sq.ft.**
  - **Previously** required when **>300 sq.ft.** in area

424 Play Structures

2021

- Play structures for children's use were initially regulated by the IBC **only** where located **within** a covered mall building
- **Provisions** were **modified** to regulate children's play structures regardless of the occupancy in which they are located

427 Medical Gas Systems

2018

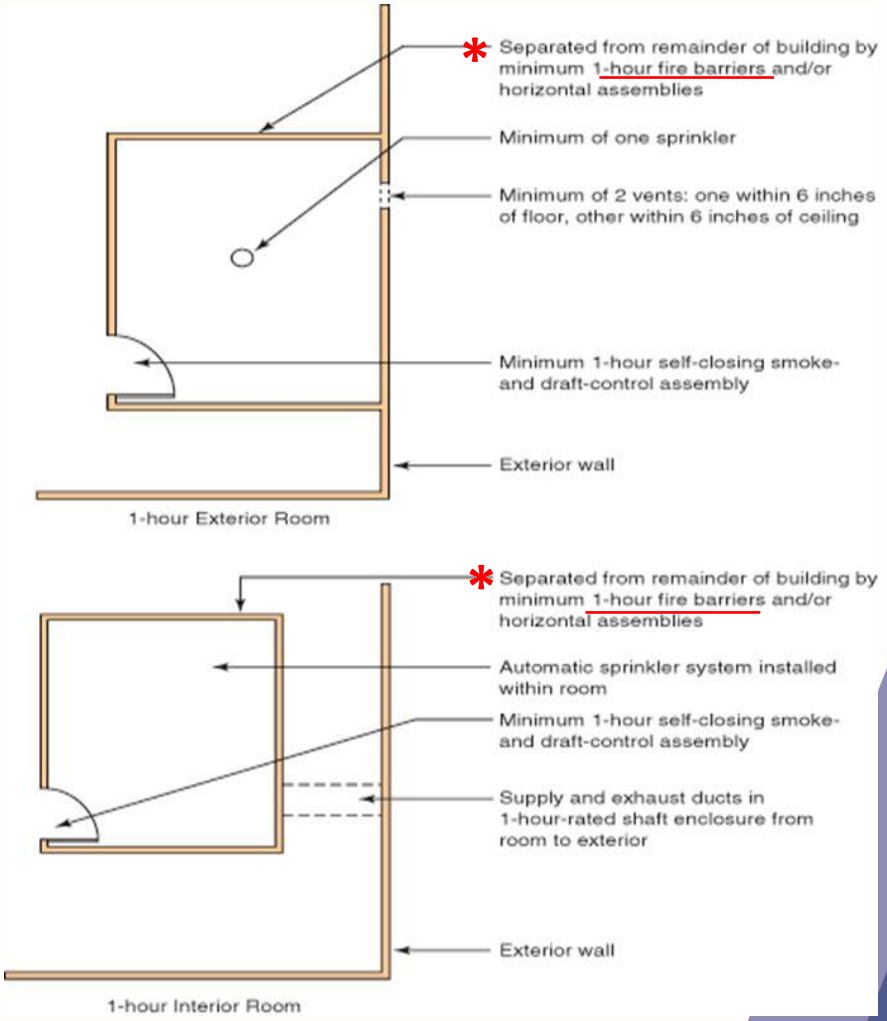
- **IFC** construction-related provisions for medical gas systems now **replicated** (from **IFC** Section **5306**) in **IBC**

- Provides a more comprehensive and efficient compilation of construction **regulations**

427 Medical Gas Systems

2018

- The provisions address the **storage** of medical gases at health-care facilities intended for patient care, inhalation or sedation, including analgesia systems for dentistry, podiatry, veterinary and similar uses



428 Higher Education Laboratories

2018

- Special allowances and provisions for **Group B** laboratories in college and university buildings
- Similar to '**control area**' concept

428 Higher Education Laboratories

2018

TABLE 428.3 Design and Number of Laboratory Suites Per Floor

Floor Level		Percentage of the Maximum Allowable Quantity Per Lab Suite[a]	Number of Lab Suites Per Floor	Fire-Resistance Rating for Fire Barriers in Hours[b]
Above Grade Plane	211	Not allowed	Not Permitted	Not Permitted
	16-20	25	1	2[c]
	11-15	50	1	2[c]
	7-10	50	2	2[c]
	4-6	75	4	1
	3	100	4	1
	1-2	100	6	1
Below Grade Plane	1	75	4	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the footnotes to those tables.
b Fire barriers shall include walls, floors and ceilings necessary to provide separation from other portions of the building.
c Vertical fire barriers separating laboratory suites from other spaces on the same floor shall be permitted to be 1-hour fire-resistance rated.

- Considered **Group B** occupancies provided such laboratories comply with **new Section 428** which provides an **alternative approach** to the existing control area provisions

Chapter 5

General Building Heights and Areas

LEARNING center

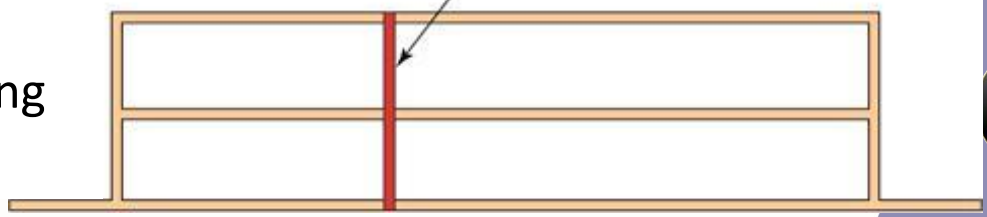
503.1, 706.1 Scope of Fire Wall Use

2018

- Use of fire wall **to create separate buildings** now limited to only the determination of permissible **types of construction**, based upon **allowable building height and area**
- **Fire walls** to continue to be used for horizontal exits, fire area separations, fire-flow calculations, etc.

- It was determined that using fire walls to control other building elements or features, such as means of egress, building systems, or building utilities is **not appropriate**

Fire wall provided for creating separate buildings now solely for determination of allowable height and area (type of construction)



503.1.4 Allowable Height and Area of Occupied Roofs

2018
2021

- An occupied roof is **not** to be **included** in the building area, building height or number of stories.
  - Any roof structures to comply with **Section 1511** for penthouses and other enclosed rooftop structures.
- Enclosures of occupied roofs limited to **48”** in height above roof deck, **except** for:
  - Penthouses, towers, spires, etc.

503.1.4 Allowable Height and Area of Occupied Roofs

2018
2021

- Occupancy on roof must be **permitted** by **Table 504.4** for story **immediately below** the roof, except the occupancies are not limited where:
  - Buildings is sprinklered **throughout** with NFPA 13 or 13R system
  - **Occupant notification** to be **provided** at the roof level where alarm system is required elsewhere in the building
- Such notification applicable to:
  - Audible alarms
  - Emergency voice/alarm (**EVAC**) communication systems
  - Visual alarms

503.1.4 Allowable Height and Area of Occupied Roofs

2018
2021

- The area of occupied roofs is **not** to be included in the building area when determining the maximum allowable area
- There is **no limit** on which occupancies occur on an occupied roof where:
  - The building is sprinklered throughout
  - Occupant notification per **Section 907.5** is provided in the area of the occupied roof

Example:
If building of Type VA construction,
Group B: 4 stories max. (S)
Group A-3: 3 stories max. (S)

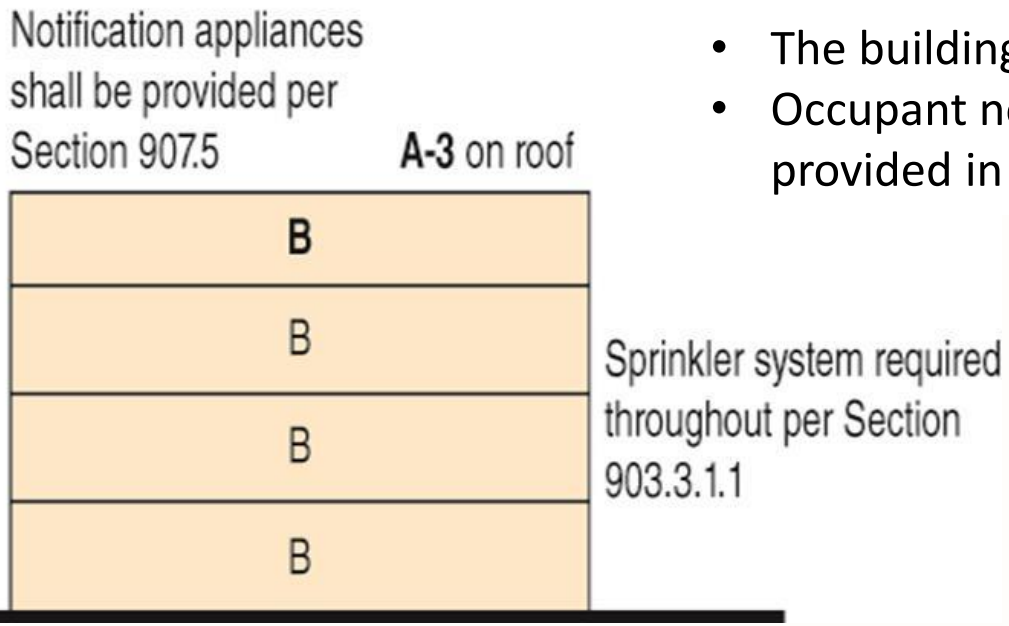


Table 504.3 Allowable Height in Feet

2021

- **Limits** to building height (**in feet**) have been developed for **Types IV-A, IV-B** and **IV-C** construction
- Significant **decreases** where building is not sprinklered
- Establishment of allowable height started with setting IV-B allowances **equivalent** to Type IB
- **No unlimited heights** for Type IV-A, but typically an increase of 1.5 over Type IV-B
- Type **IV-C generally equivalent** to **IV-HT** limits
- **No additional heights** over that permitted for Type IV-HT are permitted for non-sprinklered buildings
  - Historical recognition that **non-sprinklered** buildings are limited to **20' less** in height than sprinklered buildings **does not apply**

Table 504.3 Allowable Height in Feet

2021

TABLE 504.3 Allowable Building Height in Feet Above Grade Plane[a]

Occupancy Classification	See Footnotes	Type of Construction											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60
H-1, H-2, H-3, H-5	NS[c,d]	UL	160	65	55	65	55	120	90	65	65	50	40
	S												
H-4	NS[c,d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140	100	85	85	70	60
I-1 Condition 1, I-3	NS[d,e]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
I-1 Condition 2, I-2	NS[d,e,f]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85									
I-4	NS[d,g]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
R[h]	NS[d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	60	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85	70	60

- **Added** a **row** into the **R** occupancies to address the use of 13D sprinkler systems

Table 504.4 Allowable Height in Stories

2021

- **Limits** to number of stories above grade plane have been **established** for Types IV-A, IV-B and IV-C construction
- Rationale for story limits similar to that for height in **feet**
- Significant **reductions** in height in stories where building is not sprinklered:
  - Limits on stories same as that allowed for Type IV-HT.
  - Historical recognition that non-sprinklered buildings are **limited to 20' less in height** than sprinklered buildings **does not apply**
- Consistent with allowable height in feet and allowable floor area, **each occupancy reviewed individually** to address specific hazards that would warrant a variance from the established process

Table 504.4 Allowable Height in Stories

2021

- **Story limits** have also been **modified** for specific **Group S-1** and **S-2** occupancies
- **Height limits** for **Group S-1** occupancies in fully-sprinklered buildings of Type IIB and IIIB construction have been **increased** from 3 **to 4 stories**
  - **Restores** story limits of 2006 IBC that were part of numerous reductions due to inconsistencies in original thresholds
- **Group S-2** story **limitations** for buildings of Type IV-HT construction have been **increased** by one story, **to 5 stories** in **non-sprinklered** buildings and **6 stories** in **sprinklered** buildings
  - **Corrects two tabular errors** that went undetected in transition from Table 503 in 2012 IBC to Table 504.4 in 2015 edition

Table 504.4 Allowable Height in Stories

2021

TABLE 504.4 Allowable Number of Stories Above Grade Plane[a,b]

Occupancy Classification	See Footnotes	Type of Construction											
		Type I		Type II		Type III		Type IV	Type IV	Type IV	Type IV	Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	5	3	2	3	2	3	3	3	3	2	1
	S	UL	6	4	3	4	3	9	6	4	4	3	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
A-3	NS	UL	11	3	2	3	2	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2
S-1	NS	UL	11	4	2	3	2	4	4	4	4	3	1
	S	UL	12	5	~~3~~4	4	~~3~~4	10	7	5	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	4	~~4~~5	4	2
	S	UL	12	6	4	5	4	12	8	5	~~5~~6	5	3

(partial table)

Table 506.2 Allowable Building Area

2021

- **Limits** to building **floor areas** have been **developed** for Types IV-A, IV-B and IV-C based on fire safety characteristics of the new construction types
- **No unlimited area permitted for any of Type IV classifications**
- Initially, **allowable area factors** for Type IV-HT construction were **increased** by following multipliers:
  - **Type IV-C: x 1.25**
  - **Type IV-B: x 2.00**
  - **Type IV-A: x 3.00**
- **Factors** then **re-examined** on a **case-by-case basis** regarding their relative hazard and occupancy classification

Table 506.2 Allowable Building Area

2021

- **Allowable area factor** also **modified** for **Group I-3** occupancies in one-story buildings of **Type IIA** construction:
  - **Limit** of **45,000 sq.ft.** has been **increased** to **60,000 sq.ft.** for **single-story fully-sprinklered** buildings
  - **Corrects tabular error** that went undetected in transition from Table 503 in 2012 IBC to Table 504.4 in 2015 edition
  - There was no intent at the time of the transition to make any technical changes to allowable building area from what was previously allowed

Table 506.2 Allowable Building Area

2021

TABLE 506.2 Allowable Area Factor (A_t = NS, S1, S13R, S13D or SM, as Applicable) in Square Feet[a,b]

Occupancy Classification	See Footnotes	Type of Construction											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
I-3	NS[d,e]	UL	UL	15,000	10,000	10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
	S1	UL	UL	60,000	40,000	42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000

(partial table)

Table 506.2, Note i Allowable Area of Type IIB, IIIB and VB Greenhouses

2018

TABLE 506.2 Allowable Area Factor

Occupancy Classification	See Footnotes	Type I		Type II		Type III		Type IV	Type V	
		A	B	A	B	A	B	HT	A	B
U	NS[i]	UL	35,500	19,000	8,500	14,000	8,500	18,000	9,000	5,500
	S1	UL	142,000	76,000	34,000	56,000	34,000	72,000	36,000	22,000
	SM	UL	106,500	57,000	25,500	42,000	25,500	54,000	27,000	16,500

Note:

i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

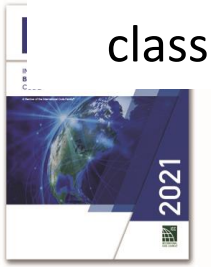
(No changes to other portions of table and notes.)

- The **tabular allowable area** for non-sprinklered single-story greenhouses classified as **Group U** occupancies has been **increased** for Type VB buildings to be consistent with those greenhouses classified as **Group B, M, F-2 and E.**

Maximum allowable area increased to 9,000 sq. ft. (from 5,500 sq. ft.)

Type VB construction
Single-story
Nonsprinklered

Group U Greenhouse



506.3.2 Allowable Area Frontage Increase

2021

- Methodology for determining allowable area increase for open frontage has been **simplified** through use of a **tabular format**
- **Table 506.3.3** based on two criteria:
  - **Smallest** public way or open space that **≥20’**, **and**
  - **Percentage** of building perimeter having **≥20’** of public way and/or open space
- **Allowance** for weighting the open space area increase has been **eliminated**
  - **Interpolation** within Table 506.3.3 is **permitted**

506.3.2 Allowable Area Frontage Increase

2021

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.

TABLE 506.3.3.1 Section 507 Buildings[a]

Percentage of Building Perimeter	Open Space					
	30 to less than 35 feet	35 to less than 40 feet	40 to less than 45 feet	45 to less than 50 feet	50 to less than 55 feet	55 to less than 60 feet
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

a. Interpolation is permitted.

506.3.2 Allowable Area Frontage Increase

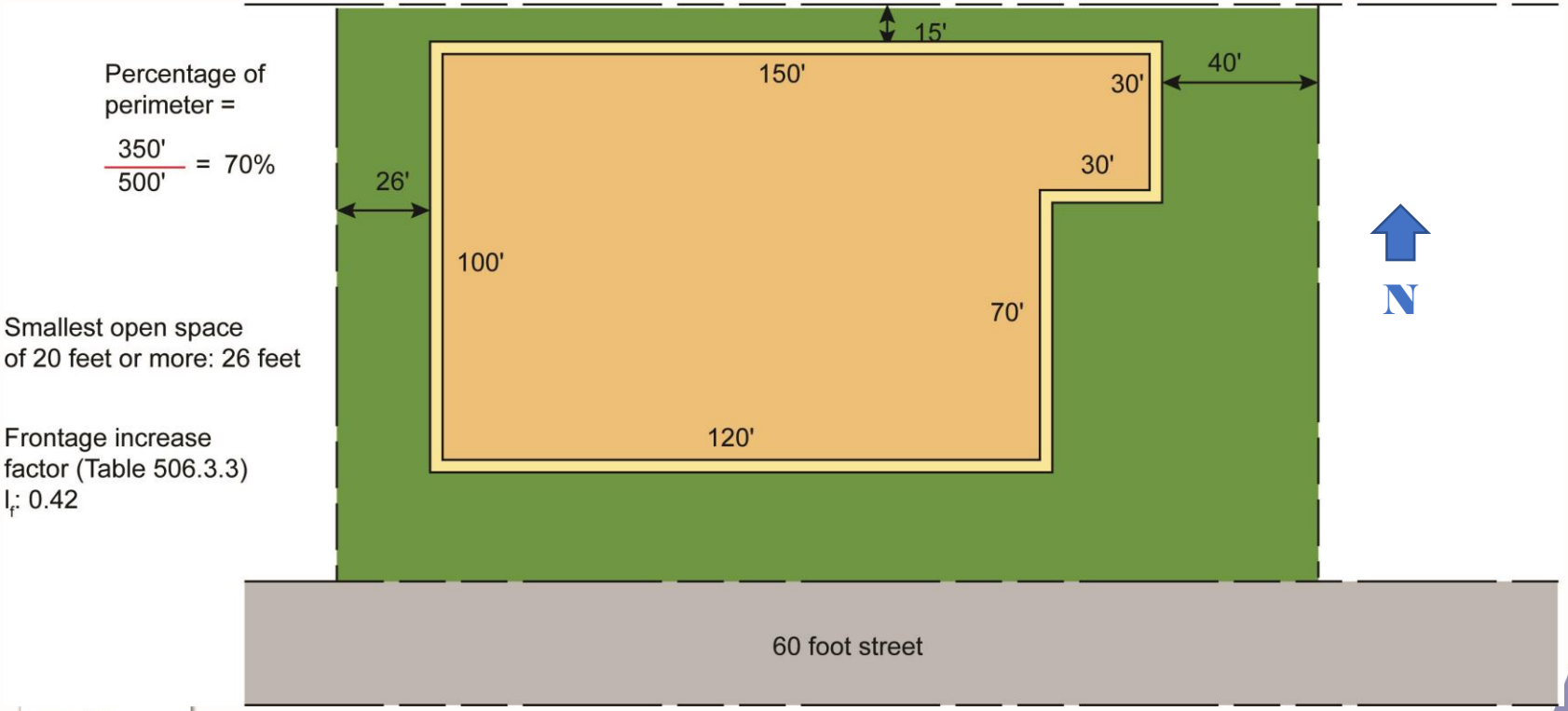
2021

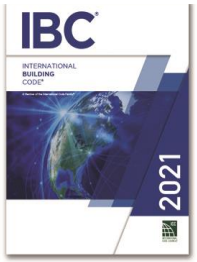
TABLE 506.3.3 Frontage Increase Factor[a]

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.

- **EXAMPLE:**





Note: If west open space is ignored, I_f **would be 0.50** based on **50%** of perimeter open with smallest open space of **≥30'**

508.4.4.1, 509.4.1.1 Fire Separations of Mass Timber

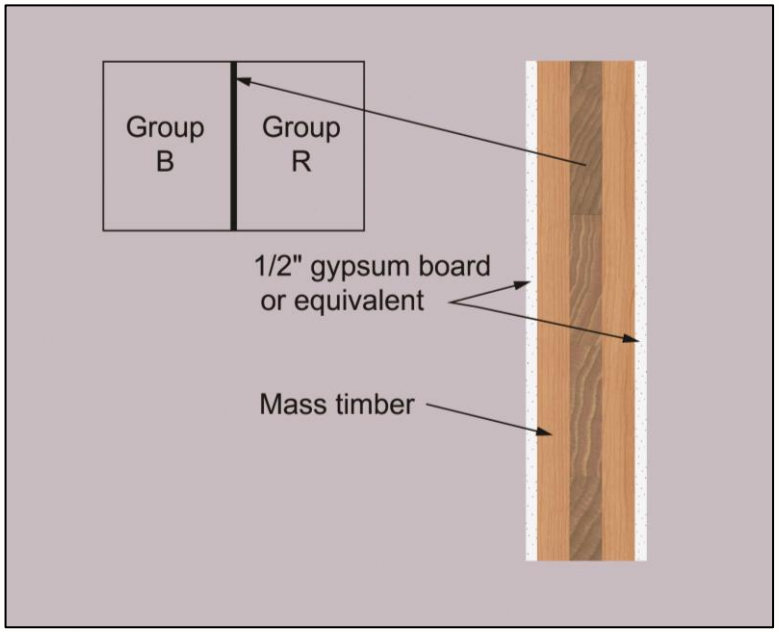
2021

- **Mass timber elements** used as fire barriers and horizontal assemblies for separating occupancies or incidental use areas to be **protected** with approved **thermal barrier** of:
  - Minimum ½" gypsum board, **or**
  - Material tested to **NFPA 275** (Temperature and Integrity Fire Tests of thermal barriers)
- Applicable **only** to **Type IV-B** and **IV-C**
- No need to regulate Type IV-A construction due to the mandatory non-combustible protection of all mass timber elements
- Thermal barrier only needs to **cover exposed wood** surfaces and **does not add** to fire-resistance rating of mass timber

508.4.4.1, 509.4.1.1 Fire Separations of Mass Timber

2021

- Only required on incidental use side of separation, on both sides for occupancy separation
- Provides a means to **contain** a fire for an established period of time



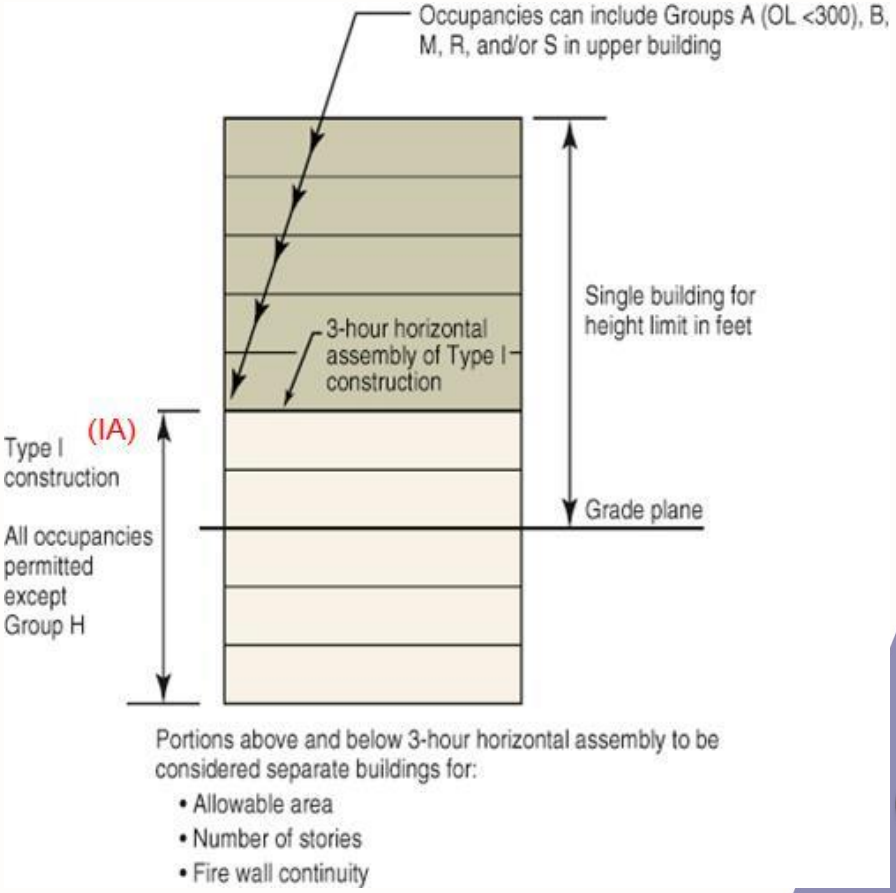
Applicable to Type IV-B and IV-C construction

Example of fire separation as required by **Table 508.4** for "separated occupancies"

510.2, Item 1 Horizontal Building Separation

2018

- Vertical offsets permitted where offset and supporting structure rated at least **≥3 hours**
- Portions below separation shall be **IA** construction



510.2 Item 4 Stairway Construction in Podium Buildings

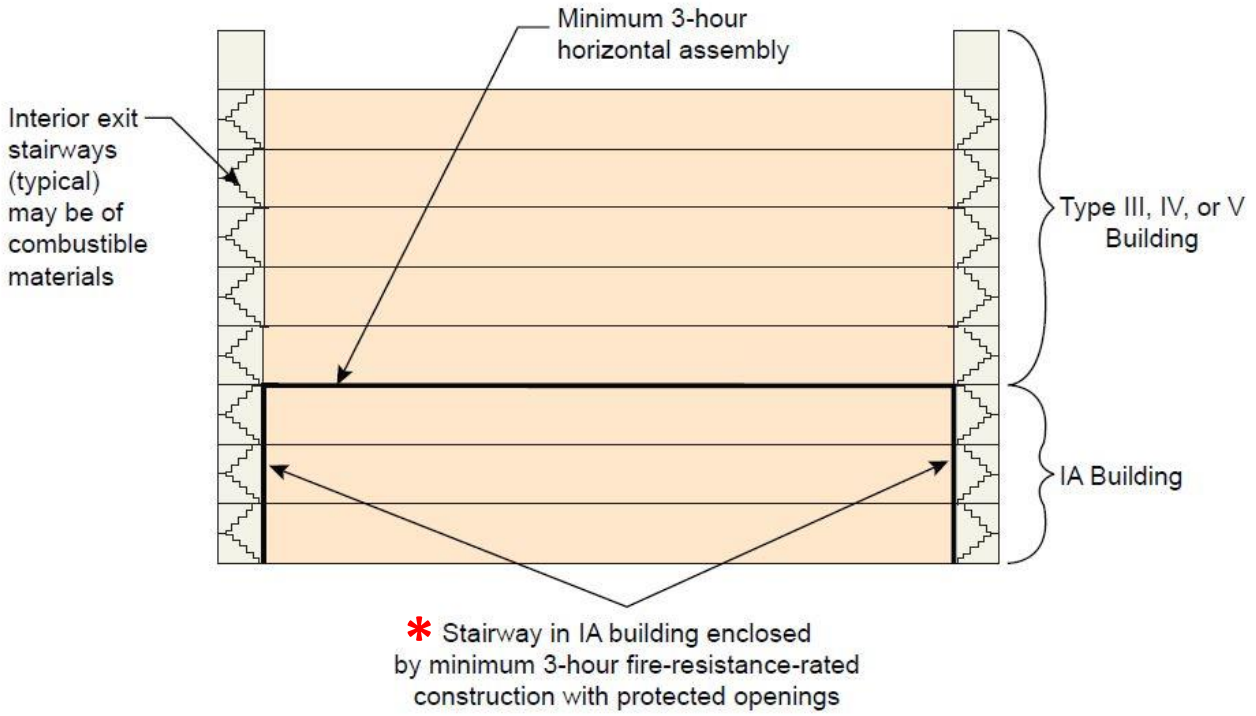
2021

- Stairway construction in **Type IA** (lower) portion of podium buildings now 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**
- Addresses confusion on how to address stairway construction that connects combustible and noncombustible portions of a podium building
  - **Section 1011.7** indicates stairways to be built of materials permitted based on building's type of construction

510.2 Item 4 Stairway Construction in Podium Buildings

2021

- Stairway is conceptually located totally within upper Type III, IV or V building, thus allowing for combustible stairway construction



Chapter 6

Types of Construction

ICC LEARNING center

Table 601, Note b Fire Protection of Structural Roof Members

2018

TABLE 601 Fire-Resistance Rating Requirements for Building Elements

Building Element	Type I A	Type I B	Type II A	Type II B	Type III A	Type III B	Type IV HT	Type V A	Type V B
Primary structural frame [f]	3[a,b]	2[a,b]	1[b]	0	1[b]	0	HT	1[b]	0
Roof construction and associated secondary members	1½[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	HT	1[b,c]	0

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.

(No changes to other portions of Table 601 and notes.)

- All portions of the roof construction, including primary structural frame members such as girders and beams, are now **selectively exempted** from fire-resistance requirements based on **Table 601** where every portion of the roof construction is **≥20' above** any floor below

Table 601, Note b Fire Protection of Structural Roof Members

2018

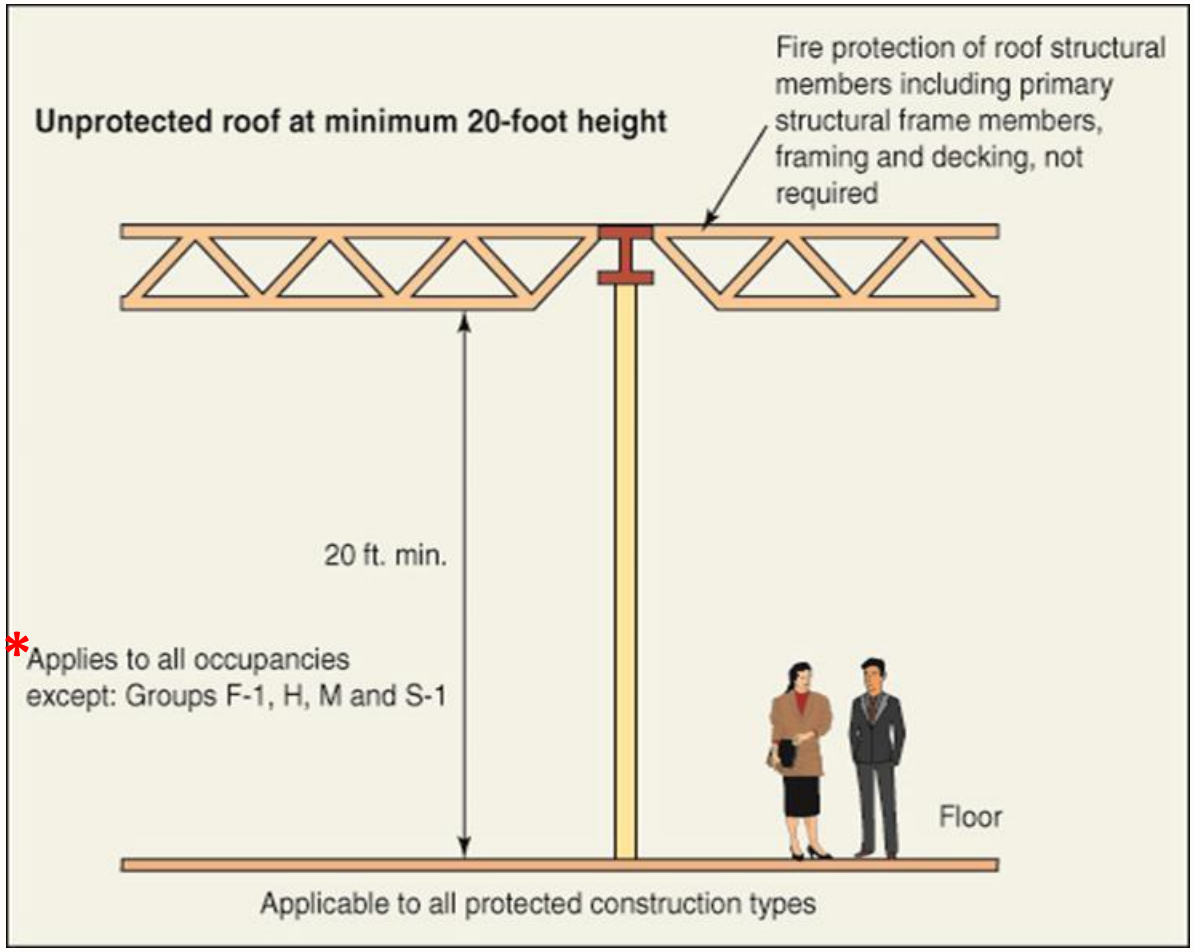


Table 601 Type IV Fire-Resistance

2021

- **Table 601** identifying minimum fire-resistance rating for building elements based on type of construction has been **expanded** to include new **Type IV-A, IV-B** and **IV-C** buildings
- General comparison with Type IA (**IV-A**), Type IB (**IV-B**) and Type IIIA (**IV-C**)
  - **Type IV-C** has **higher required ratings** than Type IIIA for structural frame members, interior bearing walls and floors
- Also **clarifies** that heavy timber roof construction, including primary structural frame members, permitted in: Type IB, IIA, IIB, IIIA and VA buildings
  - Allows for nonrated combustible roof construction
- In Type IV-HT construction, **interior bearing walls supporting >2 floors** or **>1 floor and a roof** to have minimum **1-hour** fire-resistance rating

Table 601 Type IV Fire-Resistance

2021

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

Building Element	Type I		Type II		Type III		Type IV				Type V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f]	3[a,b]	2[a,b,c]	1[b,c]	0[c]	1[b,c]	0	3[a]	2[a]	2[a]	HT	1[b,c]	0
Bearing walls												
Exterior[e,f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[g]	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[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	1½	1	1	HT	1[b,c]	0

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

602.3, 602.4.4.1 FRT Wood Sheathing in Exterior Wall Assemblies

2018

- Fire-retardant-treated wood framing **and sheathing** permitted within exterior walls of **Type III** and **IV** construction:
  - Minimum of **6”** in thickness
  - **≤2-hour** rating
  - Previously, the IBC only addressed the use of **FRT** wood **framing** within the assembly

- ASCE considers sheathing to be part of the framing system.

602.4 Mass Timber Type IV Buildings

2021

- **Three new construction types** have been introduced to recognize other forms of mass timber construction
- **Type IV-A, IV-B** and **IV-C** buildings may be constructed of mass timber and noncombustible materials
- Required fire-resistance ratings may come from mass timber, noncombustible protection, **or both**:
  - Protective material to be applied directly to the timber members
  - Assigned time determined per **Sections 703.8** and **722.7**
  - Minimum timber member **dimensions** per **Sections 602.4** and **2304.11**

602.4 Mass Timber Type IV Buildings

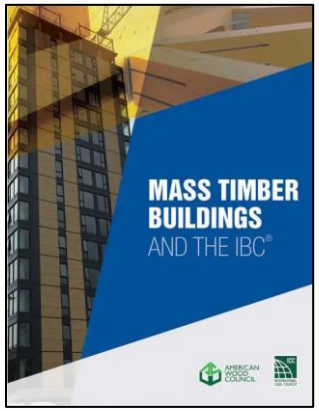
2021

- In buildings of **Type IV-A, IV-B** and **IV-C** construction with an occupied floor **>75'** above lowest level of fire department vehicle access (**LLFDVA**), mass timber **interior exit stairways** and **elevator enclosures** to be additionally **protected** where:
  - **≤12 stories** or **180'**: Interior faces of mass timber to be **covered** with non-combustible protection
  - **>12 stories** or **180'**: **Only noncombustible materials**

602.4 Mass Timber Type IV Buildings

2021

- **Limited changes** to existing heavy timber provisions now designated as Type IV-HT
- Combustible concealed spaces permitted in all Type IV categories where in conformance with **Sections 602.4.1** through **602.4.4**
- Publication **“Mass Timber Buildings and the IBC”** by ICC and AWC addresses Type IV construction in detail



602.4.1- 602.4.3 Type IV-A, IV-B and IV-C Buildings

2021

- **Type IV-A** construction mandates that faces of all timber members be **protected** with noncombustible materials
  - Noncombustible wall and ceiling protection to contribute a time per Table 722.7.1(1), **but not less than 80 minutes**
  - **Floor assembly** to be **protected** with noncombustible material at least **1" thick on top**
- **Type IV-B** construction mandates similar protection, but only required on an established **percentage** of members
  - Some degree of exposed timber permitted
- **Type IV-C** construction permits all timber members to be unprotected
- **All three types permit concealed spaces with limitations**

602.4.1 Type IV Buildings

2021

- **Type IV-A construction mandates:**
  - **Outside face** of exterior walls of mass timber construction to have noncombustible **protection** with **minimum** assigned time of **40 minutes**
  - **Interior faces** of all mass timber elements, including inside faces of exterior mass timber walls and mass timber roofs, to have non-combustible **protection** with **minimum** assigned time of **80 minutes**
  - **Floor assemblies** to contain a noncombustible material at least **1" thick** above mass timber with underside protected to same criteria as for other interior faces (**80 minutes**)
  - **Interior surfaces of roof assemblies** to meet same criteria as for other interior faces (**80 minutes**)

602.4.2 Type IV-B Buildings

2021

- **Type IV-B construction requires** same degree of non-combustible protection as mandated for Type IV-A buildings
- **Unprotected** portions of mass timber ceilings and walls **permitted** in Type IV-B buildings where:
  - Limited to a wall area equal to **40%** of the floor area in any dwelling unit or fire area, **or**
  - Limited to a ceiling area equal to **20%** of the floor area in any dwelling unit or fire area, **or**
  - A **combination** of unprotected wall and ceiling areas determined by applying the **unity formula**

602.4.1- 602.4.3 Type IV-A, IV-B and IV-C Buildings

2021

- A combination of unprotected wall and ceiling areas determined by applying the **unity formula**

$$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1$$ Equation 6-1

where:

U_{tc} = Total unprotected *mass timber* ceiling areas.

U_{ac} = Allowable unprotected *mass timber* ceiling area conforming to Exception 1.1 of Section 602.4.2.2.2.

U_{tw} = Total unprotected *mass timber* wall areas.

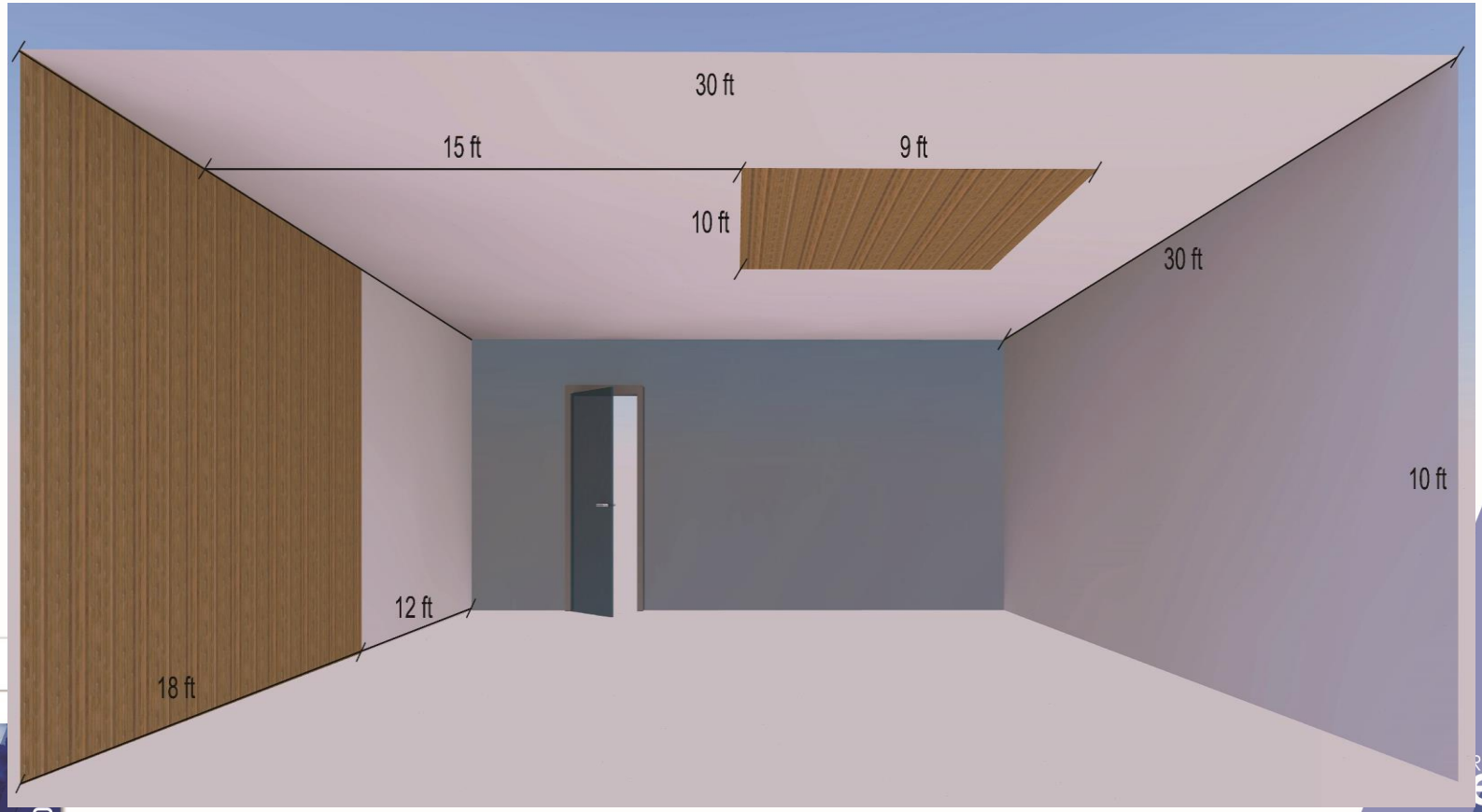
U_{aw} = Allowable unprotected *mass timber* wall area conforming to Exception 1.2 of Section 602.4.2.2.2.

- In each dwelling unit or fire area:
  - Unprotected portions of mass timber walls & ceilings **separated by 15'** from unprotected portions of other walls & ceilings
  - Measured **horizontally** along ceiling and floor

602.4.2 Type IV-B Buildings

2021

- In each dwelling unit or fire area, **unprotected portions** of mass timber walls and ceilings to be **≥15'** from other unprotected portions of other walls and ceilings



602.4.3 Type IV-C Buildings

2021

- **Type IV-C** construction **differs significantly** from Types IV-A and IV-B as mass timber located on building's **interior** can be **fully exposed**, **except** for:
  - Concealed spaces
  - Shaft enclosures and interior exit stairways
- In addition, **Type IV-C** differs from Type IV-HT regarding fire-resistance-rated protection of building elements
  - Minimum **2-hour** rating required for bearing walls, floors and primary structural frame elements, however such rated elements need **not** be covered with non-combustible protection

602.4.1- 602.4.3 Type IV-A, IV-B and IV-C Buildings

2021

- **Concealed spaces** in Type IV-A, IV-B and IV-C buildings **shall not contain combustibles** other than electrical, mechanical, fire protection and plumbing materials and equipment permitted in plenums per IMC Section 602
  - Combustible construction forming concealed spaces to be **protected** with noncombustible materials with minimum assigned time of:
    - **80 minutes in Types IV-A and IV-B**
    - **40 minutes in Type IV-C**
- In **shaft construction**, both shaft and room sides of mass timber elements to be **protected** with noncombustible materials with minimum assigned time of:
  - **80 minutes in Types IV-A and IV-B**
  - **40 minutes in Type IV-C**

602.4.4 Type IV-HT Buildings

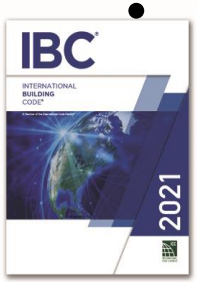
2021

- **Type IV-HT** represents the traditional heavy timber construction type where **fire-resistance relies** almost solely on minimum **cross-sectional dimensions**
- All fire-resistance based on dimensions of timber members, **prescriptive rather than performance**
- **Modifications** made where **FRT wood** is used within exterior wall assemblies:
  - **Minimum 6”** thickness **deleted**
  - **CLT** minimum thickness (**4”)** regulated rather than wall thickness (**6”)**

602.4.4 Type IV-HT Buildings

2021

- **Concealed spaces** now **permitted** provided **no combustibles** other than building elements and electrical, mechanical, fire protection and plumbing materials permitted in plenums per IMC Section 602, and **protected** by one of following:
  - Building is **sprinklered throughout**, including within concealed space, or
  - Concealed space is **completely filled** with noncombustible insulation, or
  - Surfaces within concealed space to be **fully covered** with minimum **5/8" Type X** gypsum board
- Exception allows concealed spaces within interior walls and partitions having minimum **1-hour** rating with no additional protection



Part 3
Fire Protection
Chapters 7 through 9

ICC LEARNING center

Chapter 7

Fire and Smoke Protection Features

ICC LEARNING center

703.6 Noncombustible Protection for Mass Timber

2021

- The **time contributed** to the fire-resistance rating for mass timber elements, components and assemblies by the noncombustible protection to be established through a comparison of assemblies **tested per ASTM E119 or UL 263**
- **Two assemblies to be tested** to same criteria of structural failure with the following conditions, with non-combustible protection time contribution assigned based on time difference between the two assemblies:
  - **Test Assembly 1: without** protection
  - **Test Assembly 2: includes** representative noncombustible protection
  - **Prescriptive** path is outlined in **Section 722.7**
  - **Performance** path is outlined in **Section 703.6**

703.7 Sealing Mass Timber Edges

2021

- In buildings of Type IV-A, IV-B and IV-C construction, **sealant** or **adhesive** to be provided **to resist air passage** at:
  - Abutting edges and intersections of mass timber elements required to be fire-resistance rated
  - Abutting intersections of mass timber elements and building elements of other materials where both elements are required to be fire-resistance rated
- **Sealants or adhesives** need **not** be provided where they are **not a required component** of a tested fire-resistance-rated assembly

703.7 Sealing Mass Timber Edges

2021

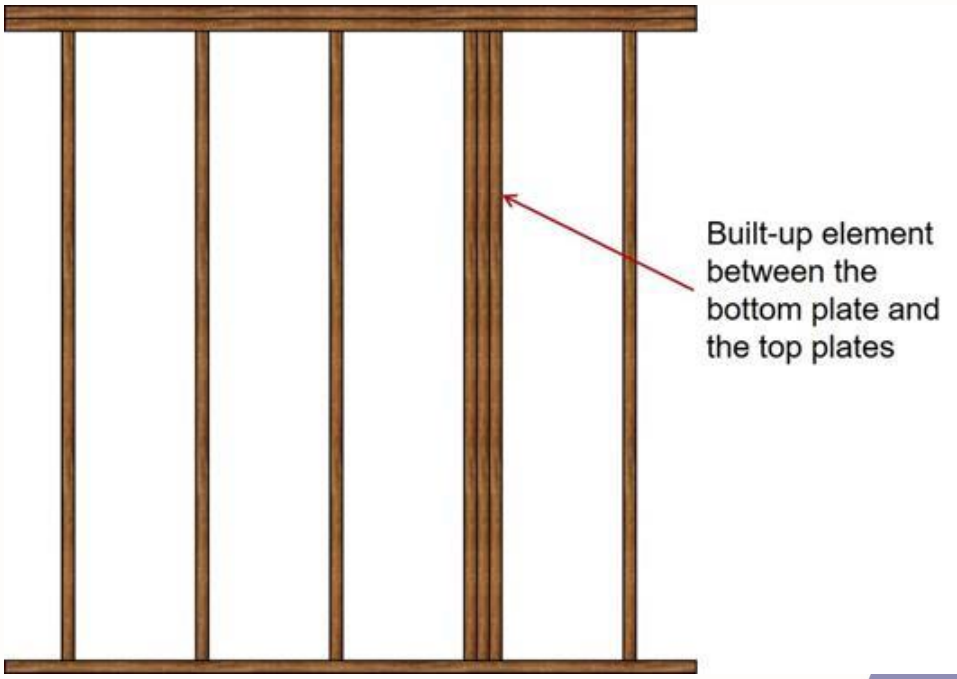
- **Intent** of provision is to **prevent passage** of hot gases from one area to another where required to be separated by fire-resistance-rated assemblies:

- Sealant would not normally be protruding from intersections as shown
- Unless based on a tested assembly, sealant only required if two CLT panels creating a FRR floor assembly abutted each other above the glu-lam beam.
- Sealant **not** required between glu-lam beam and CLT unless required based on tested assembly

704.2, 704.4.1 Column Protection in Light-Frame Construction

2018

- Required fire-resistance rating permitted to be provided with membrane protection
- Columns extending **only** between the bottom and top plates **do not need** to be provided with individual encasement protection



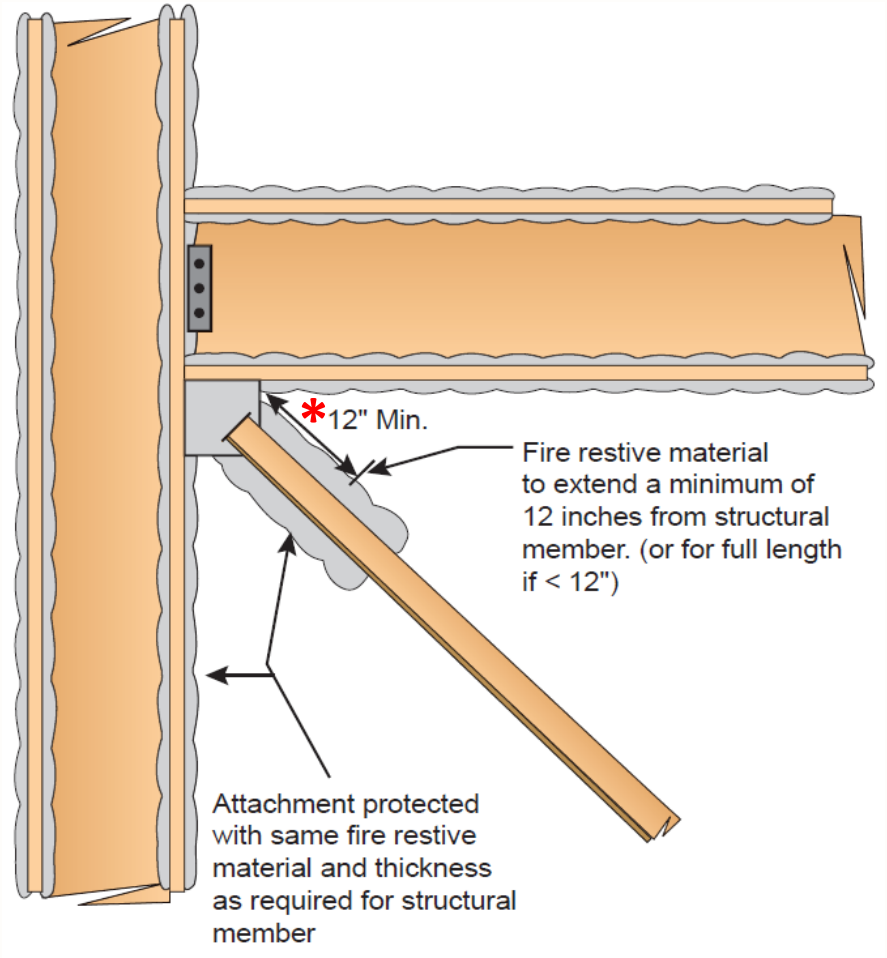
704.6.1 Secondary Attachments and Fireproofing

2021

- Where primary and secondary structural steel members require fire protection, secondary steel attachments to have **same** protective **material** and **thickness** as required for primary member to address heat transfer
- **Protection** to **extend** away from primary member:
  - **≥12”**, **or**
  - Applied to entire length where attachment **<12”** in length
- Where attachment is hollow and ends are **open**, fire-resistive material and thickness to be **applied** to **both** the **interior** and **exterior** of the hollow steel attachment

704.6.1 Secondary Attachments and Fireproofing

2021



705.2.3, 705.2.3.1, 705.2.4 Combustible Balconies, Projections, and Bay Windows

2018

- Provisions **relocated** from Section 1406 of 2015 code (Combustible Materials on the Exterior Side of Exterior Walls)
- Plastic composites now **permitted** to be installed in guard components where untreated wood allowed

Table 705.5 Exterior Wall Ratings

2021

- Previous **Table 602** addressing "Fire-resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance" has been **relocated**
- **Relocation** is deemed appropriate as Chapter 7 is the primary location for establishing exterior wall requirements related to fire-resistance
- In **addition**, entries have been made for **new construction** types IV-A, IV-B and IV-C

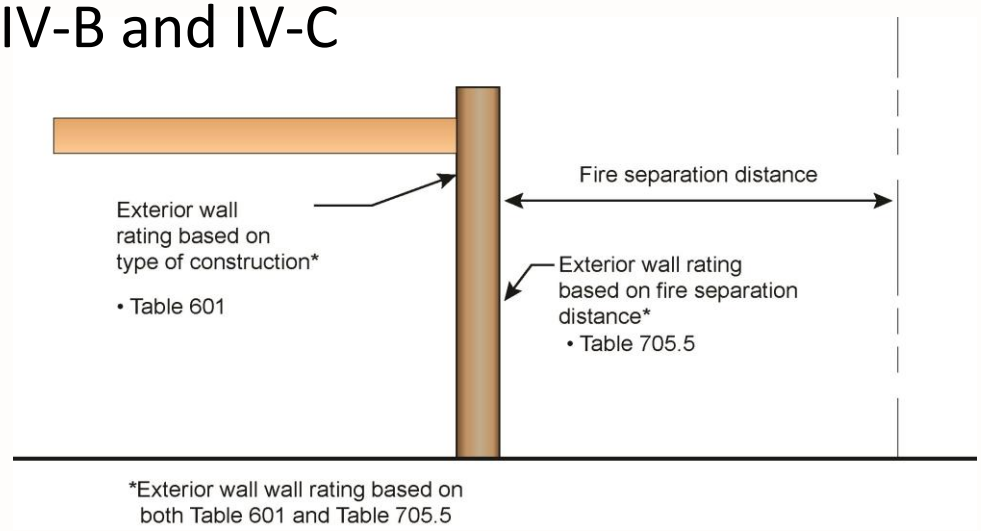


Table 705.5 Exterior Wall Ratings

2021

TABLE ~~602~~ 705.5 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance[a,d,g]

Fire Separation Distance = X (feet)	Type Of Construction	Occupancy Group H[e]	Occupancy Group F-1, M, S-1[f]	Occupancy Group A, B, E, F-2, I, R[i], S-2, U[h]
$X < 5$[b]	All	3	2	1
$5 \leq X < 10$	IA, IV-A	3	2	1
	Others	2	1	1
$10 \leq X < 30$	IA, IB, IV-A, IV-B	2	1	1[c]
	IIB, VB	1	0	0
	Others	1	1	1[c]
$X \geq 30$	All	0	0	0

(footnotes not shown)

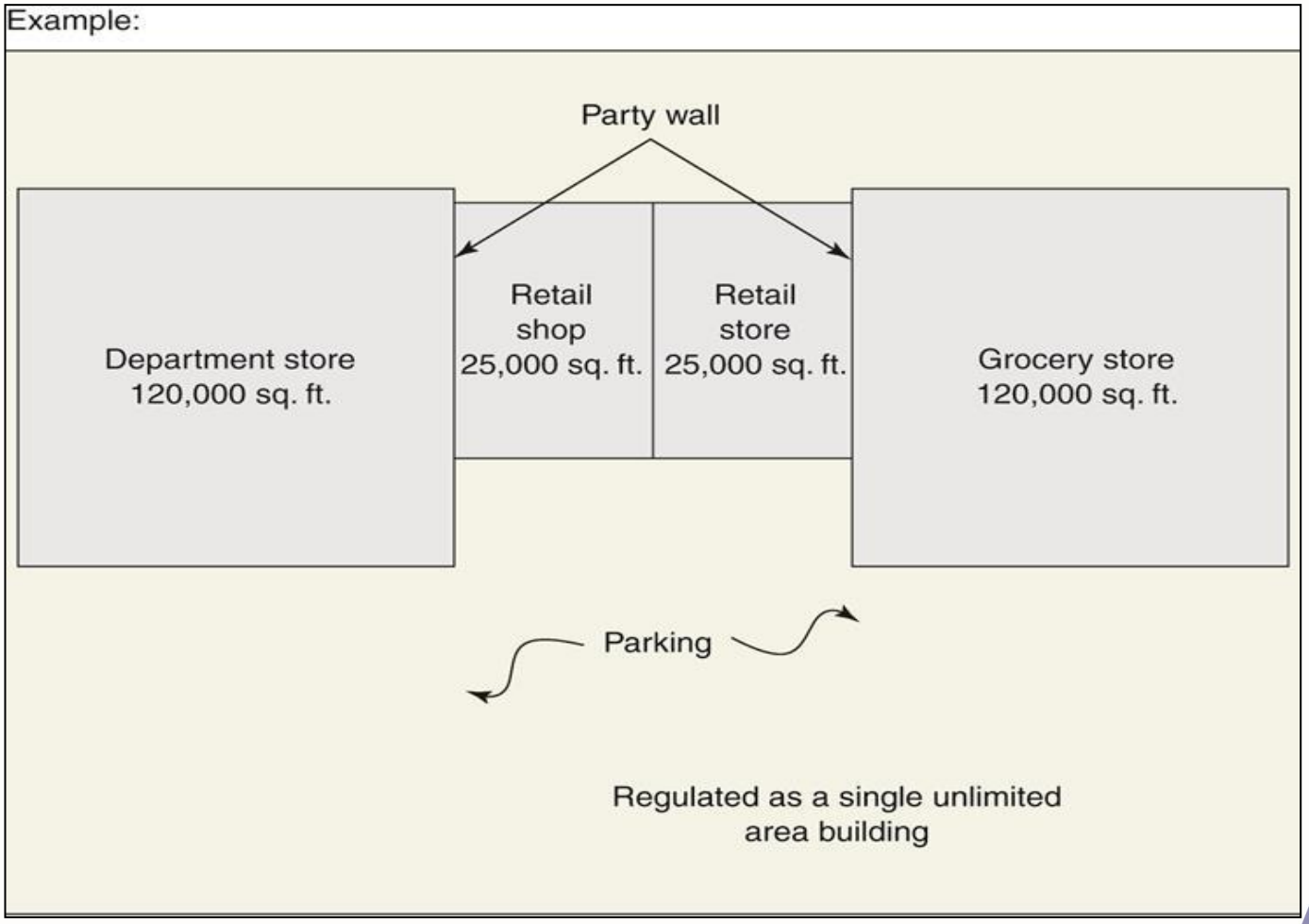
706.1.1 Party Walls Not Constructed as Fire Walls

2018

- Party walls and fire walls **not required** on lot lines dividing a building **for ownership purposes** where:
  - Aggregate height and area **do not exceed** maximum requirements
  - Dedicated access easements and contractual **agreements** are provided to **allow access** for purposes of maintaining fire and life safety systems necessary for building operation
    - **Subject to review and approval by building official**

706.1.1 Party Walls Not Constructed as Fire Walls

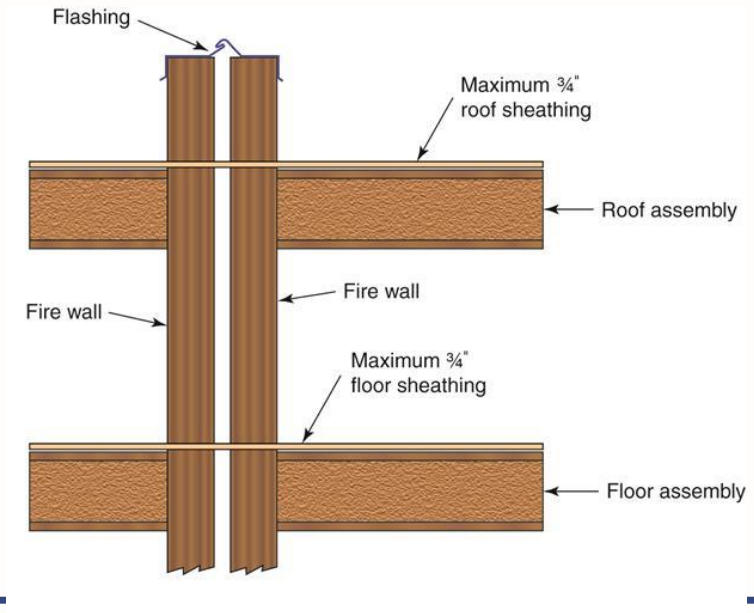
2018



706.2 Structural Continuity of Double Fire Walls

2018

- Applicable **only** in **SDCs D, E** and **F**
- Allows for **continuous** diaphragm for floor and/or roof assembly
- Also **stabilizes** double fire walls to resist impact during seismic event
- **Sheathing** does **not exceed** a thickness of **¾”**



707.5 Enclosure of Exit Passageways

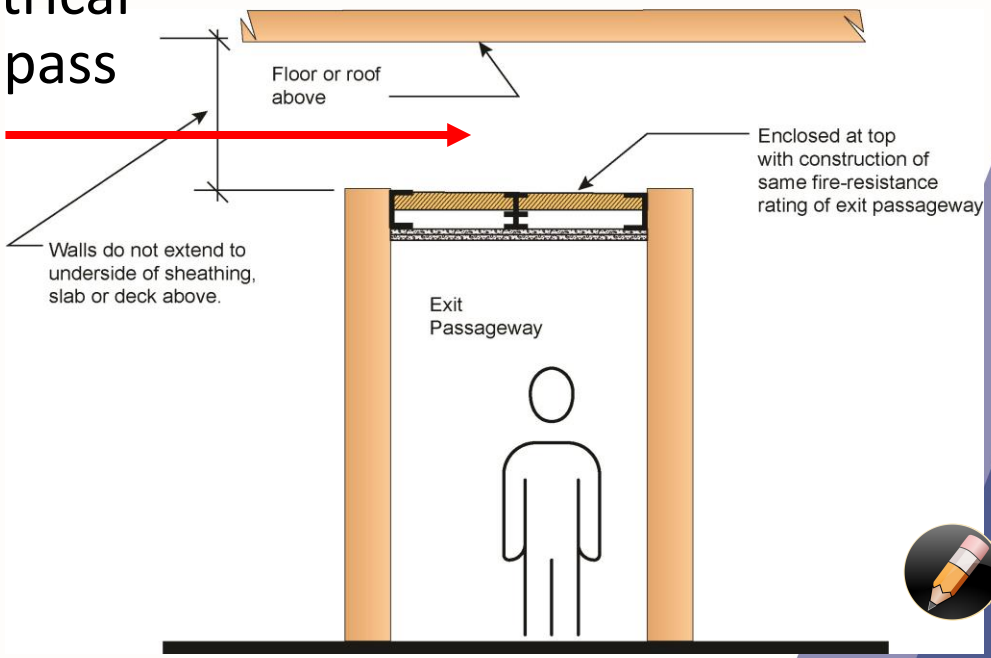
2021

- **Allowance** now provided for **fire barriers** creating an exit passageway to **terminate** at a fire-resistance-rated lid
  - **Enclosure at top** to have same fire-resistance rating as required for the exit passageway
- This **new option** can be applied where fire barrier does not extend to the underside of the roof sheathing, slab or deck above
- **Permits** passage of ducts, piping and conduit from one side of the exit passageway to the other without need for a horizontal shaft enclosure

707.5 Enclosure of Exit Passageways

2021

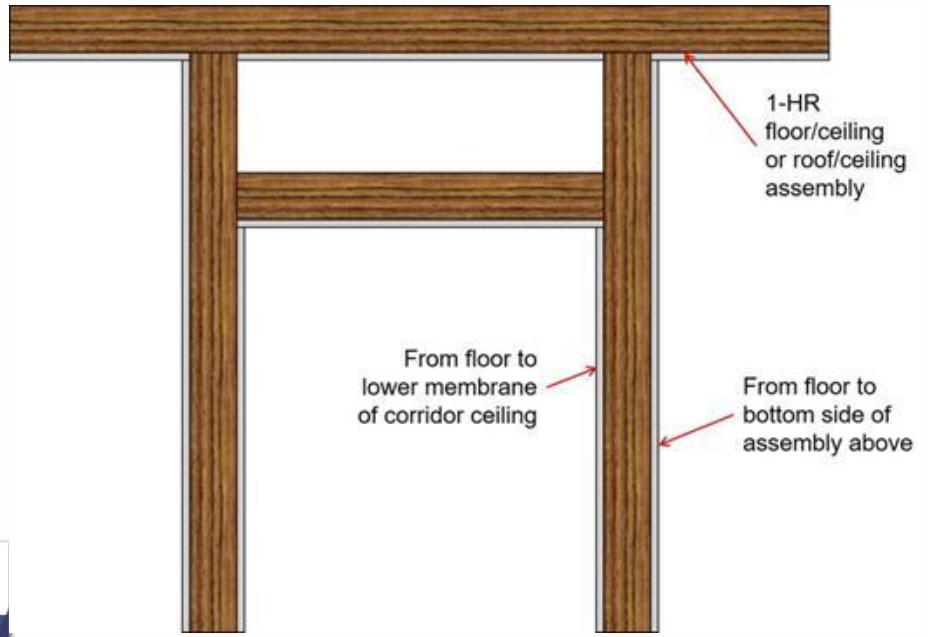
- Provision is applicable where either a floor or roof occurs **above** the exit passageway enclosure
- Concept is somewhat similar to the "**tunnel corridor**" system
- Allows mechanical, electrical or plumbing systems to pass above the passageway



708.4 Continuity of Fire Partitions

2018

- **Reformatted** into **3** distinct **areas**:
  - **Continuity** in regard to enclosure limits
  - **Supporting** construction components
  - Fireblocking and draftstopping



- Listing of where fire partitions are required for the separation of dwelling units and sleeping units has been **expanded** to include all **Group R** occupancies

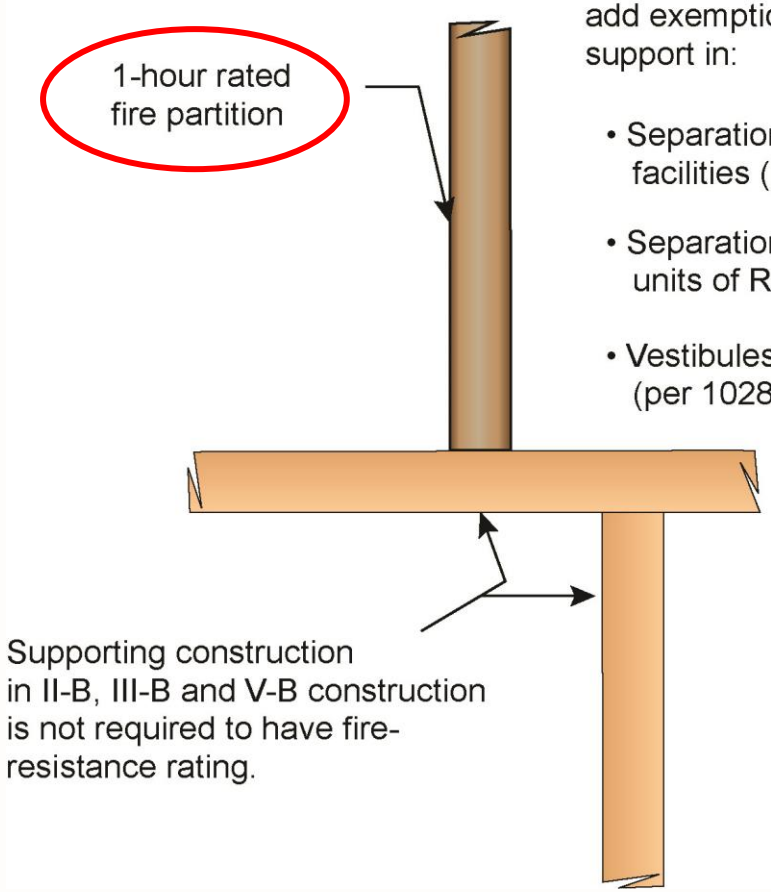
708.4.1 Supporting Construction for Fire Partitions

2018

- **Additional locations** have been identified where fire partitions **need not be supported** by equivalent fire-resistance-rated construction:
  - Separation by **fire partitions** of ambulatory care facilities from adjacent spaces
  - Walls separating dwelling and sleeping units in **Group R-1 and R-2** occupancies for purposes of eliminating the manual fire alarm requirement
  - Vestibule walls regulated as interior exit discharge
- **Allowances** continue to be **limited** to supporting construction **Type IIB, IIIB** and **VB** buildings

708.4.1 Supporting Construction for Fire Partitions

2018



Exception in section 708.4.1 add exemption for rated support in:

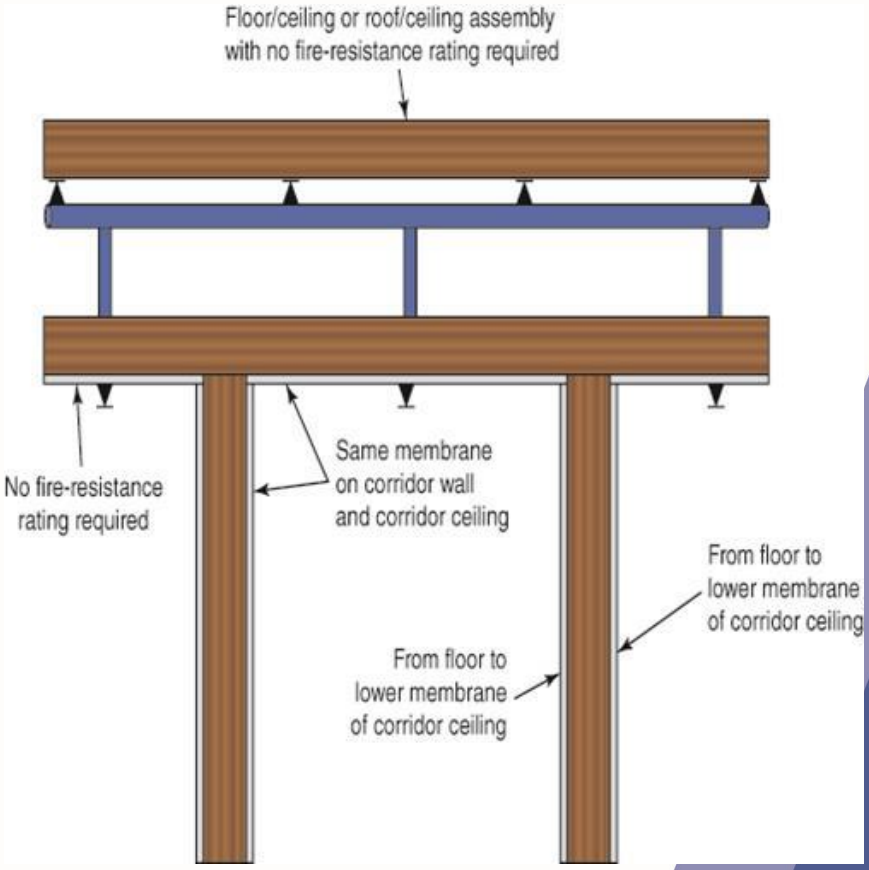
- Separation of ambulatory care facilities (PER 422.2)
- Separation of dwelling and sleeping units of R-1 and R-2 (per 907.2.8.1 and 907.2.9.1)
- Vestibules in exit discharge (per 1028.1)

* Supporting construction in II-B, III-B and V-B construction is not required to have fire-resistance rating.

708.4 Continuity of Fire Partitions

2018

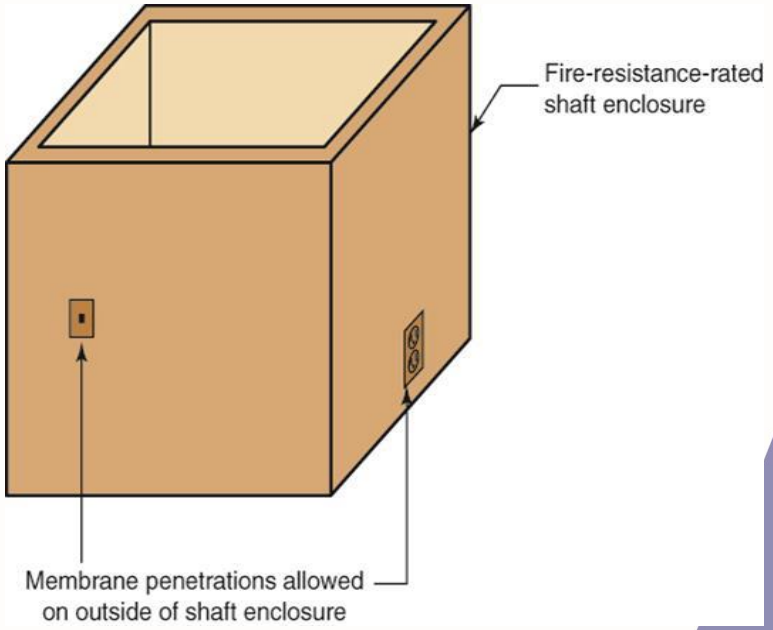
- **Additional** enclosure continuity method for corridor walls that **do not extend** above lower membrane of corridor ceiling:
  - Applicable to sprinklered buildings where sprinklers installed in concealed space



713.8.1 Membrane Penetrations of Shaft Enclosures

2018

- **Consistent** with allowance for interior exit stairway membrane penetrations when protected per **Section 714.4.2**
- Membrane penetrations **not related** to the purpose of a shaft enclosure are **no longer prohibited** from penetrating the outside of the enclosure

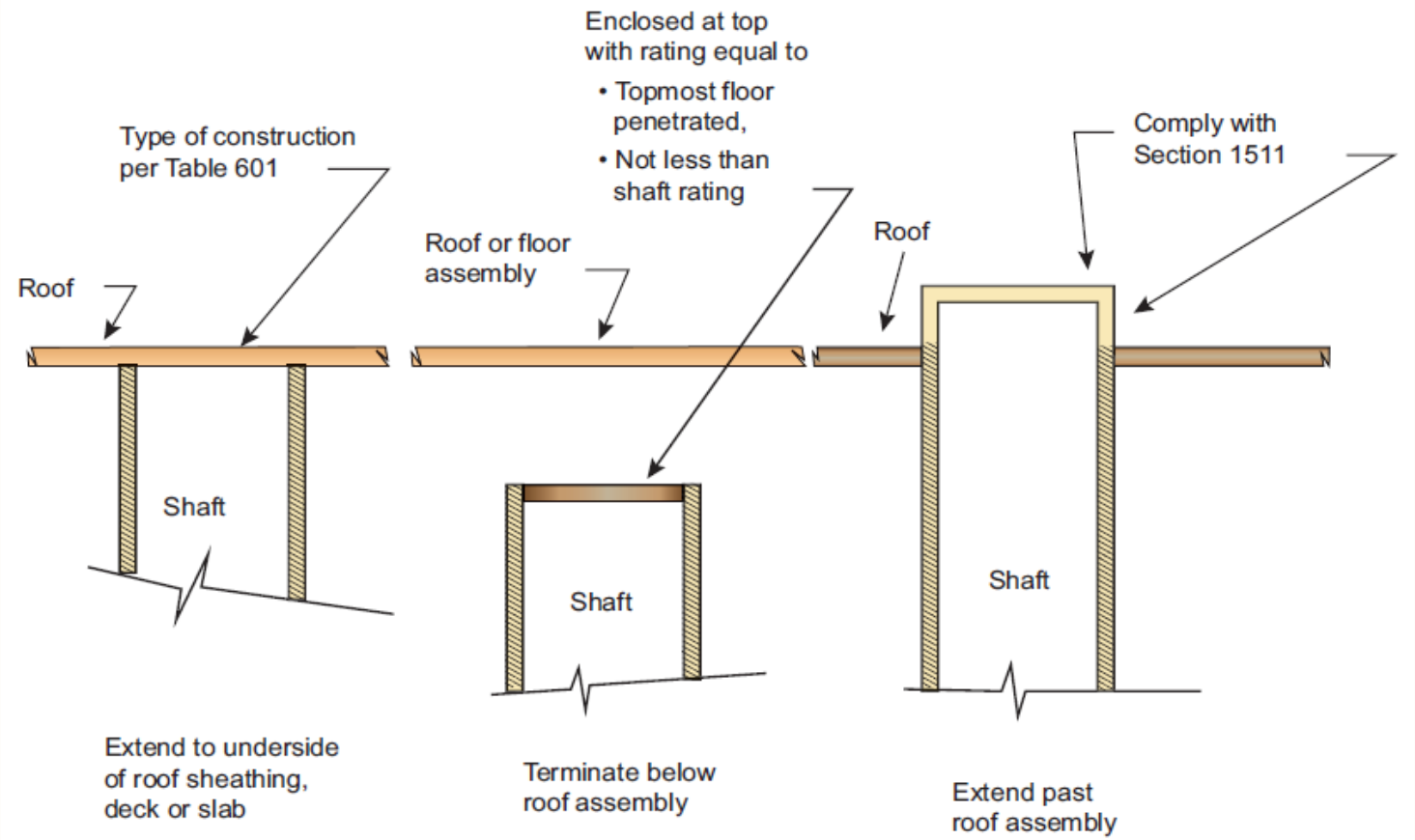


- The limitations are now consistent with those currently permitted for interior exit enclosures

713.12 Top of Shaft Enclosure 2021

- **Three** specific **methods** for terminating a shaft enclosure at the **top** have been established to **clarify** the options that are available:
  - **Extend** the shaft walls to the underside of the roof sheathing, deck or slab, **or**
  - **Terminate below** the roof assembly with a top enclosure having the **same** fire-resistance **rating** as the topmost floor penetrated by the shaft but not less that the required rating of the shaft enclosure, **or**
  - **Extend past** the roof assembly and comply with the provisions for rooftop structures (penthouses) in **Section 1511**

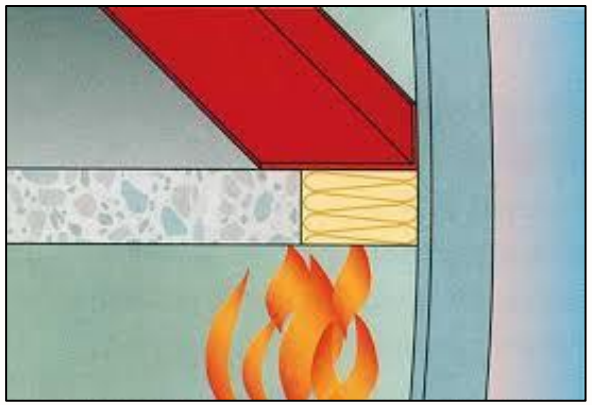
713.12 Top of Shaft Enclosure 2021



715 Protection of Joints and Voids

2021

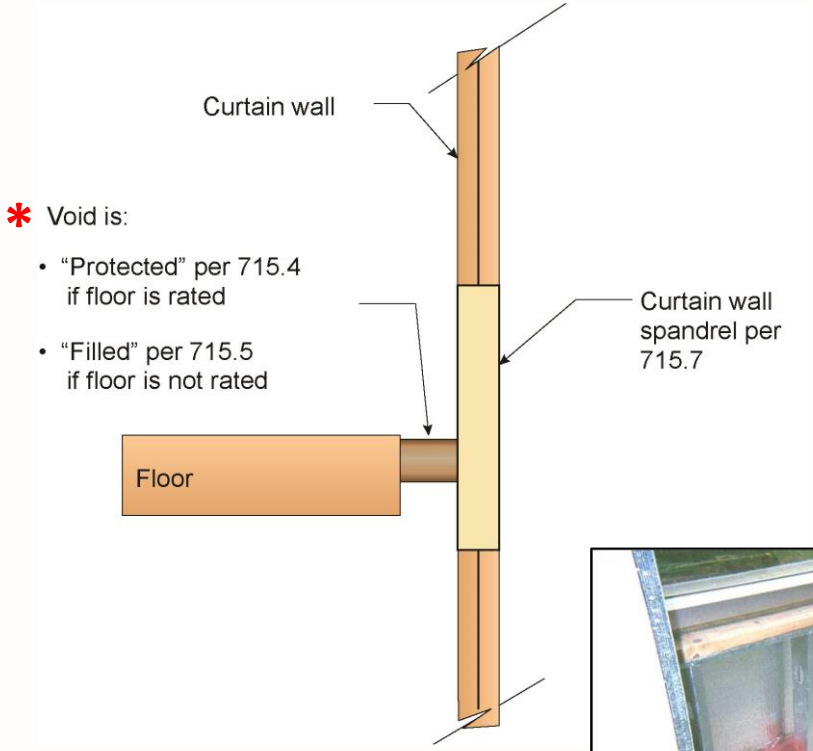
- **Provisions** for joints and voids have been **reformatted** and **modified** to allow for more consistent application
- Joints and voids are required to be "**protected**" where the protection method is required to be **tested** to a specific test **standard**
- Where a void is only required to be "**filled**," there is **no** specific test **standard or listing** requirement

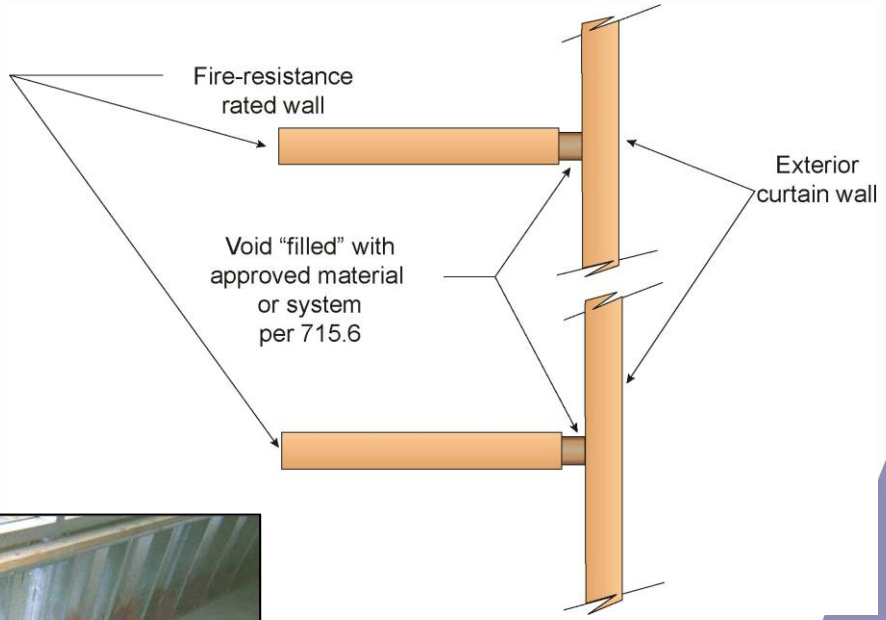


715 Protection of Joints and Voids

2021

- **Provisions** for joints and voids have been **reformatted** and **modified** to allow for more consistent application

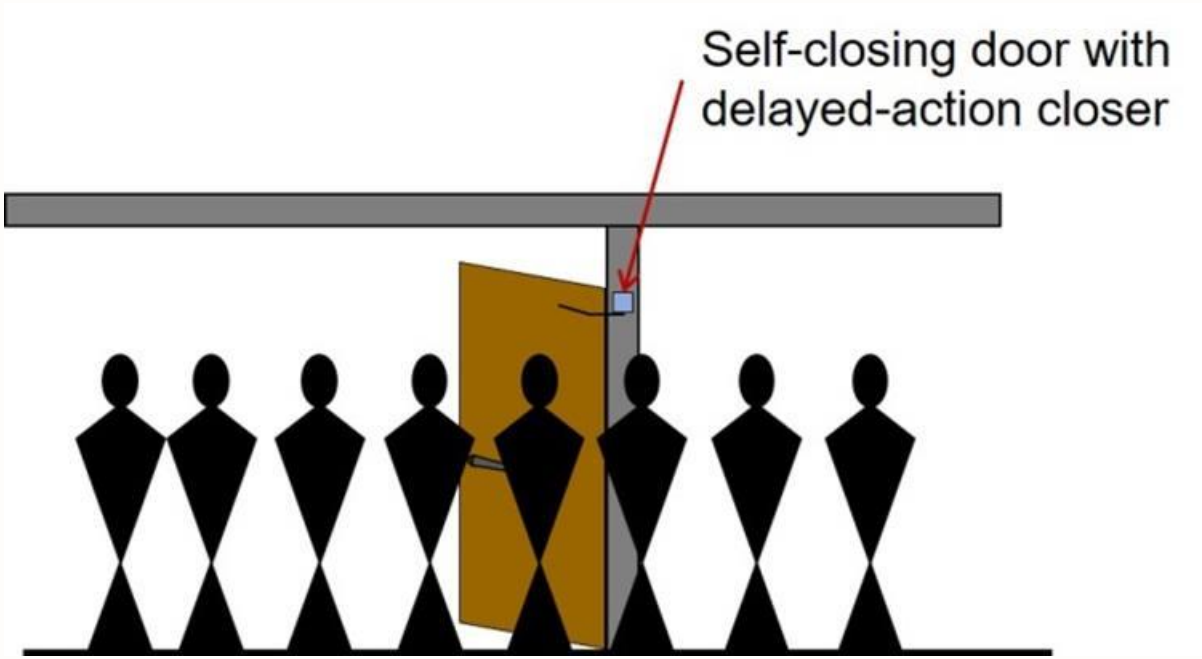




716.2.6.5 Delayed-Action Self-Closing Doors

2018

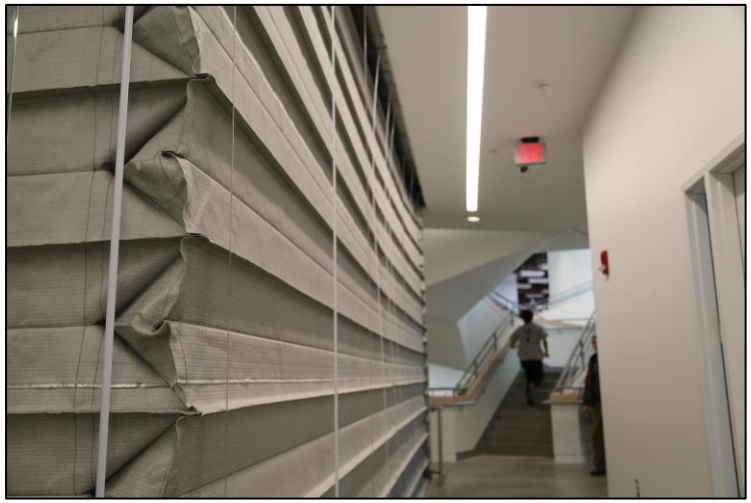
- **Delay-action** closers **permitted** where automatic-closing **not required**
- **Defined** as mechanical devices with an adjustable delay
- Time **delay not** specifically **addressed**



716.4 Fire-Protective Curtain Assemblies

2021

- **New definition** in **Section 202** defining fire-protective curtain assembly as: **an assembly consisting of a fabric curtain, bottom bar, guides, coil, and an operating and closing system**
- **New provisions** establish guidance on how such assemblies are to be tested, labeled and installed



716.4 Fire-Protective Curtain Assemblies

2021

- Assemblies to be evaluated using **UL 10D**, but **without** hose stream test
- **IBC does not address** how or where these systems are to be used or where they would be accepted
  - It is assumed that the assemblies would typically be **installed** as a means of **smoke and draft control**
- Their use, either vertical or horizontal, will need to be **reviewed** and **approved** by the building official under alternate methods provisions of **Section 104.11**

717.4 Access to Dampers

2021

- Dampers equipped with fusible links and/or internal operators to be provided with a:
  - Minimum **12” x 12” access door**
  - **Removable** duct section
- Previously required “approved” means of access to “permit inspection and maintenance of the damper”
- Where space constraints or physical barriers restrict damper access for periodic inspection and testing, the damper to be a single- or multi-blade type and comply with **remote inspection** requirements of NFPA 80 or NFPA 105
  - Requirements for maintenance and periodic inspection found in **IFC Section 706.1**

717.5.2 Flex Connectors

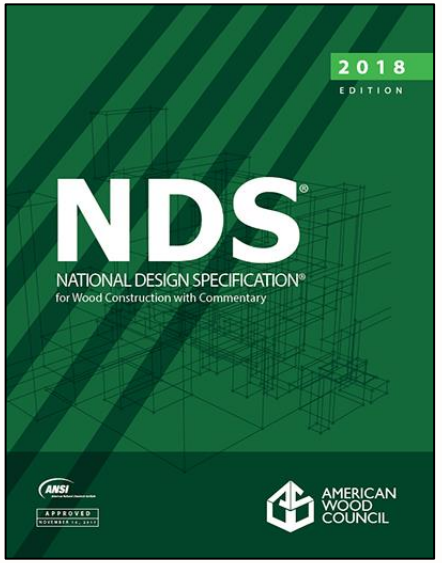
2021

- Under **Exception 3**, fire dampers continue to be permitted to be omitted at penetrations of fire barriers in **fully-ducted** HVAC systems where specified **conditions** are met
- **New allowances** permit the installation of nonmetal flexible air connectors at two locations:
  - At the duct connection to the air handling unit or equipment located within the mechanical room per **IMC Section 603.9**
  - From an overhead metal duct to a ceiling diffuser within the same room per **IMC Section 603.6.2**

722.1 Fire-Resistance Rating of Exposed Mass Timber Members

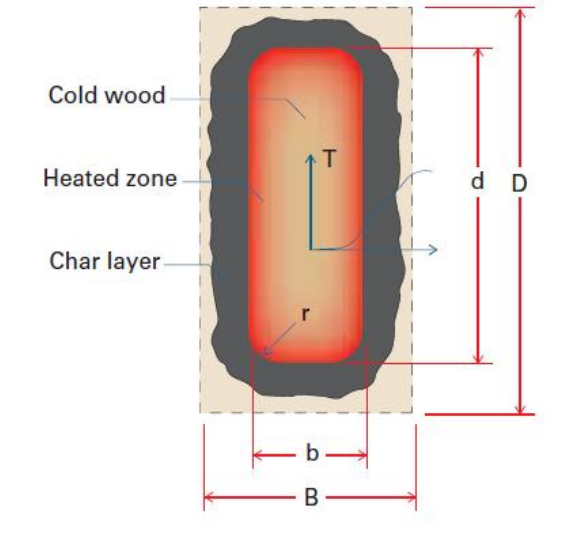
2021

- The fire-resistance rating of mass timber members is to be in conformance with **Chapter 16** of the **National Design Specification for Wood Construction** (**NDS**)
- NDS 16.2 addresses fire design up to **2 hours**
- Applicable to beams, columns, walls, floors/roofs
- Applicable products include:
  - Sawn lumber
  - Glulam (softwood)
  - LVL
  - PSL
  - LSL
  - CLT



722.1 Fire-Resistance Rating of Exposed Mass Timber Members

2021



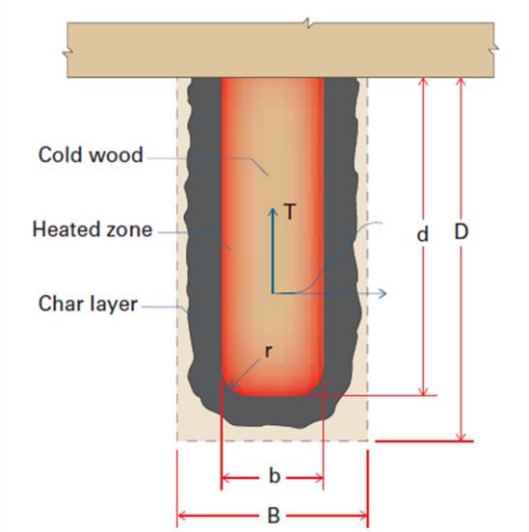


Table 16.2.1A Char Depth and Effective Char Depth (for β_n = 1.5 in./hr.)

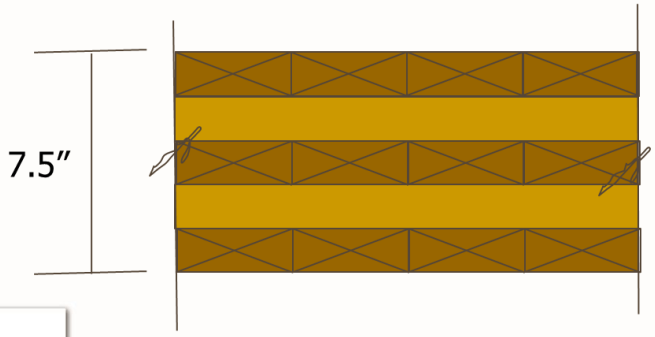
Required Fire Resistance (hr.)	Char Depth, a_{char} (in.)	Effective Char Depth, a_{eff} (in.)
1-Hour	1.5	1.8
1½-Hour	2.1	2.5
2-Hour	2.6	3.2

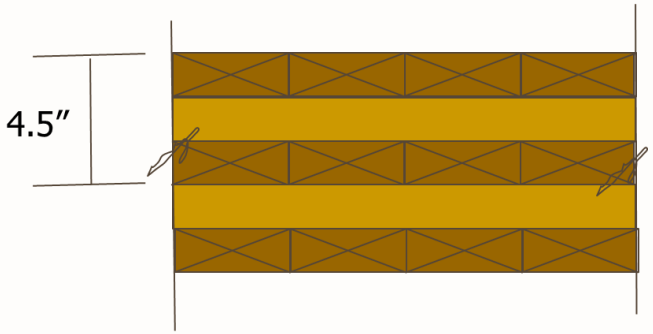
722.1 Fire-Resistance Rating of Exposed Mass Timber Members

2021

Example of determination of effective CLT roof cross-section:

- Assume 5-layers @ 1.5” (total = 7.5”)
- Determine thickness for 1-hr FRR
- a_{char} = 1.8” (NDS Table 16.2.1B)
- d = 7.5” – 1.8” = 5.7”
- Could conservatively assume 3-layer panel for design





722.7 Fire-Resistance Rating of Mass Timber Assemblies

2021

- A **prescriptive** approach has been provided to achieve the required fire-resistance ratings for mass timber members and assemblies
- The fire-resistant rating to consist of the rating of the unprotected mass timber element added to the protection time of the non-combustible protection
  - At least **2/3** of the required fire-resistance rating must come from the **non-combustible** protection
- Provisions address protection on both exterior and interior surfaces
- The fire-resistance rating of exposed mass timber members is to be in conformance with **Chapter 16** of the **National Design Specification for Wood Construction (NDS)**

Tables 722.7.1(1) & (2)

2021

TABLE 722.7.1(1) Protection Required from Noncombustible Covering Material

Required Fire-Resistance Rating of Building Element per Tables 601 and 705.5 (hours)	Minimum Protection Required from Noncombustible Protection (minutes)
1	40
2	80
3 or more	120

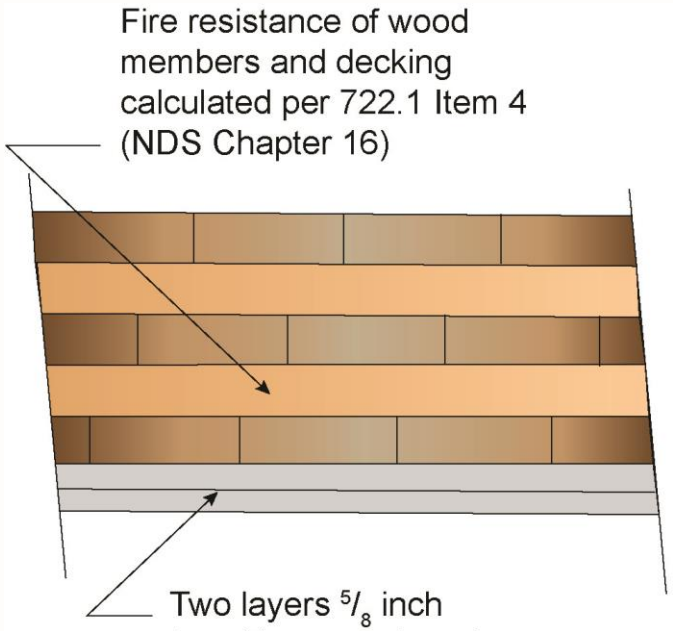
TABLE 722.7.1(2) Protection Provided by Noncombustible Covering MateriaL

Noncombustible Protection	Protection Contribution (minutes)
1/2-inch Type X gypsum board	25
5/8-inch Type X gypsum board	40

722.7 Fire-Resistance Rating of Mass Timber Assemblies

2021

- **Example:**



CLT time = 50 min.

5/8" typex = 40 min.

5/8" typex = 40 min.

Total = 130 min.

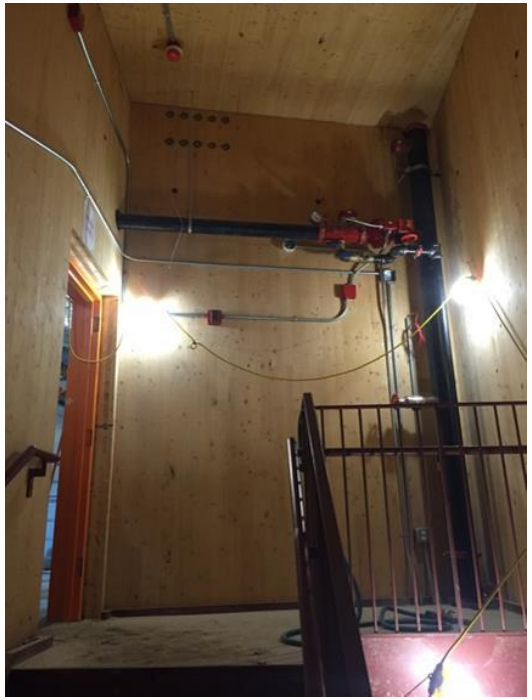
* (Ok for 2-hour rating)

Chapter 8
Interior Finishes

803.3 Interior Finish Requirements for Heavy Timber Members

2018

- Generally, heavy timber elements do not need to comply with flame spread provisions
- Flame spread rating now **applies** to:
  - Interior exit stairways
  - Interior exit ramps
  - Exit passageways



803.11, 803.12 Flame Spread Testing of Laminates and Veneers

2018

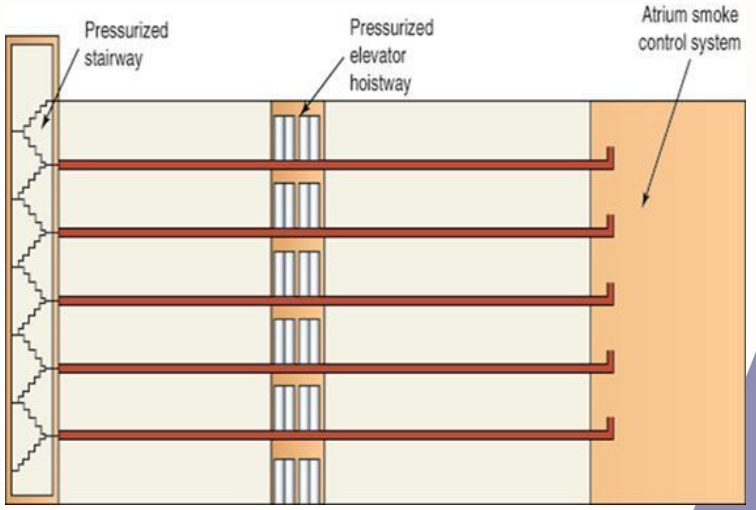
- Addresses flame spread testing for:
  - **Factory-produced** laminated products over a wood substrate
  - Facings and wood veneers **applied** over a wood substrate **on site**

Chapter 9
Fire Protection Systems

901.6.2 Integrated Fire Protection System Testing

2018

- Where **≥2** fire protection or life safety systems are **interconnected**, the acceptance process and testing must **evaluate all systems as a whole**
- Reference is made to **NFPA 4** Integrated testing required for:
  - High-rise buildings
  - Smoke control systems



903.2.3 Sprinklers in Group E Occupancies

2018

- Sprinkler protection now also **required** for **Group E** fire areas where fire area:
  - Located on a floor **other than** the level of exit discharge, **or**
  - Has an occupant load **≥300** or more

903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

2021

- **Sprinkler scoping** criteria for **Groups F-1, M** and **S-1** where upholstered furniture or mattresses are manufactured, sold or stored have been **revised:**
  - **Group F-1**: Area threshold (**2,500 sf**) now based on **size of fire area** where upholstered furniture or mattresses are **manufactured**
  - **Groups M**: Area threshold (**5,000 sf**) now based on **size of floor area** within fire area used for **display** and **sales** of upholstered furniture or mattresses
  - **Group S-1**: Area threshold (**2,500 sf**) now based on **size of floor area** within fire area used for **storage** of upholstered furniture or mattresses

903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

2021

- In addition, where floor area **threshold exceeded**, sprinkler need only be **provided in fire area** and not throughout building

Separation per Table 707.3.10

Sprinkler system required throughout fire area, if:

- **F-1**: > 2,500 sq.ft. **fire area** for manufacture
- **M**: > 5,000 sq.ft. **floor area** within fire area for display and sale
- **S-1**: > 2,500 sq.ft **floor area** within fire area for storage

903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses

2021

- In addition, **new exception** indicates that one-story **Group S-1** self-storage facilities are **exempt** from **2,500 sq.ft.** sprinkler threshold where all storage spaces can be **accessed directly from exterior**
  - General **Group S-1** sprinkler threshold of **12,000 sq.ft.** continues to be applicable
- Based on assumption that such facilities contain significant amount of upholstered furniture and/or mattresses

903.2.4.2, 903.2.9.3 Distilled Spirits

2021

- Automatic sprinkler protection now **required** in all:
  - **Group F-1** fire areas used for the **manufacture** of distilled spirits
  - **Group S-1** fire areas used for the bulk **storage** of distilled spirits or wine
- Part of a series of **changes in IBC and IFC** to eliminate confusion in regulation of such buildings
  - Includes **allowance** that Group H classification not warranted regardless of quantities of hazardous materials

903.2.10 Sprinklers in Open Parking Garages

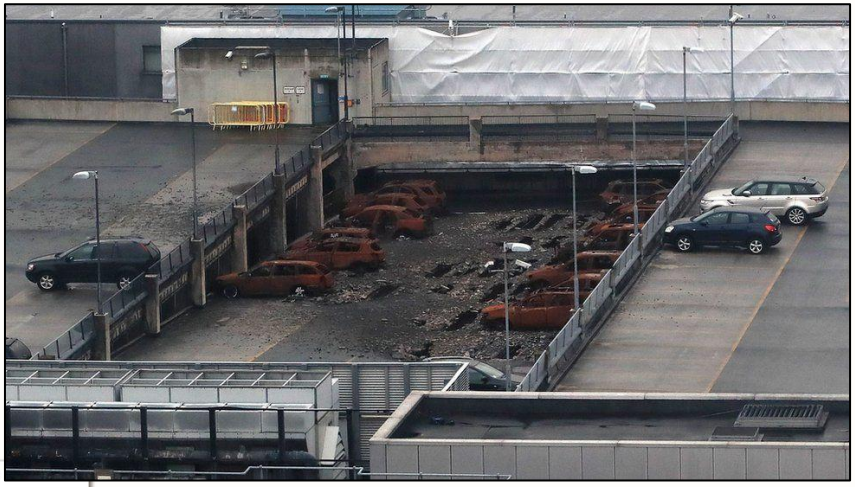
2021

- Sprinklers now **required** in **Group S-2** open parking garages where:
  - Any **fire area >48,000 sq.ft.**, **or**
  - In a building having one or more stories with an **occupant load ≥30** located **≥55'** above lowest level of fire department vehicle access (**LLFDVA**)
- Sprinkler protection to extend **throughout entire** garage
- Concern was based on:
  - **Increased fuel load** due to expanded use of plastics and lightweight materials in vehicles, as well as types of fuels being utilized
  - Recognition of a fire that occurred in a parking garage in **Liverpool**, **England** in late 2017

903.2.10 Sprinklers in Open Parking Garages

2021

- Liverpool, England, parking garage fire:
  - New Year's eve 2017
  - 1400 vehicles destroyed
  - Temperatures reached **>1,800°F**



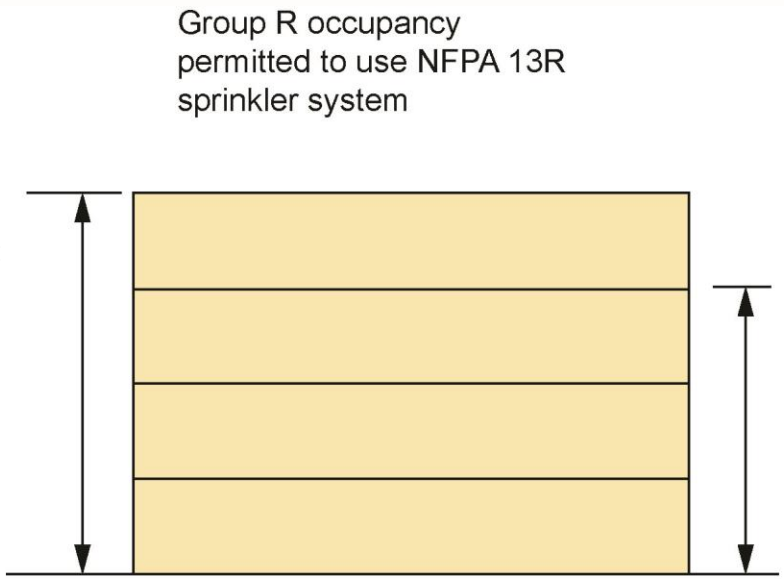
903.3.1.2 NFPA 13R Sprinkler Protection

2021

- **Scoping** for the permitted use of an NFPA 13R sprinkler system in **Group R** occupancies has been **modified** such that the following conditions must **all** be met by the Group R to allow for use of 13R system:
  - Located **≤4 stories above grade plane**, **and**
  - Floor level of highest story **<30' above** lowest level (or lowest story below highest level) of fire department vehicle access. (previously **60'** above grade plane)
- In addition, the **story limit of four** is now to be **measured from grade plane** in podium buildings (Sec. 510.2 and 510.4) rather than from the horizontal assembly separating the two buildings

903.3.1.2 NFPA 13R Sprinkler Protection

2021



2018

- ≤ 4 stories in height
- ≤ 60-foot building height

2021

- 4 stories above grade plane
- Highest story ≤ 30 feet above lowest level of fire dept. vehicle access

* Limit on stories also measured from grade plane when constructed using Sec. 510.2 or 510.4 (podium provisions

903.3.1.2.3 Protection of Attics in Group R Occupancies

2018

- Additional sprinkler protection or **acceptable alternative methods** now required for attics in multi-family occupancies equipped with an **NFPA 13R** system
- Applicable where roof assembly **>55' feet above LLFDA** (mid-rise buildings)
- 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

903.3.1.2.3 Protection of Attics in Group R Occupancies

2018

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

904.14 Domestic Cooking Protection in Institutional and Residential Occupancies

2018

- Automatic fire-extinguishing system now required at required hood over any domestic cooktop or range in:
  - **Group I-1** occupancies
  - **Group R-2** college dormitories
- Previously only required in **Group I-2, Condition 1** occupancies

905.3.1 Class III Standpipes

2018
2021

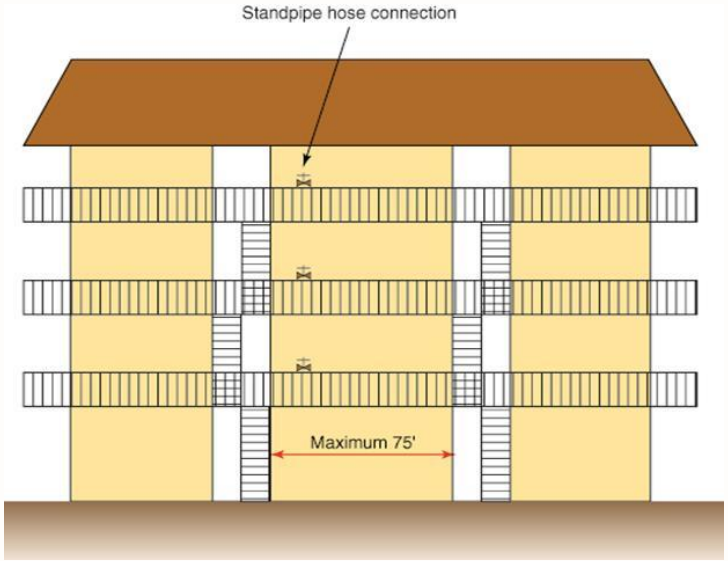
- **Class III** standpipe system required where **≥4 stories** above or below grade plane
- **Class I** standpipes now allowed:
  - In **Group B** occupancies
  - In **Group E** occupancies
  - Where occupant-use hose lines will not be utilized by trained personn or fire department
  - In parking garages

Class I: 2½" hose connection for FD
Class II: 1 ½" hose station for occupants
Class III: 2½" hose connection & 1½" hose station

905.4 Class I Standpipe Connection Locations

2018

- **Class I** standpipe hose connections now to be located at main floor exit stairway landings unless otherwise approved by fire code official
- Single hose connection **permitted** in open corridor or open breezeway between open stairs

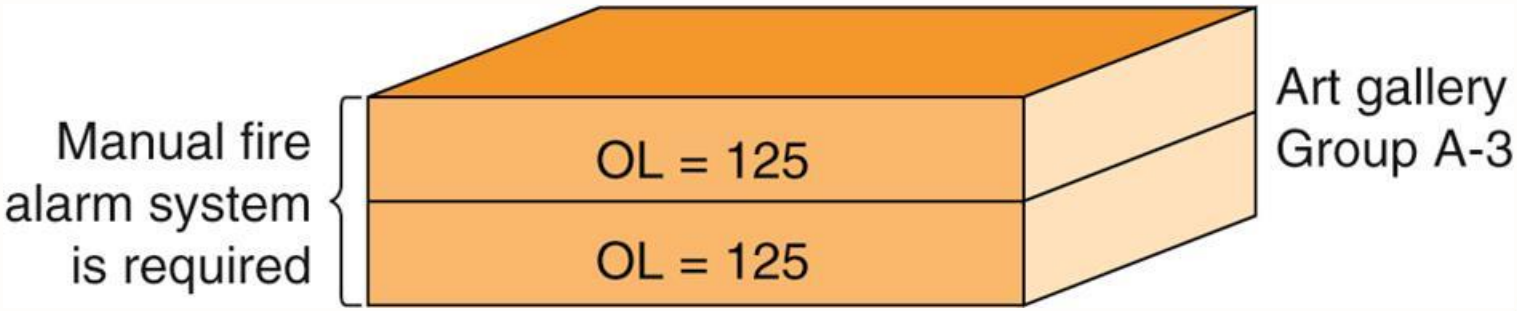


907.2.1 Fire Alarms in Group A Occupancies

2018

- Manual fire alarm system **required** where **Group A** occupant load **>100 above or below** the lowest level of exit discharge

EXAMPLE:



907.2.10 Group R-4 Fire Alarm Systems

2018

- Installation of manual fire alarm system and automatic smoke detection system **no longer required** in **Group R-4** occupancies

907.2.10 Manual Fire Alarms in Group S Buildings

2021

- **Manual** fire alarm system now **required** in **Group S** public- and self-storage occupancies where **both** of following conditions occur:
  - ≥**3**stories in height, **and**
  - Interior corridors and/or interior common areas
  - At least one manual fire alarm box must be installed at an approved location
- Visible notification appliances **not required** within storage units
- Manual fire alarms boxes **not required** where building is fully sprinklered and occupant notification appliances activate throughout notification zones upon sprinkler water flow

907.5.2.1.3 Fire Alarm Occupant Notification

2021

- In sleeping rooms of **Group R-1** and **R-2** occupancies, the audible fire alarm activated by the fire alarm system to now be a **520-Hz** (hertz) **low-frequency signal**
  - Where smoke alarm unable to produce a 520-Hz signal, the signal to be provided by a **listed** notification appliance or smoke detector with an integral 520-HZ sounder

907.5.2.1.3 Fire Alarm Occupant Notification

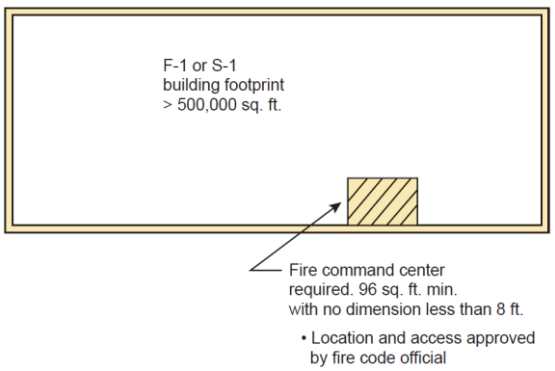
2021

- Low frequency signals have been shown to **improve** the **waking effectiveness** for several high-risk groups, including:
  - Individuals who are **over 65** who are hard of hearing
  - School-age children
  - People who are alcohol impaired
- As there are currently very few smoke alarms capable of providing the low-frequency signal, particularly in back-up mode, other methods include:
  - Fire alarm system horns and horn/strobes
  - Smoke detectors w/integral sounder bases
  - Speakers connected to an EVAC system

911 Fire Command Centers in Groups F-1 and S-1

2021

- Fire command center now required in **Group F-1** and **S-1** occupancies with building footprint **>500,000 sq.ft.**
  - Fire command centers continue to be **required** for high-rise buildings
- Fire command center to be **≥96 sq.ft.** with a minimum dimension of **8'** where **approved** by the fire code official
  - Reduction from general requirement of **≥200 sq.ft.** and **≥10'** minimum dimension



Part 4
Means of Egress
Chapter 10

ICC LEARNING center

Table 1004.5, 1004.8 Occupant Load Calculation in Business Use Areas

2018

TABLE ~~1004.1.2~~ 1004.5 Maximum Floor Area Allowances Per Occupant

Function of Space	Occupant Load Factor[a]
Business areas	~~100~~150 gross
Concentrated business use areas	See Section 1004.8

(No changes to other portions of table.)

Example:

30,000 ft² office space

Concentrated business use area

* OL @ 50 ft²/occupant = 600

- The method of calculating occupant load in business areas has been **revised** which will typically result in **reduced** design **occupant loads**

1006.2.1 Egress from Mechanical Rooms and Penthouses

2021

- **Common path of travel distance** limitations are **no longer applicable** to unoccupied mechanical rooms and penthouses
- These limited use spaces continue to be regulated based on:
  - Occupant load (**Table 1006.2.1**)
  - Exit access travel distance (**Table 1017.2**)

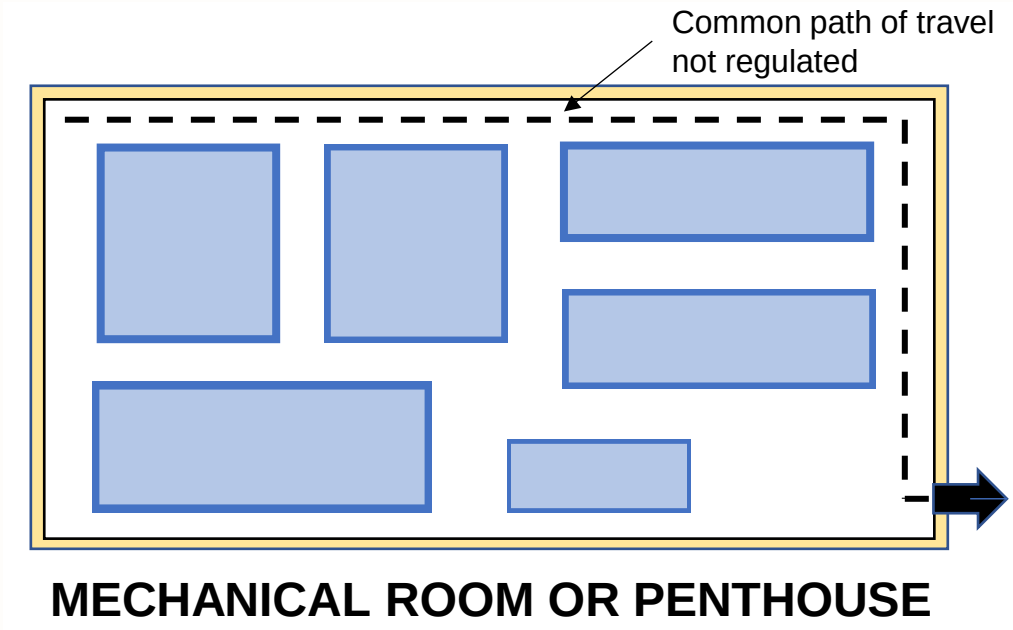
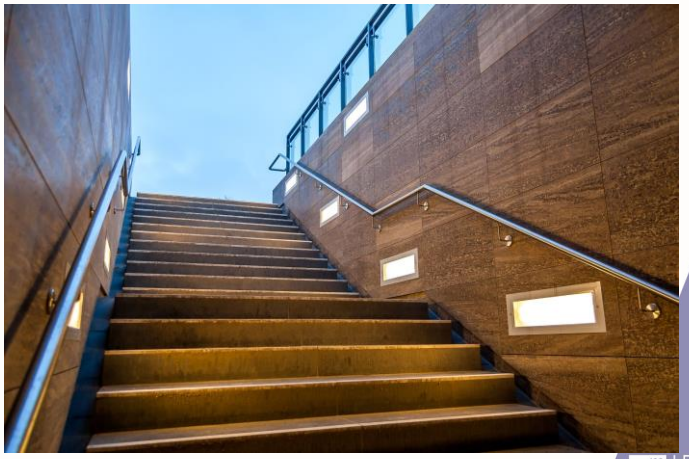


TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE[a]

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200[c]	250[b]
I-1	Not Permitted	250[b]
B	200	300[c]
F-2, S-2, U	300	400[c]
H-1	Not Permitted	75[d]
H-2	Not Permitted	100[d]
H-3	Not Permitted	150[d]
H-4	Not Permitted	175[d]
H-5	Not Permitted	200[c]
I-2, I-3	Not Permitted	200[c]
I-4	150	200[c]

1008.2.1 Stairway Illumination 2021

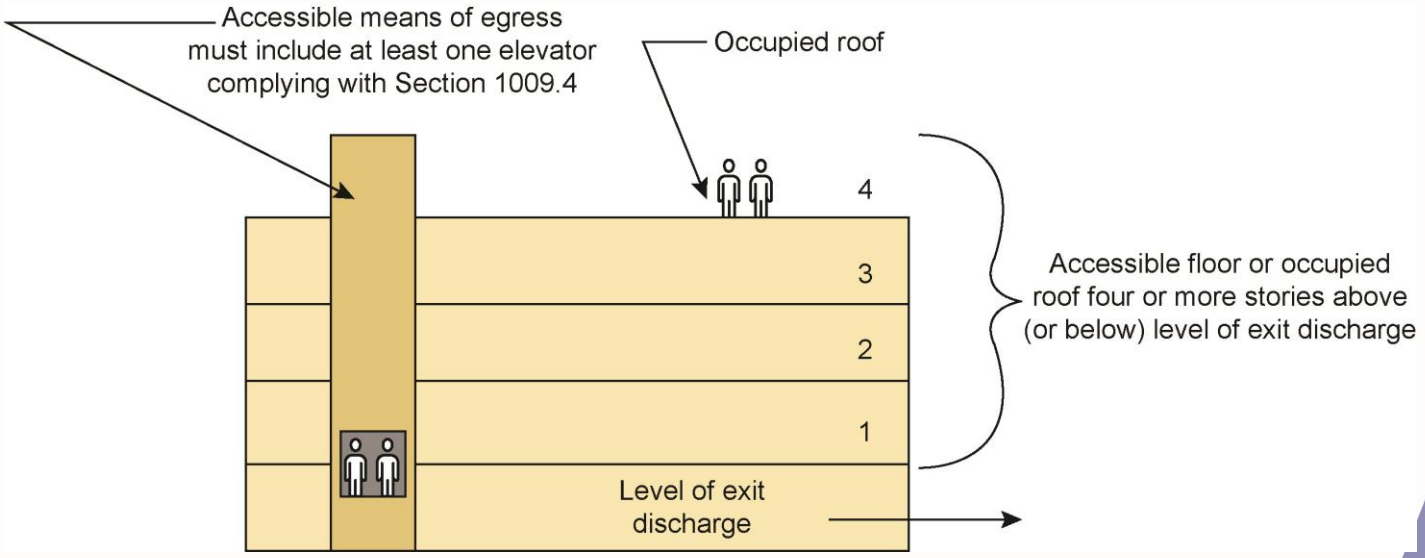
- Exit stairways, exit access stairways and their associated landings must now have an illumination level under normal power of at least **10 footcandles:**
  - **Measured** at the walking surface
  - **Not applicable** to stairs in exit discharge
  - Required only when stairway is **in use**, allowing for occupant-sensor or daylight-responsive controls
  - **Exceptions** for auditoriums, theaters and similar assembly occupancies still applicable
- Considered as an easily accomplished means for **improving stairway safety**



1009.2.1 Accessible Elevators to Occupied Roofs

2021

- An elevator serving a required accessible occupied roof **must** now be considered as one of the required accessible means of egress (**AMOE**) where the roof is located **directly above the 3rd story** above the level of exit discharge

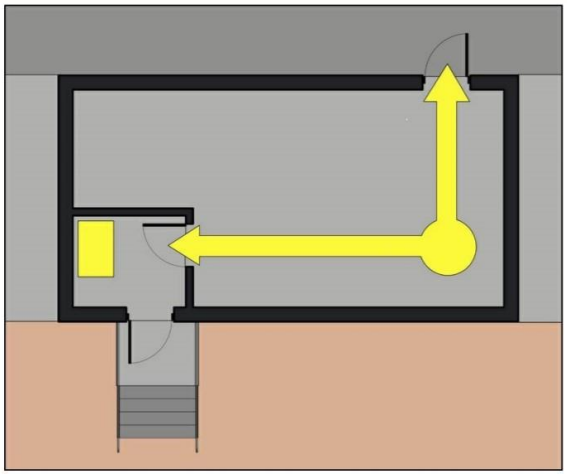


- Having the elevator **available** for independent or possibly assisted rescue will help emergency responders who would help people from the occupied roof

1009.6.2 Areas of Refuge

2021

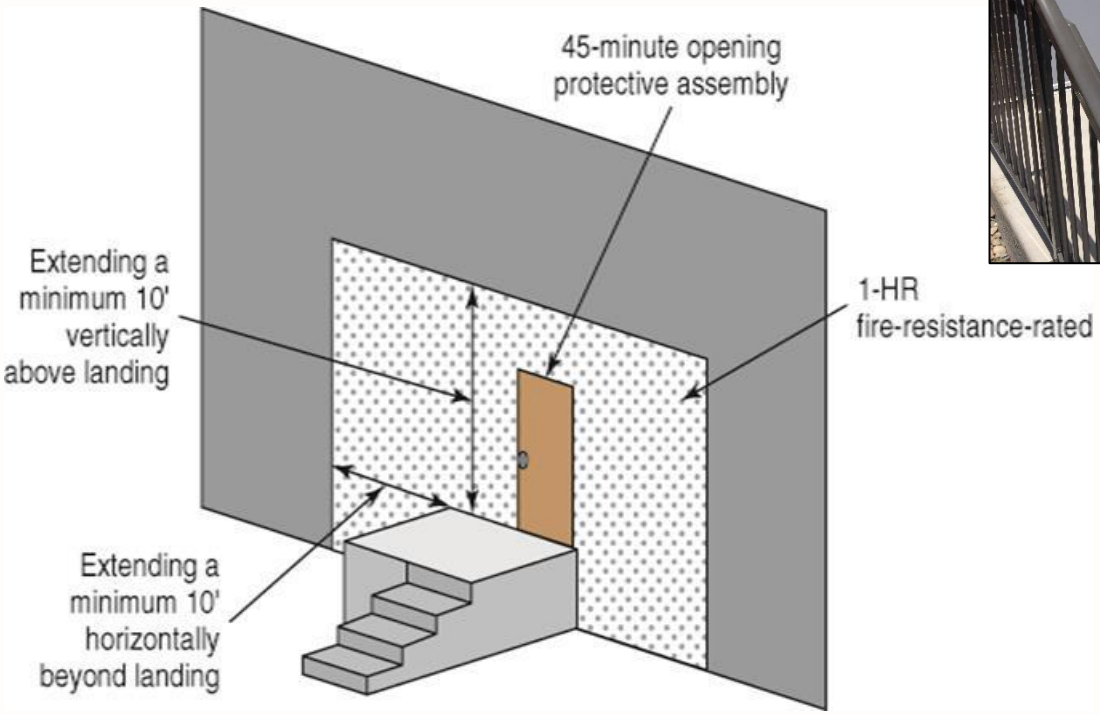
- An **interior** area of refuge **no longer needs** to have direct access to a complying stairway or elevator where the area of refuge:
  - Is located at the level of exit discharge, **and**
  - Provides **direct access** an exterior exit door
- Allows for an **alternative** to an exterior area for assisted rescue which is typically utilized where the exit discharge is not accessible



1009.7.2 Protection of Exterior Areas of Assisted Rescue

2018

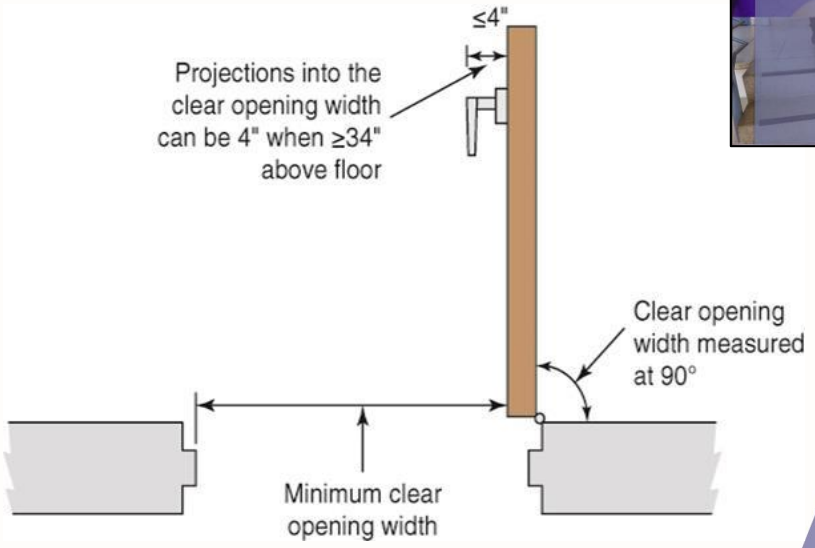
- Wall rating and opening protectives **not required** where building fully **sprinklered**

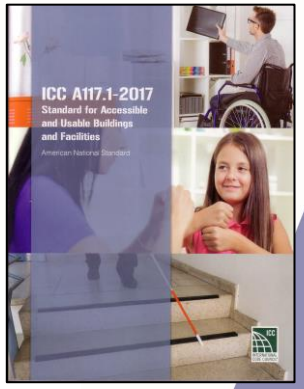


1010.1.1 Size of Doors

2018
2021

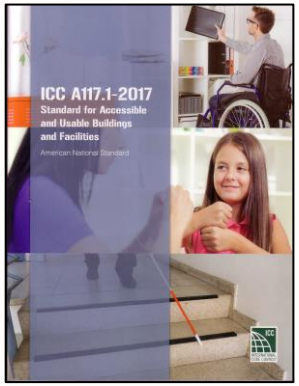
- Door width provisions **reorganized** and **revised** to correlate with technical requirements of **ICC A117.1**, ADA, IFC and IPC
- **48”** maximum **width** of door leaf **deleted**
- Minimum width of **20”** set for certain **non-accessible** single user doors





1010.1.3 Door Opening Forces 2021

- To provide **coordination** with **ICC A117.1-2017**, technical and format changes now address:
  - **Releasing** the latching hardware, **and**
  - **Force to open** an egress door



- **To unlatch doors:**
  - Where door hardware operates by **push or pull**, the operational force not **>15 pounds** (**no change**)
  - Where door hardware operates by rotation, the operational force not to exceed **28-inch pounds** (**new**)
    - Coordinates with Section 404.3.6 of ICC A117.1

1010.1.3 Door Opening Forces 2021

- **To open doors: (no changes)**
  - For **manually-operated**, interior swinging doors (other than doors required to be fire-rated), the **force** for pushing or pulling door **open** not **>5 pounds**
  - For **other** swinging doors, sliding doors, folding doors, and doors required to be fire-rated, door to:
    - Require not more than a 3**0-pound force** to be set in **motion**, **and**
    - Shall move to a **full-open** position when subjected to not more than a **15-pound force**

1010.2.4 Locks and Latches 2021

- In **Group I-1, Condition 2** and **Group I-2** occupancies where clinical needs of care recipients require **containment**, or where such persons pose a security threat, locks and latches are permitted to prevent door operation where:
  - All clinical **staff** can **readily unlock** doors **at all times**
  - All such locks are keyed to **keys carried** by clinical **staff** at all times, or clinical staff **have codes** or other means necessary to operate the locks at all times
- Consistent with federal healthcare regulations
- Locking devices now also **permitted** on doors to balconies, decks and other exterior spaces serving:
  - Private office spaces where exterior space **≥250 sq.ft.**
  - Individual dwelling or sleeping units

1010.2.4 Locks and Latches

2021

- Where occupants must egress from an exterior space through the building, exit access doors **permitted** to equipped with an **approved** locking device.
  - Applicable to enclosed courtyards, occupied roofs, decks and other exterior areas
  - Not applicable to egress courts
- **Six conditions** must be met in order for the locking to be permitted:

1010.2.4 Locks and Latches

2021

- **6 Conditions include:**
  1. Maximum occupant load **posted** per Section 1004.9 **inside** building adjacent to all exit access doorways.
  2. **Weatherproof** telephone or two-way **communication system** installed on exterior side adjacent to at least one required exit access door.
  3. Locking device to be **key-operated** and **readily distinguishable** as locked.
  4. Minimum **5 sq.ft.** clear window or glazed door opening provided at each exit access door.
  5. **Signage** posted on interior side at each locked door stating "**THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED**".
  6. Occupant load of exterior area limited to **300**.

1010.2.8 Locking Arrangements in Educational Occupancies

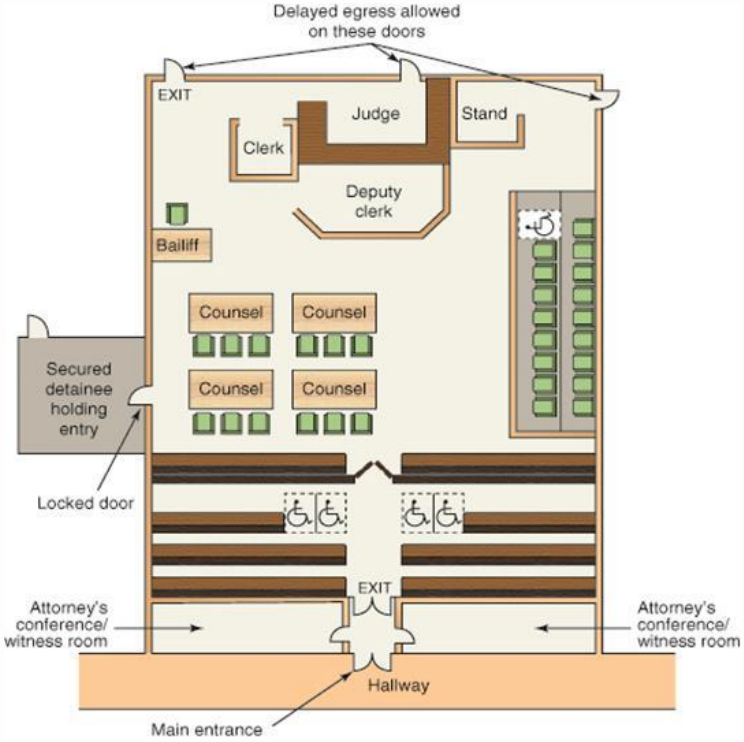
2018
2021

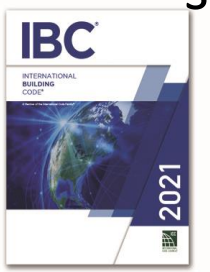
- Applicable to **Groups E, B** and **I-4**
- Addresses locking devices designed to keep intruders from entering room
- **Conditions** include:
  - Allows for outside unlocking
  - Openable from **within** room
  - Allows **remote** operation
  - **Modifications** to door hardware or closers **not permitted**

1010.2.13 Use of Delayed Egress Locking Systems in Classrooms and Courtrooms

2018
2021

- Delayed egress locking devices now **permitted** on **Group E** classrooms with an occupant load **<50**
- Also **permitted** on **courtroom** (A-3 or B) means of egress doors other than main door(s) where building is sprinklered

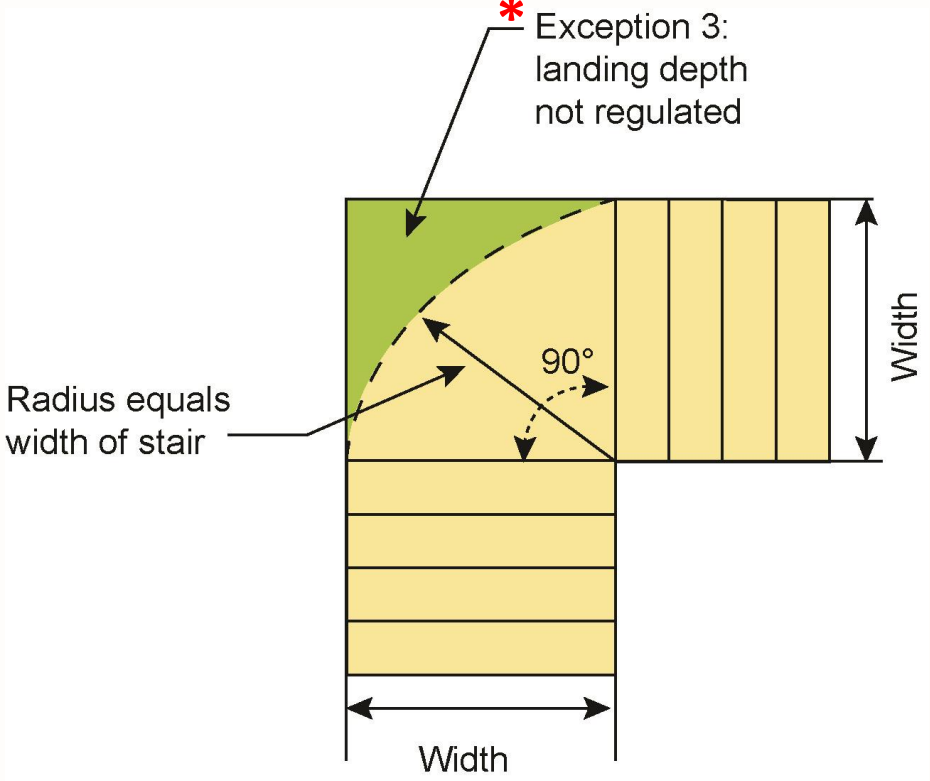




1011.6 Stairway Landings

2021

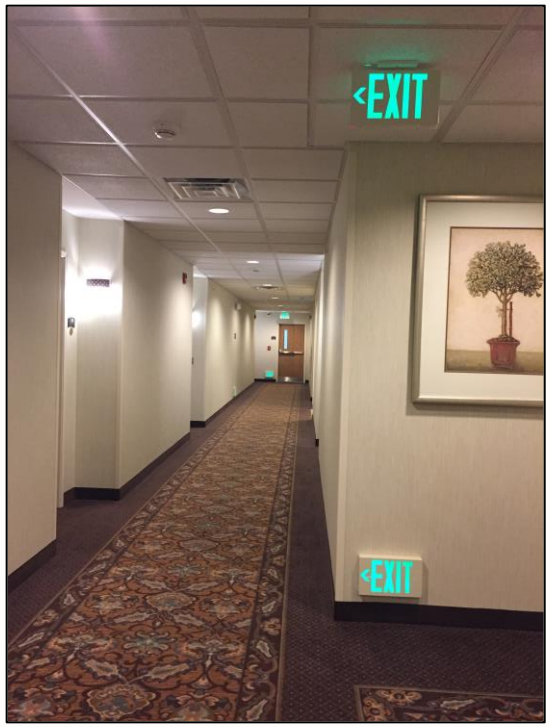
- Where landing turns **≥90°**, minimum landing depth **not regulated** where landing provided is **not less than** that described by an arc with a radius equal to width of the flight served

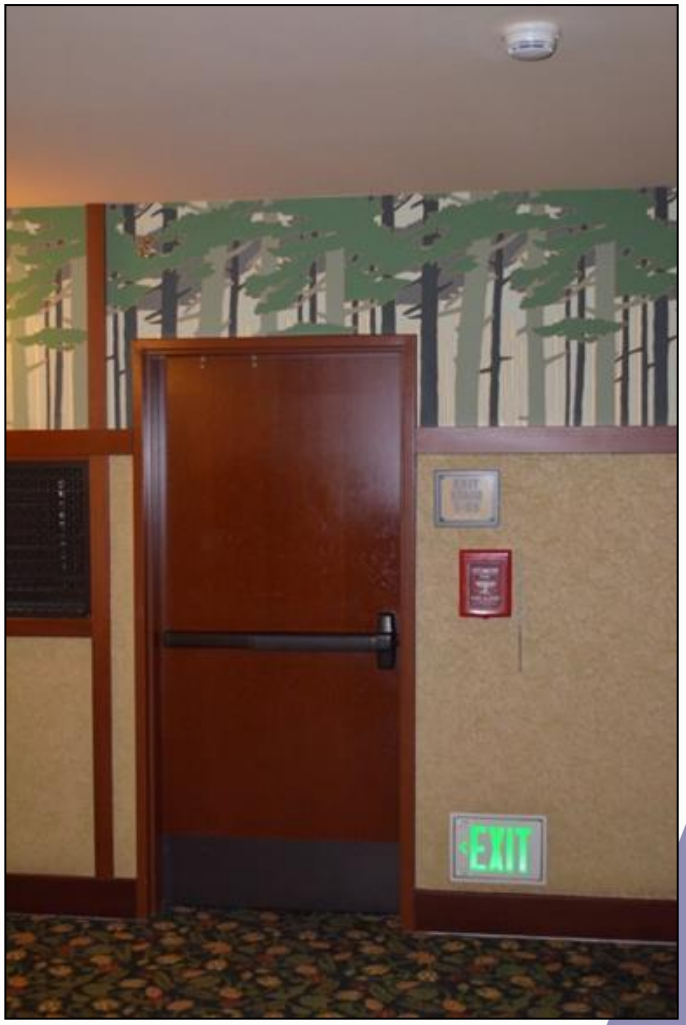


1013.2 Floor Level Exit Sign Location

2018

- Bottom of ‘low-level’ exit signs now limited to **≤18”** above floor level





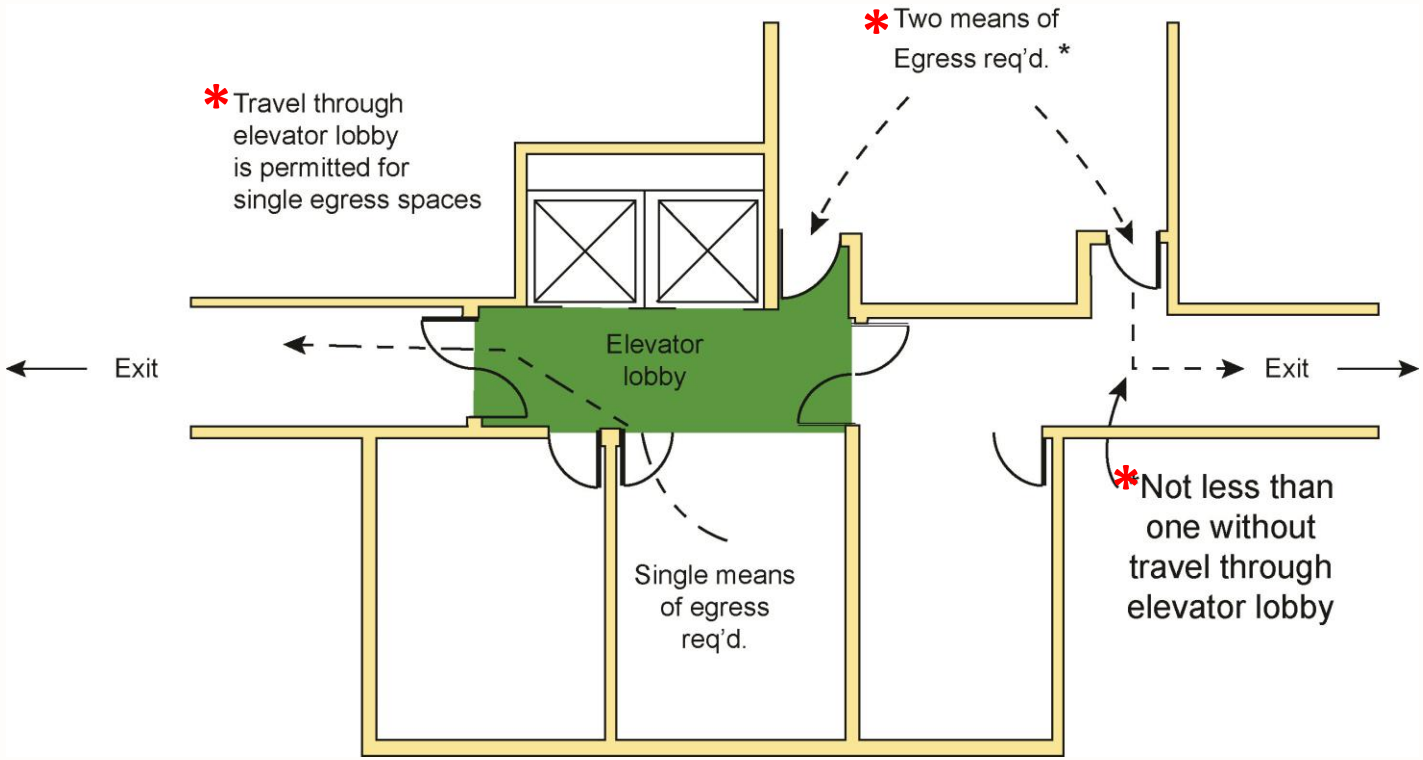
1016.2 Egress Through Intervening Spaces

2021

- Egress through an **enclosed** elevator lobby now **permitted** for spaces having a single means of egress
- Previous language mandated that access to not less than one of required exits to be provided without travel through an enclosed elevator lobby
  - Such requirement still **applicable** to spaces where **≥2** means of egress are required
- Applicable for **both** nonrated and rated corridors

1016.2 Egress Through Intervening Spaces

2021

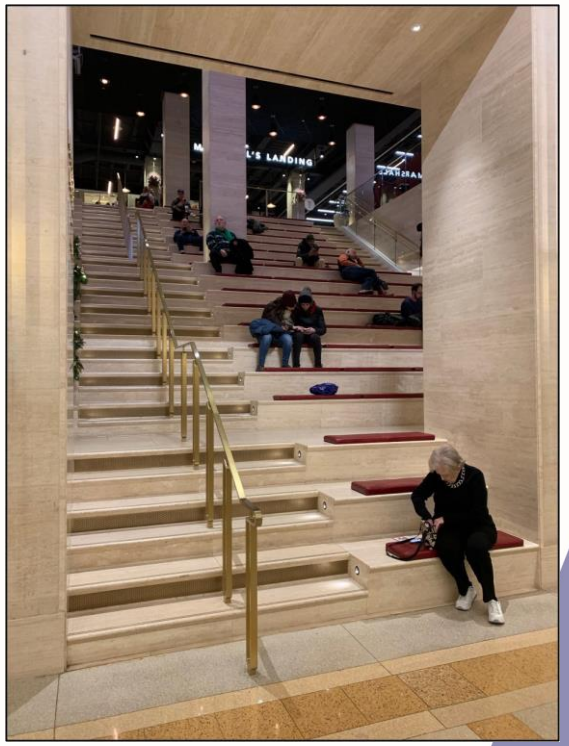


1030.16 Handrails at Social Stairs

2021

- Guidance has been provided to address handrails on those stairs, primarily in **Group A** and **Group E** occupancies, that are a **combination** of stairway travel and assembly seating

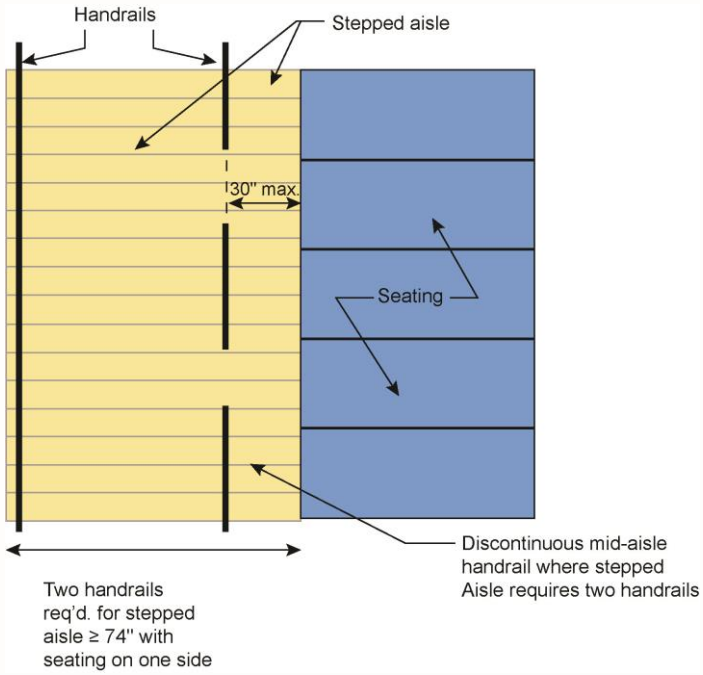
- Based on the assembly stepped aisle provisions, the condition is viewed as an **assembly seating area** with the **seating platforms** (without seats) located to the side of the stepped aisle

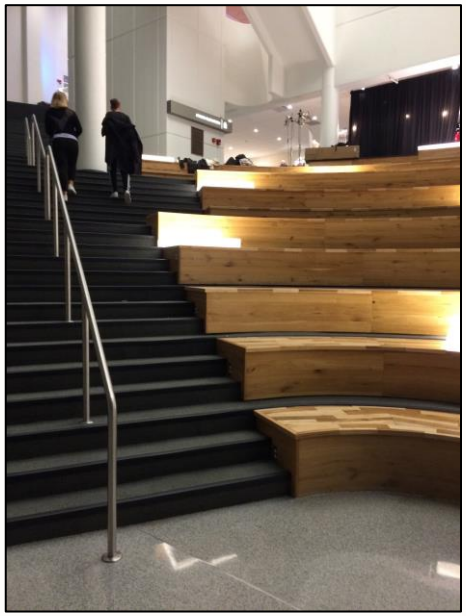


1030.16 Handrails at Social Stairs

2021

- Where the stepped aisle has **seating** on **one side** and the aisle width is **≥74”**, two handrails are required (with at least one **<30”** of the stepped aisle)
  - Where the stepped aisle is required to have **2** handrails, mid-aisle handrails to be **discontinuous**

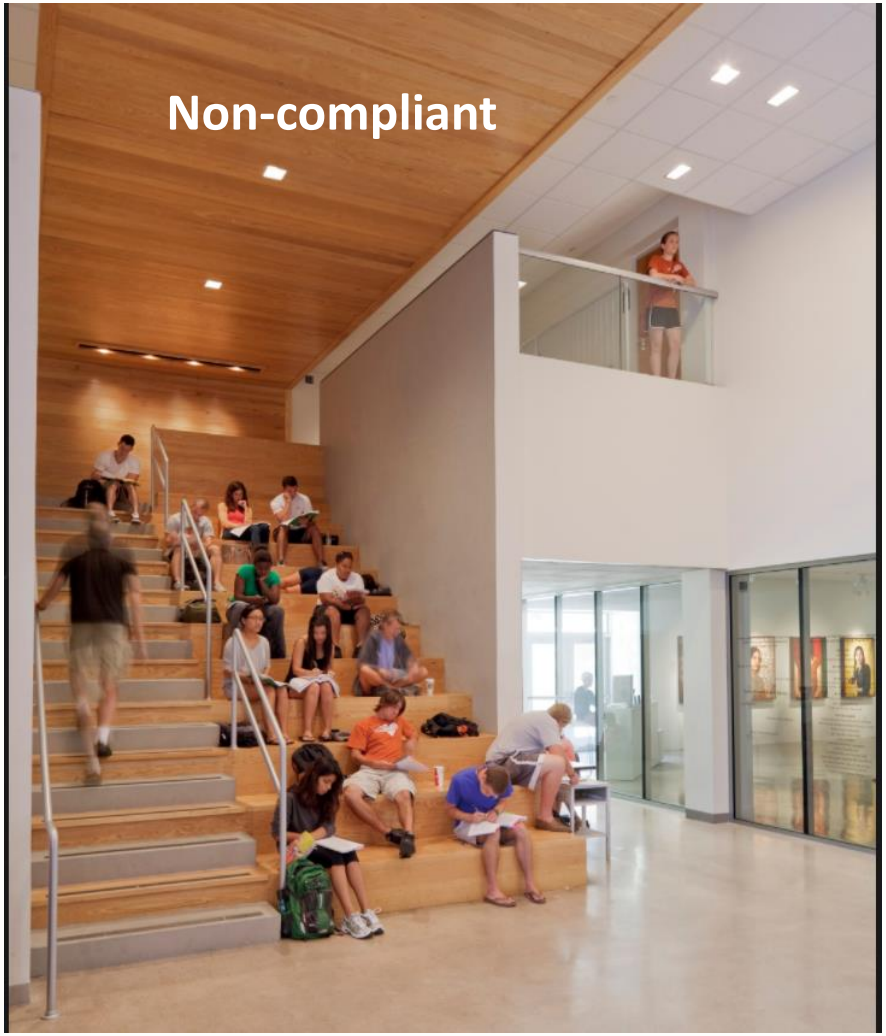




Non-compliant

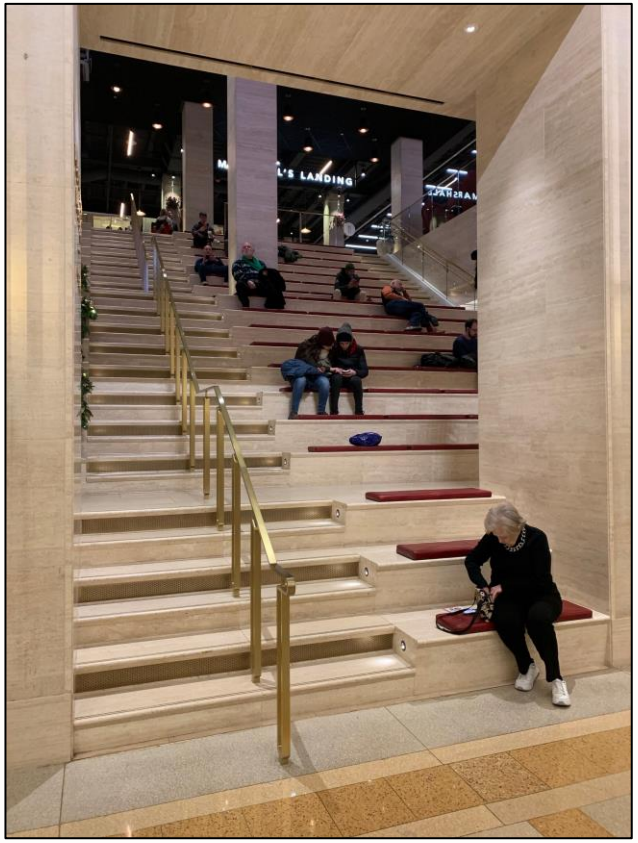
1030.16 Handrails at Social Stairs - Example

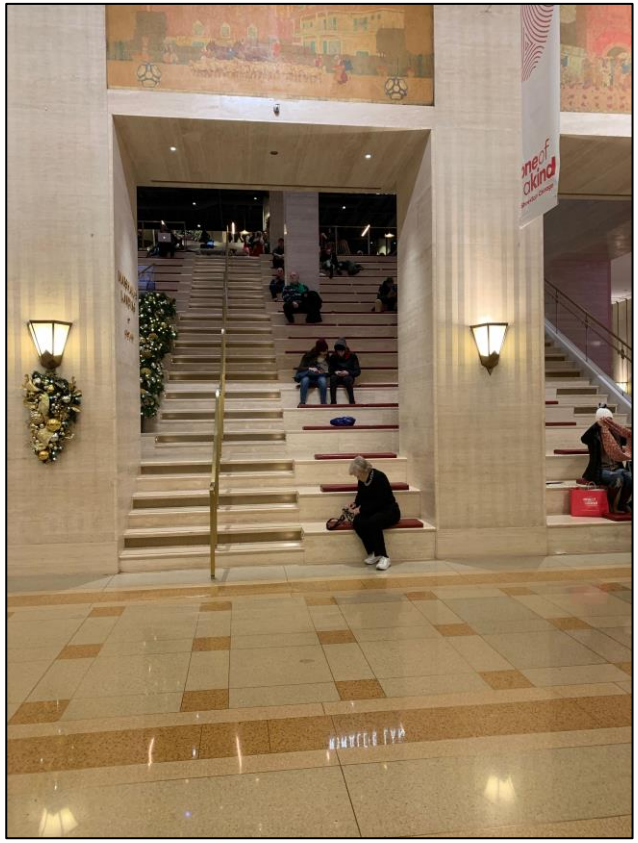
2021



1030.16 Handrails at Social Stairs - Example

2021

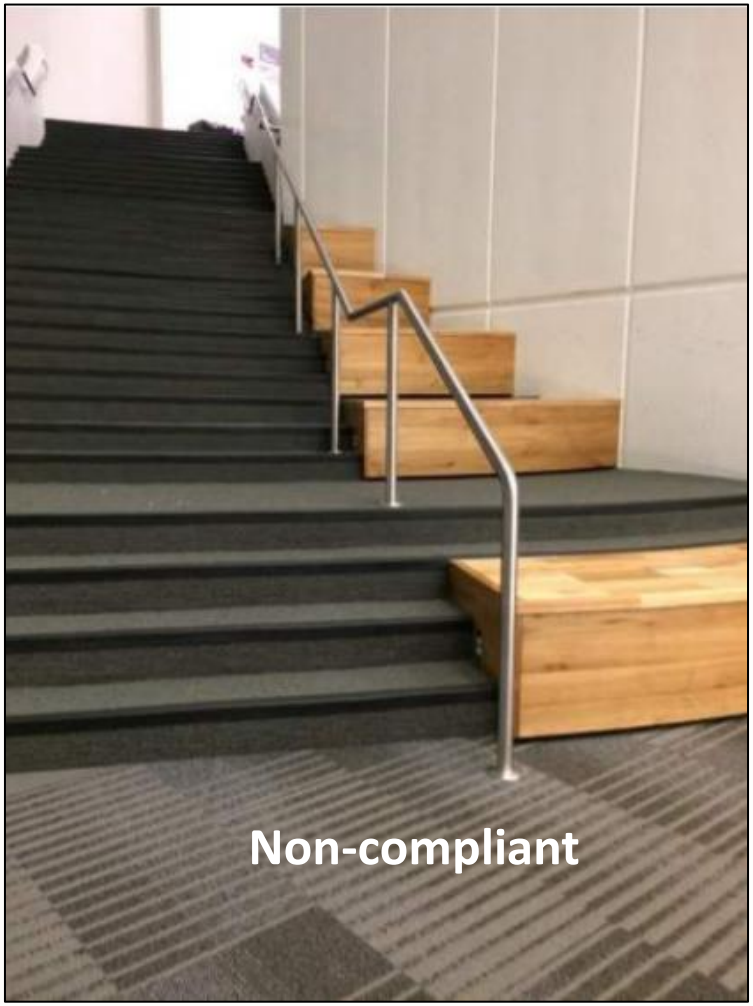




Possibly compliant

1030.16 Handrails at Social Stairs - Example

2021



1030.16 Handrails at Social Stairs - Example

2021

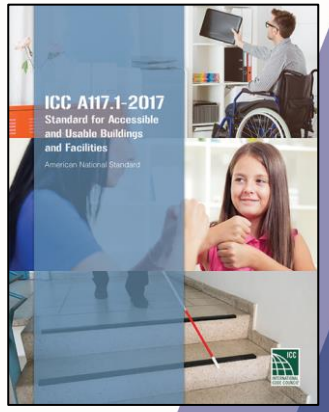
Part 5
Accessibility
Chapter 11

LEARNING center

1102 Accessible Design Compliance

2021

- The **ICC A117.1** standard as referenced by the IBC for the design and construction of accessible buildings and facilities has been **updated** from the 2009 edition to the **2017** edition
- Many of the major **revisions** are addressed in the ICC publication **Significant Changes to the ICC A117.1 Accessibility Standard**, 2017 Edition, including:
  - **Enhanced** dimensions for clear floor spaces and turning spaces
  - **Modifications** to exterior routes, curb cuts, blended transitions, detectable warnings, passenger drop-offs and parking facilities



1103.2.14 Access to Walk-In Coolers and Freezers

2018

- Walk-in cooler and freezer **equipment exempted** from accessibility provisions where **accessed only** from work areas

1105.1.1 Automatic Doors at Public Entrances

2021

- In **specified occupancies** with sizable occupant loads, the accessible public entrances must now be **provided** with an automatic door
  - Where an automatic door is required by **Table 1105.1.1**, it shall be either a **full power-operated** door or a **low-energy** power-operated door

TABLE 1105.1.1 Public Entrance with Power-Operated Door[a]

Occupancy	Building Occupant Load Greater Than
A-1, A-2, A-3, A-4	300
B, M, R-1	500

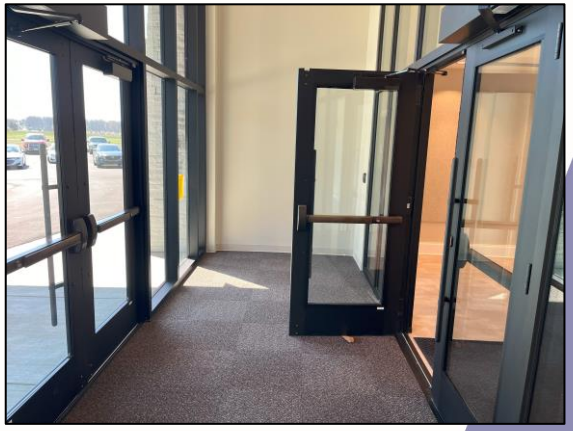
a. In mixed-use facilities where the total sum of the building occupant load is greater than those listed, the most restrictive building occupant load shall apply.

- The thresholds chosen are consistent with those for **Risk Category III** of Table 1604.5 when addressing Assembly occupancies, and the need for a third exit (Table 1006.3.3) when serving the other occupancies

1105.1.1 Automatic Doors at Public Entrances

2021

- In mixed-occupancy buildings where total building occupant load exceeds that listed, the **most restrictive** building occupant load shall apply, **for example**:
  - Where Group B has OL of 300 and Group A-3 has OL of 100, total OL of 400, automatic door required based on Group A-3 tabular threshold
  - Where Group B has OL of 450 and Group E has OL of 60, total OL of 510, automatic door required based on Group B tabular threshold
- Where the public entrance includes a vestibule, at least **one door into and one door out of** the vestibule must comply with the requirements



1107.2 Vehicle Charging Stations

2021

- **New scoping** provisions now require electrical vehicle charging stations to meet limited accessibility criteria
  - Charging stations provided to serve **Group R-2, R-3** and **R-4** occupancies are **not required to comply**
- To be viewed as a "**service**" rather than a parking space
- Neither the IBC nor ICC A117.1 mandate the installation of such stations, but **if** they are **provided, they must comply** with limited accessibility requirements:
  - Minimum of **5%** of vehicle spaces on site, but **≥1** of **each type** of system, shall be **accessible**
  - Where charging stations are located at multiple locations on sites, **accessible** charging stations are **not necessarily required** at each location

1107.2 Vehicle Charging Stations

2021

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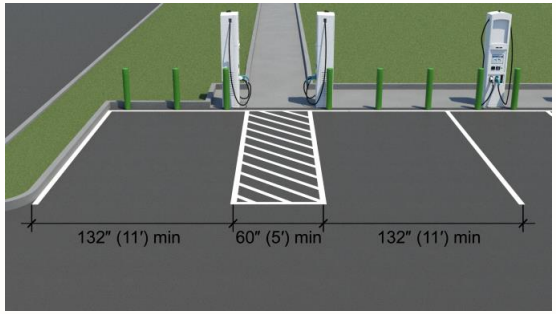
  - Where charging stations are located at multiple locations on sites, **accessible** charging stations are **not necessarily required** at each location

1107.2 Vehicle Charging Stations

2021

- **Accessible** vehicle spaces to comply as for a van accessible parking space, with:
  - **132”** minimum width, **and**
  - Minimum **60” wide** access aisle



- In addition, applicable provisions of ICC A117.1 **Section 502** must be met, including:
  - Access aisle
  - Floor surface
  - Vertical clearance
- A117.1 Section **502.11** specific to vehicle charging stations addresses:
  - Operable parts
  - Accessible route
  - Obstructions

1108.5, 1110.2 Assisted Toileting and Bathing

2021

- **Changes** have been made to the provisions for nursing homes and assisted living facilities to allow some units to have toilet and bathing facilities designed for assisted use
  - These allowances are permitted instead of the independent use facilities generally intended by the **ICC A117.1** Accessible unit provisions
- Both **scoping** (**what, where and how many**) and **technical provisions** (**how things are made accessible**) are provided in IBC
- The assisted use provisions are optional and can be applied when desired by the designer
  - Units **may** be **modified** for toileting, bathing or both

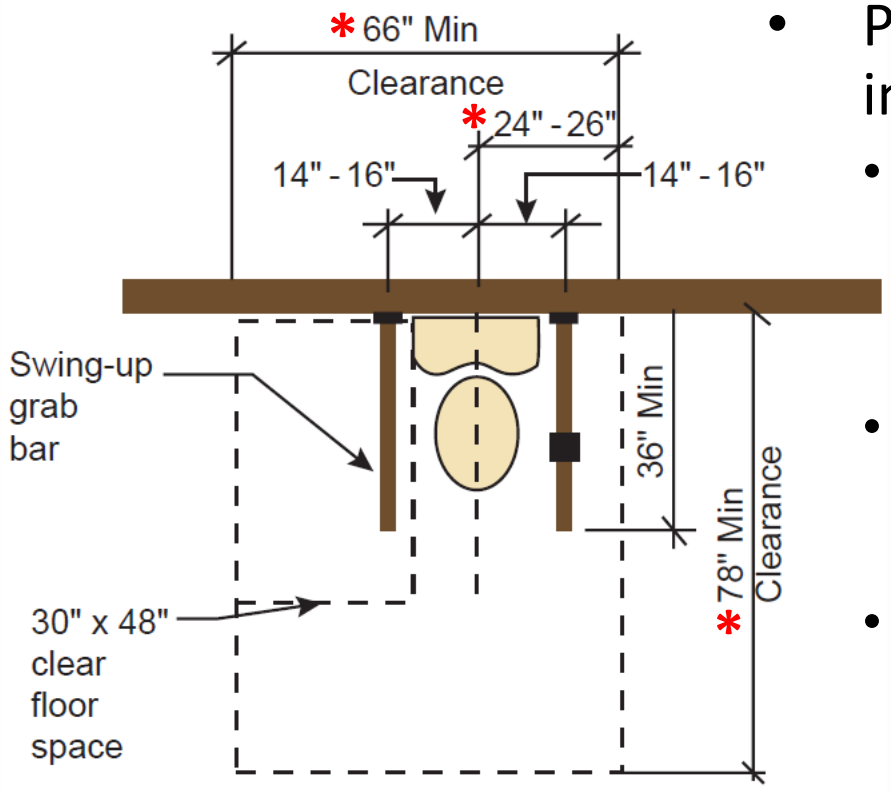
1108.5, 1110.2 Assisted Toileting and Bathing

2021

- Assisted water closets and roll-in-type showers **may replace** like fixtures in **up to 50**% of Accessible units in the following occupancies:
  - **Group I-1, Conditions 1 and 2**
  - **Group I-2** rehabilitation facilities
- Assisted water closets and roll-in-type showers may replace like fixtures in up to **90%** of Accessible units in the following occupancies:
  - **Group I-2** nursing homes

1108.5, 1110.2 Assisted Toileting

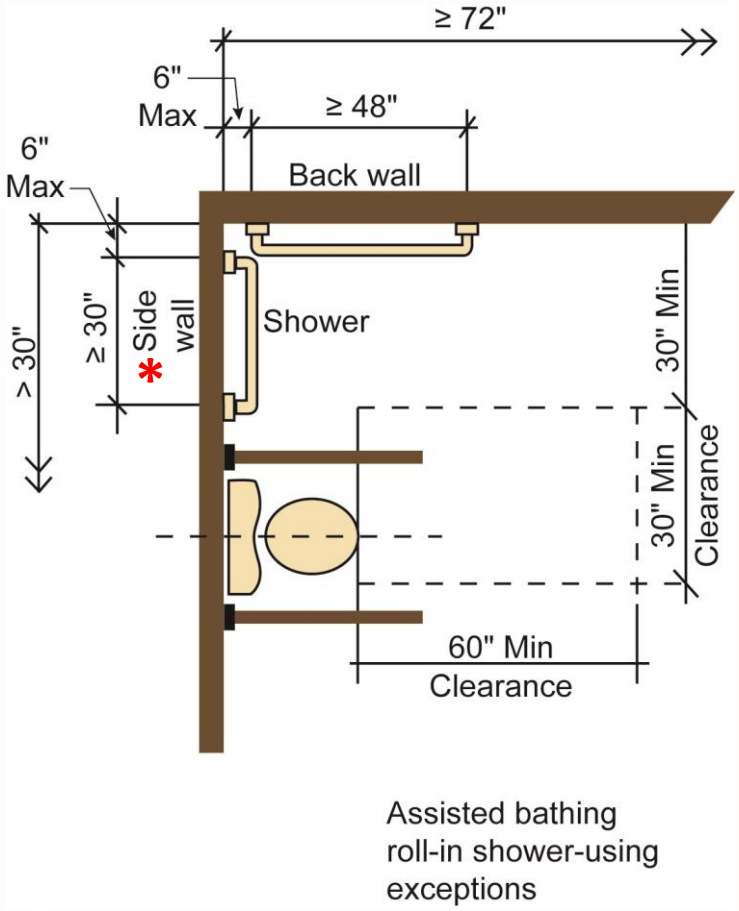
2021



- Primary **technical changes** include:
  - **Increased clearance around** water closet of **66”** with clearance of **24” - 26”** from centerline of fixture
  - **Increased clearance depth** of **78”** to allow for additional approach options
  - **Allowance** for swing-up grab bars that are typically only permitted in Type B units
  - Toilet paper dispenser to be installed on at least one of the swing-up grab bars

1108.5, 1110.2 Assisted Bathing

2021



Assisted bathing roll-in shower-using exceptions

- Primary **technical change** is **elimination** of required folding seat
- **Allows** for use of rolling chair when necessary
- Sidewall and backwall grab bars now **differ**, with side-wall bar required on 'seat wall' and both grab bars starting in corners

1110.2.1.2 Fixtures in Family or Assisted-Use Toilet Rooms

2018

- **Additional** fixtures permitted in a family or assist-use toilet room now include:
  - Child-height water closet
  - Child-height lavatory
- Provides **additional** accommodation on an optional basis

Part 6
Building Envelope, Special Inspections and Tests, and Construction Materials
Chapters 12-15, 17 and 25

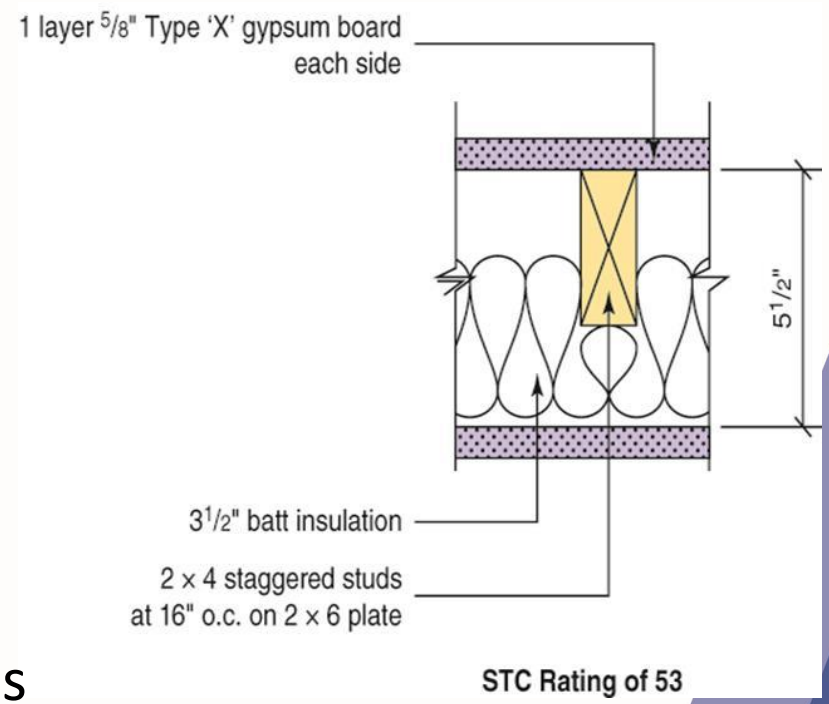
ICC LEARNING center

Chapter 12
Interior Environment

1206.2, 1206.3 Engineering Analysis of Sound Transmission

2018
2021

- **Performance-based** approach to sound transmission compliance
- Based on a comparison with designs tested to **ASTM E90**
- Applies to **both**:
  - Air-borne sound
  - Structural-borne sound
- 2021 added separate test standards for lab and field tests



1207 Enhanced Classroom Acoustics

2021

- In **Group E** occupancies, enhanced classroom acoustics **shall be provided** in all classrooms having a volume of **≤20,000 cu.ft.**
- Intended to apply to standard-sized self-contained classrooms, but not larger spaces for activities such as band or choir
  - Also not intended to apply to ancillary spaces, such as individual tutoring rooms, corridors, or a cafeteria
- Good acoustics are essential to support language acquisitions and learning for all children
- Assistive technologies typically only amplify the teacher and do not amplify discussions between students or between teacher and individual student

1207 Enhanced Classroom Acoustics

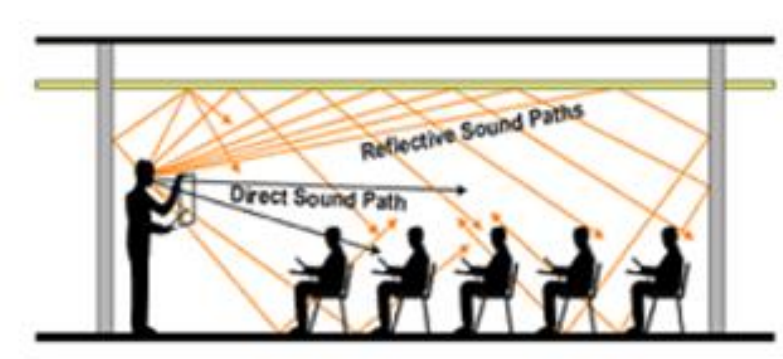
2021

- Such acoustics to be in compliance with **Section 808** of ICC A117.1, including regulation of:
  - **Reverberation times** (how quickly sound decays in a room) **based on either the performance method or prescriptive method**
  - Ambient sound levels from sources both inside and outside of the classroom

1207 Enhanced Classroom Acoustics

2021

- In addressing reverberation times, both **performance** and **prescriptive** methods are available
- Reverberation time measures how **quickly sound decays** in a room
- Sound levels **not to exceed 35 dBA** (**A**-weighted sound pressure level) **and 55 dBC** (**C**-weighted sound pressure level)
  - The ambient sound levels must be **measured** in **both dBA** and **dBC**
  - The **dBA** filter measures **mid-range** frequencies, while the **dBC** filter measures **low** and **high** frequencies



Chapter 14
Exterior Walls

1406.10 Metal Composite Material (MCM) Cladding

2021

- Metal composite materials (**MCM**) and systems installed on buildings of Type I, II, III and IV construction are now **regulated** based upon one of **two conditions**:
  - Such installations that are **>40'** above grade plane must comply with:
    - Surface-burning characteristics
      - **Flame spread index ≤25**
      - **Smoke developed index ≤450**
    - Thermal barrier separation
      - Minimum **½"** gypsum board or test per **NFPA 275**
    - Acceptance criteria of **NFPA 285**
      - Addresses exterior non-load-bearing wall assemblies containing combustible components
  - Such installations that **≤40'** above grade plane need only comply with surface-burning characteristics and thermal barrier separation

1406.10 Metal Composite Material (MCM) Cladding

2021

- Previously, all MCM cladding on buildings of other than Type V to meet all **three conditions**, **or** meet **alternative conditions** of **Sections 1406.4 - 1406.13**
- **Allowance** for use of **alternative conditions** has been **deleted**, thus removing issues addressing:
  - Fire separation distance
  - MCM surface area limitation and separation
  - Sprinkler protection throughout building
- **Modification** addresses any confusion in the various requirements, as well as **eliminating allowances** previously provided where building is sprinklered

Chapter 15

Roof Assemblies and Rooftop Structures

LEARNING center

1504.4.3 Metal Roof Shingles

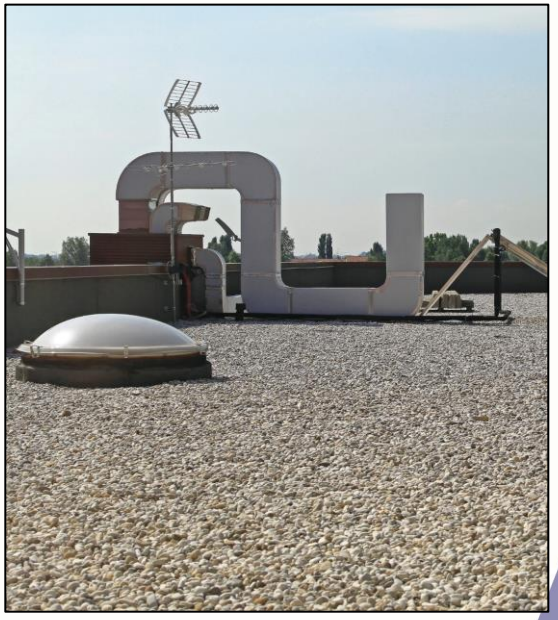
2018

- Metal roof shingles now addressed **independent** from other metal panel roof systems
- Reference made to applicable **standards** for:
  - Labeling
  - Testing for wind resistance

1504.9 Aggregate-surfaced Roof

2021

- **Minimum parapet heights** have been established for aggregate-surfaced roofs to **prevent** blow-off
- **New Table 1504.9** now mandates minimum heights based on:
  - Aggregate size
  - Mean roof height
  - Wind exposure
  - Basic design wind speed
- Provides engineering and scientific basis for roof design to prevent blow-off based on wind tunnel tests subsequent field studies of hurricane damage



1504.9 Aggregate-surfaced Roof

2021

- Past provisions were not based on a quantitative analysis of observed roofing system performances on real wind events, but rather variations in surface pressure with building height
- **Table 1504.8** previously either permitted or prohibited aggregate used as surfacing for roof coverings or ballast solely based on:
  - Maximum mean roof height
  - Design wind load
  - Exposure category
- **Conditions where no parapets are provided are no longer allowed**

1504.9 Aggregate-surfaced Roof 2021

TABLE 1504.9 Minimum Required Parapet Height (inches) for Aggregate Surfaced Roofs[a,b,c]

Aggregate Size	Mean Roof Height (ft)	Wind Exposure and Basic Design Wind Speed (mph)																	
		Exposure B									Exposure C[d]								
		≤95	100	105	110	115	120	130	140	150	≤95	100	105	110	115	120	130	140	150
ASTM D1863 (No.7 or No.67)	15	2	2	2	2	12	12	16	20	24	2	13	15	18	20	23	27	32	37
	20	2	2	2	2	12	14	18	22	26	12	15	17	19	22	24	29	34	39
	30	2	2	2	13	15	17	21	25	30	14	17	19	22	24	27	32	37	42
	50	12	12	14	16	18	21	25	30	35	17	19	22	25	28	30	36	41	47
	100	14	16	19	21	24	27	32	37	42	21	24	26	29	32	35	41	47	53
	150	17	19	22	25	27	30	36	41	46	23	26	29	32	35	38	44	50	56
ASTM D1863 (No.6)	15	2	2	2	2	12	12	12	15	18	2	2	2	13	15	17	22	26	30
	20	2	2	2	2	12	12	13	17	21	2	2	12	15	17	19	23	28	32
	30	2	2	2	2	12	12	16	20	24	2	12	14	17	19	21	26	31	35
	50	12	12	12	12	14	16	20	24	28	12	15	17	19	22	24	29	34	39
	100	12	12	14	16	19	21	26	30	35	16	18	21	24	26	29	34	39	45
	150	12	14	17	19	22	24	29	34	39	18	21	23	26	29	32	37	43	48

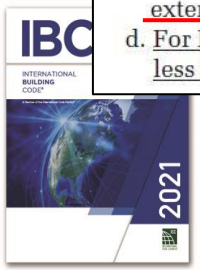
For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s.

a. Interpolation shall be permitted for mean roof height and parapet height.

b. Basic design wind speed, *V*, and wind exposure shall be determined in accordance with Section 1609.

c. Where the minimum required parapet height is indicated to be 2 inches (51 mm), a gravel stop shall be permitted and shall extend not less than 2 inches (51 mm) from the roof surface and not less than the height of the aggregate.

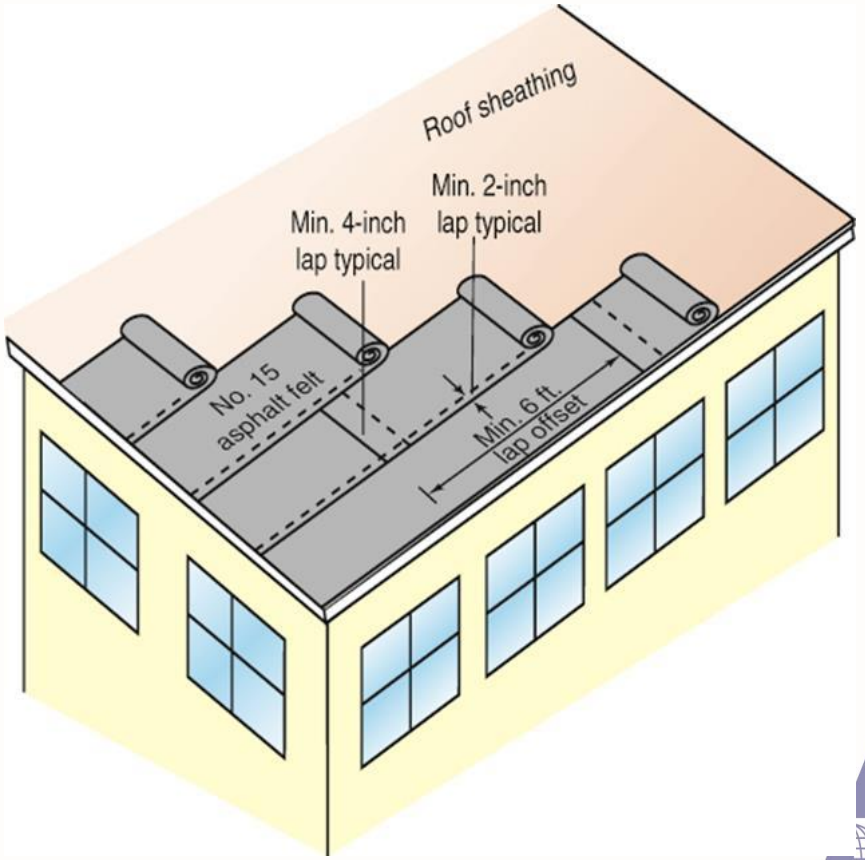
d. For Exposure D, add 8 inches (203 mm) to the parapet height required for Exposure C and the parapet height shall not be less than 12 inches (305 mm).



1507.1.1 Underlayment

2018

- Underlayment and ice barrier requirements **relocated** to a single location in code to address:
  - Type
  - Attachment
  - Application



1507.1.1 Underlayment

2018

TABLE 1507.1.1(2) Underlayment Application

Roof Covering	Section	Maximum Basic Design Wind Speed, V < 140 mph	Maximum Basic Design Wind Speed, V ≥ 140 mph
Asphalt shingles	1507.2	For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm). End laps shall be 4 inches (102 mm) and shall be offset by 6 feet (1829 mm). Distortions in the underlayment shall not interfere with the ability of the shingles to seal. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm). Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches (102 mm) and shall be offset by 6 feet (1829 mm).	Same as Maximum Basic Design Wind Speed, V < 140 mph except all laps shall be not less than 4 inches (102 mm).

- Underlayment and ice barrier requirements have been **relocated** from sections describing each type of roofing material and placed into one **new section** describing the type, attachment and application of underlayment

Chapter 16

Structural Design

Table 1604.5 Public Assembly Spaces in Risk Category III

2021

- **Risk Category III** has been assigned to those buildings whose **primary occupancy is not public assembly**, but have **one or more** public assembly spaces with an occupant load **>300** and a **cumulative** occupant load of such assembly spaces that **>2,500**
  - Eliminates inconsistency in risks associated with large assembly spaces
- **Risk Category III** also now **applies** to **Group I-4** occupancies where occupant load **>250**, or where combined occupant load of **Groups I-4** and **E >250**

Table 1604.5 Public Assembly Spaces in Risk Category III

2021

TABLE 1604.5 Risk Category of Buildings and Other Structures

Risk Category	Nature of Occupancy
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of the public assembly spaces of greater than 2,500. • Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250. *(Other Risk Category III criteria remain unchanged)*

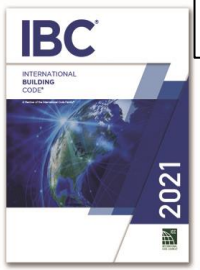


Table 1604.5 Public Assembly Spaces in Risk Category III

2021

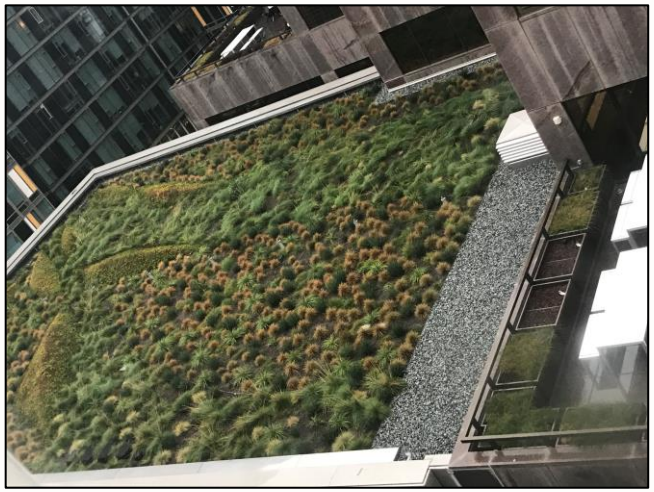
- **Risk Category III** previously only applied to public assembly condition where the assembly activity is the **primary occupancy** and the occupant load **>300**
- **Example** of new RC III designation:
  - 5-story hotel with conference center where hotel is building's primary occupancy
  - 2 ballrooms with 1,200 occupants each
  - 3 meeting rooms with 90 occupants each
  - Total assembly occupant load: 2,670
  - **At least one assembly room with >300 occupants, and total assembly occupant load >2,500, thus Risk Category III**

1606.5 Vegetative/Landscaped Roof Dead Loads

2021

- The weight of all landscaping and hardscaping materials on roof to be considered as **dead load**
- In determination of most severe load effects on structure, **computed weight** to consider both:
  - Fully saturated soil and drainage layer materials
  - Fully dry soil and drainage layer materials

Failure



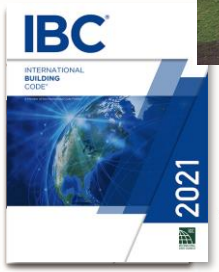


Table 1607.1 Deck Live Load

2018

TABLE 1607.1 Minimum Uniformly Distributed Live Loads, L_0, and Minimum Concentrated Live Loads

Occupancy or Use	Uniform (psf)	Concentrated (pounds)
5. Balconies and decks[h]	1.5 times the live load for the area served, not required to exceed 100 ~~Same as occupancy served~~	—

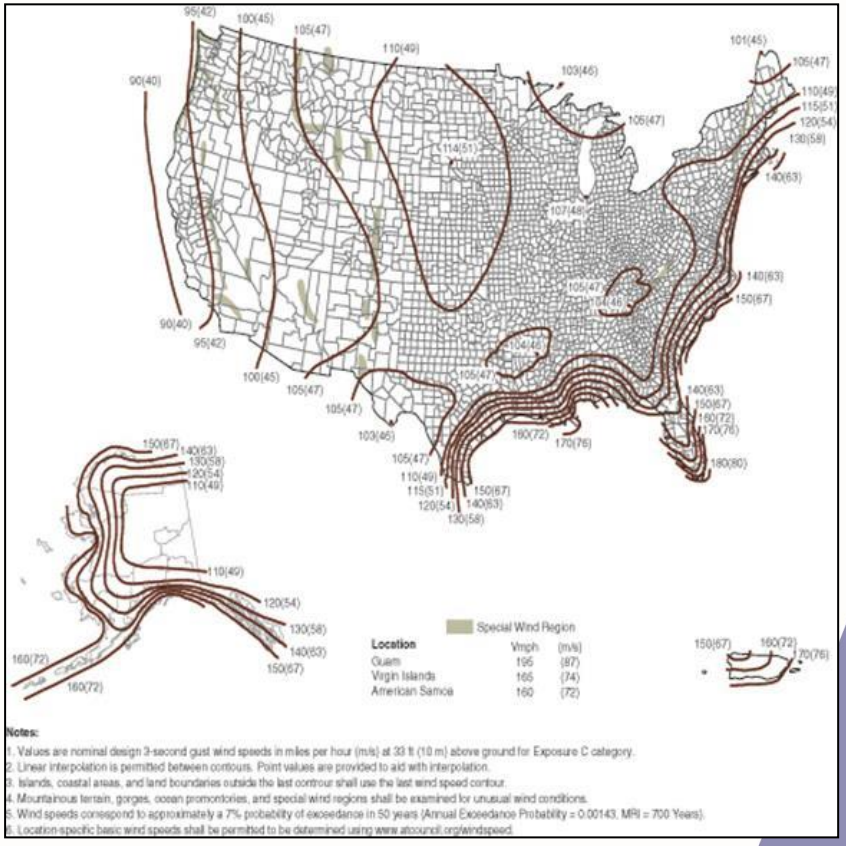
h. See Section 1604.8.3 for decks attached to exterior walls.

- Table 1607.1 is now **consistent** with the provisions in the 2010 and 2016 editions of ASCE 7 for minimum uniformly distributed live loads on decks and balconies by **increasing the deck live load to one and one-half times the live load** of the area served

1609 Wind Loads

2018

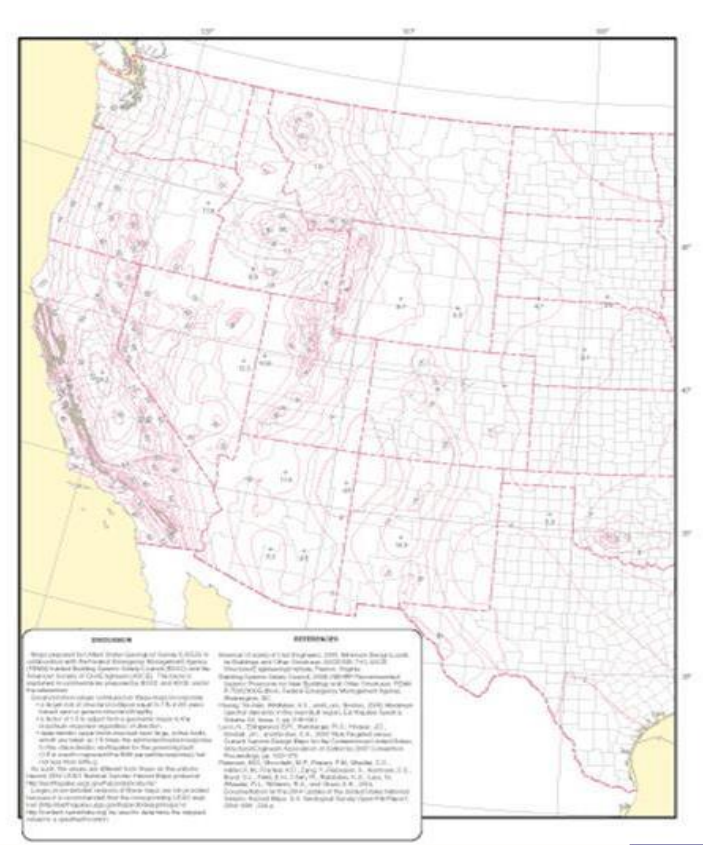
- Updated wind speed maps
- **Terminology changed** from “**ultimate** design” to “**basic** design”



1613.2.1 Seismic Maps

2018

- Seismic maps **updated** to match new maps in:
  - **2015 NEHRP** (National Earthquake Hazard Reduction Program)
  - **2016 ASCE 7**



1613.2.3 Earthquake Loads

2018

- Values of site coefficients now in **alignment** with newest generation of ground motion attenuation equations
- **Modifications** made for both short period and **1-second** period parameters
- Previous coefficients based on soil studies performed in early 1990s

1613.2.3 Earthquake Loads

2018

TABLE ~~1613.3.3(1)~~ 1613.2.3(1) Values of Site Coefficient F_a[a]

Site Class	Mapped Risk Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameter at short period					
	$S_s \leq 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s \geq 1.25$	$S_s \geq 1.5$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.9~~1.0~~	0.9~~1.0~~	0.9~~1.0~~	0.9~~1.0~~	0.9~~1.0~~	0.9
C	1.3~~1.2~~	1.3~~1.2~~	1.2~~1.1~~	1.2~~1.0~~	1.2~~1.0~~	1.2
D	1.6	1.4	1.2	1.1	1.0	1.0
E	2.4~~2.5~~	1.7	1.3~~1.2~~	Note b~~0.9~~	Note b~~0.9~~	Note b
F	Note b	Note b	Note b	Note b	Note b	Note b

a. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at short period, S_s.
b. Values shall be determined in accordance with Section ~~11.4.7~~ 11.4.8 of ASCE 7.

TABLE ~~1613.3.3(2)~~ 1613.2.3(2) Values of Site Coefficient F_v[a]

Site Class	Mapped Risk Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameter at 1-second period					
	$S_1 \leq 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 \geq 0.5$	$S_1 \geq 0.6$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.8~~1.0~~	0.8~~1.0~~	0.8~~1.0~~	0.8~~1.0~~	0.8~~1.0~~	0.8
C	1.5~~1.7~~	1.5~~1.6~~	1.5	1.5~~1.4~~	1.5~~1.3~~	1.4
D	2.4	2.2[c]~~2.0~~	2.0[c]~~1.8~~	1.9[c]~~1.6~~	1.8[c]~~1.5~~	1.7[c]
E	4.2~~3.5~~	3.3[c]~~3.2~~	2.8[c]	2.4[c]	2.2[c]~~2.4~~	2.0[c]
F	Note b	Note b	Note b	Note b	Note b	Note b

a. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at 1-second period, S_1.
b. Values shall be determined in accordance with Section ~~11.4.7~~ 11.4.8 of ASCE 7.
c. See requirements for site-specific ground motions in Section ~~11.4.7~~ 11.4.8 of ASCE 7.

- The site coefficients contained in the IBC have now been brought into **alignment** with the newest generation of ground motion attenuation equations

ICC LEARNING center

1615 Tsunami Loads

2018

- **New section** and **definitions** address tsunami-resistant design of critical infrastructure and essential facilities
- Applicable to **Risk Category III and IV** structures located in Tsunami Design Zones

Chapter 17

Special Inspections and Tests

ICC LEARNING center

1704.6 Structural Observation

2018
2021

- Structural observation now **required** in **all** buildings classified as:
  - High-rise
  - Risk Category III
  - Risk Category IV
  - In SDC E if **>2 stories** above grade plane

IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b] • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

1705.5.3 Mass Timber Special Inspection – Construction

2021

- Applicable only to **Type IV-A, IV-B** and **IV-C** construction, special inspection requirements have **been** added to address the **erection**, **anchorage** and **connection** of mass timber structural elements
- Inspections are similar to requirements for other prefabricated systems, such as precast concrete and structural steel
- **Additional special inspections may be required** by the building official for any work unusual in its nature

Photo courtesy of ATF Fire Research Laboratory

1705.5.3 Mass Timber Special Inspection – Construction

2021

- The **specific elements** requiring special inspection for construction Types IV-A, IV-B and IV-C include:
  1. The **connection** of mass timber elements to timber deep foundation elements.
  2. **Erection** of mass timber elements.
  3. Specialized **connections** between mass timber products that utilize threaded, bolted or concealed connections.
  4. **Adhesive** anchorage installed in horizontal or upwardly inclined positions resisting sustained tension loads.

1705.5.3 Mass Timber Special Inspection – Construction

2021

TABLE 1705.5.3 Required Special Inspections of Mass Timber Construction

Type	Continuous Special Inspection	Periodic Special Inspection
1. Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.		X
* 2. Inspect erection of mass timber construction.		X
3. Inspection of connections where installation methods are required to meet design loads.		
Threaded fasteners.		
Verify use of proper installation equipment.		X
Verify use of pre-drilled holes where required.		X
Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.		X
Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads.	X	
Adhesive anchors not defined in the preceding cell.		X
Bolted connections.		X
Concealed connections.		X

1705.13.6 Fire Sprinkler Clearance

2018

- Provisions **added** (**Item 6**) for **periodic** special inspection of minimum **clearance** of fire sprinkler components to mechanical, electrical and plumbing systems
  - **Not** required where **flexible** sprinkler hose **fittings** are used

1705.13.7 Special Inspection of Storage Racks

2021

- Steel storage rack special inspection duties have been **clarified** with the **addition** of specific special inspection **tasks**
  - Requirement continues to be applicable only to racks that are **≥8'** in height and assigned to **SDC D, E or F**

TABLE 1705.13.7 Required Inspections of Storage Rack Systems

Type	Periodic Inspection	Referenced Standard	IBC Reference
1. Materials used, to verify compliance with one or more of the material test reports in accordance with the approved construction documents.	×		
2. Fabricated storage rack elements.	×		1704.2.5
3. Storage rack anchorage installation.	×	ANSI/MH16.1 Section 7.3.2	
4. Completed storage rack system, to indicate compliance with the approved construction documents.	×		

1705.18 Firestop Inspection in Group R

2021

- In **Group R** fire areas with an occupant load **>250**, special inspection is **now required** for the installation of:
  - Firestops
  - Fire-resistant joint systems
  - Perimeter fire containment systems
- Provides greater assurance that such fire protective features are **properly installed** where large residential occupant loads are anticipated

1705.20 Mass Timber Special Inspection – Sealants

2021

- Special inspection is also required where **sealants** and/or **adhesives** are provided in mass timber construction **to resist the passage of air** at abutting edges and intersections of mass timber elements required to be fire-resistant
  - **Not required** where **tested proprietary process** to ensure there are no voids at intersections is used
- Only abutting edges and intersections in the plane and between different planes to be **sealed**
- Special inspection **not applicable** to joints designed to accommodate building **tolerances** or to allow independent **movement**
  - Regulated by **Section 715**
  - Special inspection addressed in **Section 1705.18**

1705.20 Mass Timber Special Inspection – Sealants

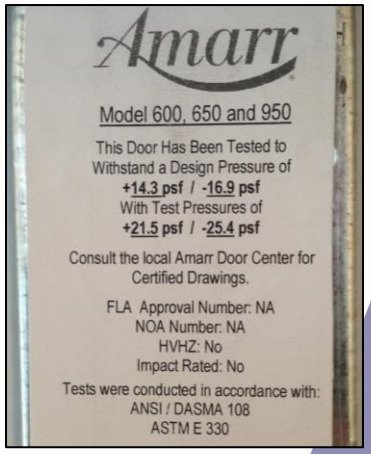
2021

- Applicable to **Types IV-A, IV-B** and **IV-C** construction
- **Sealants** regulated by **ASTM C920**
- **Adhesives** regulated by **ASTM D3498**

1709.5 Window and Door Assemblies

2021

- Testing standards and analysis procedures are **clarified** for door and window assemblies, including garage doors
- Garage doors now required to have a **permanent label** indicating:
  - Manufacturer
  - Model/serial number
  - Performance characteristics, including design wind pressure rating
- Provisions applicable regardless of whether building is in a hurricane-prone region
- Provides for additional information regarding building's resilience



Chapter 18
Soils and Foundations

1809.5.1 Frost Protection at Required Exits

2021

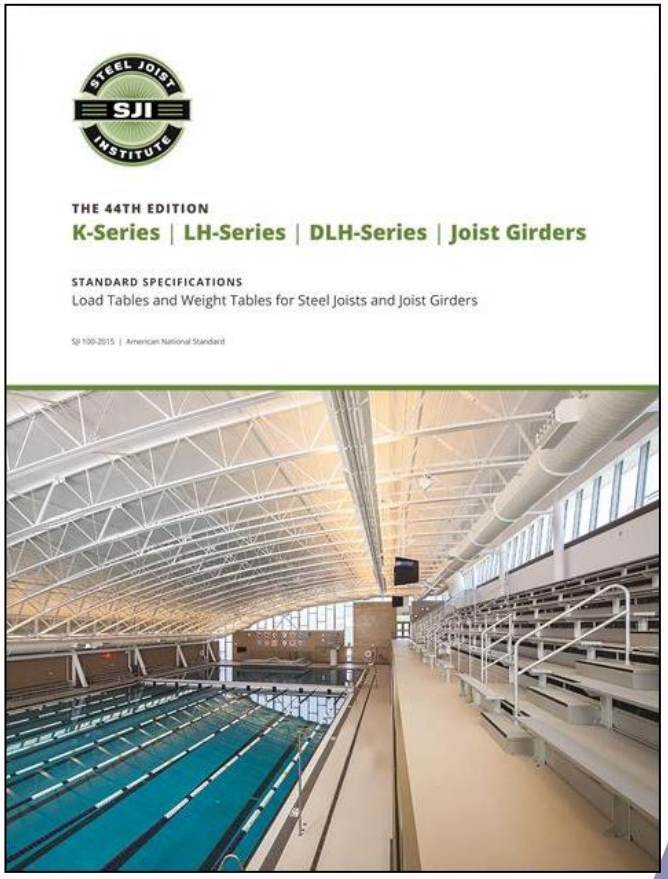
- Frost protection to be **provided** at exterior landings of **all required** exits utilizing outward swinging doors
  - Extent of protection need only extend enough to ensure the **unobstructed opening** of the required exit doors
- Foundations to be **protected** by:
  - Extending foundation below frost line, **or**
  - Frost-protected shallow foundations, **or**
  - Erecting foundation on solid rock
- Protection helps prevent concrete landings from heaving and interfering with swing of exit door

Chapter 22
Steel

2207.1 SJI Standard

2021

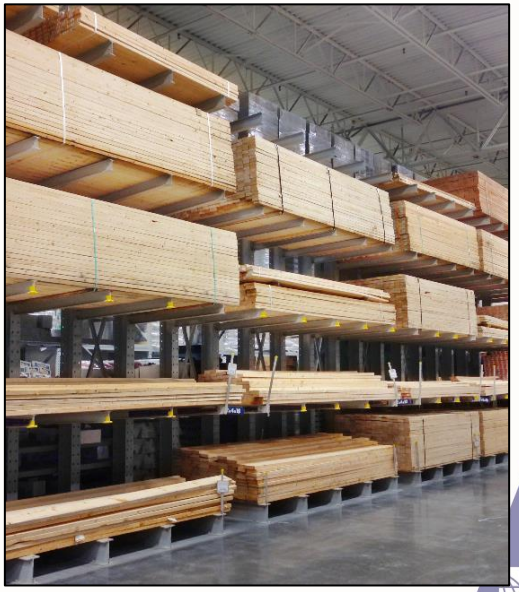
- 2020 edition of combined **SJI1-100** standard now referenced for steel joists

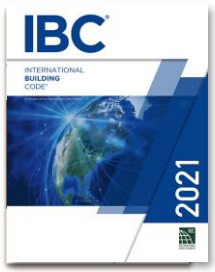


2209 Steel Storage Racks

2018
2021

- **New section** and standard added to address cantilevered racks
- Definition of "**cantilevered steel storage rack**" added to **Section 202**, acknowledges that such racks have different load and design requirements as a standard steel storage rack
- In addition, a **certificate of compliance** is required under specified circumstances





202 Definition of Storage Racks – Steel Cantilevered

2021

- A framework or assemblage composed of cold-formed or hot-rolled steel structural members, primarily in the form of vertical columns, extended bases, **horizontal arms projecting** from the faces of the columns, and longitudinal bracing between columns.
  - There may be shelf beams between the arms, depending on the products being stored; this definition does not include other types of racks such as pallet storage racks, drive-in racks, drive-through racks, or racks made of materials other than steel.

2209.3 Steel Storage Rack Certification

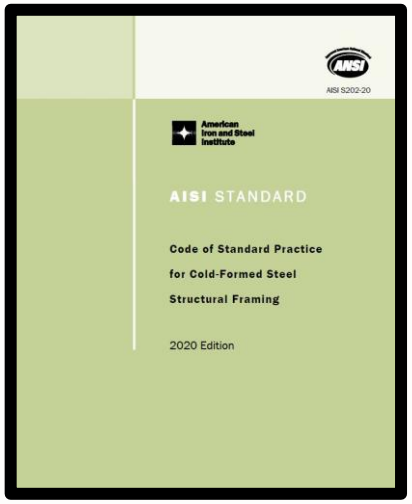
2021

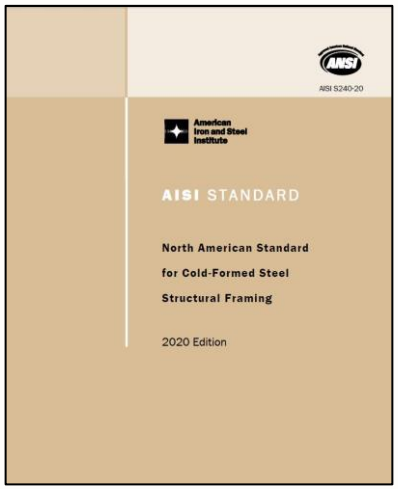
- Steel rack storage structures, including cantilevered storage racks, required to have a **certificate of compliance** where **both**:
  - **≥8' feet** to top load level, **and**
  - Assigned to **Seismic Design Category D, E,** or **F**
- After rack installation, the certificate of compliance is:
  - To be submitted to the owner or owner's authorized agent, **and**
  - Indicate that work was performed per approved construction documents

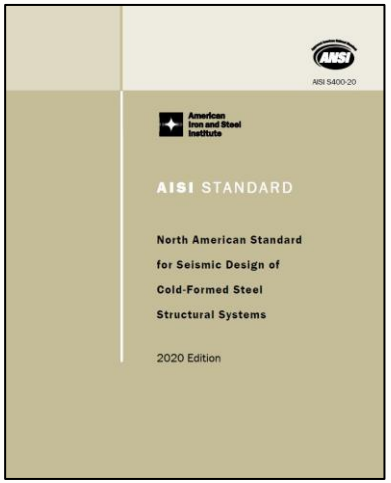
2211 Cold-Formed Light-Frame Construction

2021

- **2020 editions** of **AISI** (American Iron & Steel Institute) standards for cold-formed steel now referenced
- **Added** reference to **S202**; Code of Standard Practice for Cold-formed Steel Framing







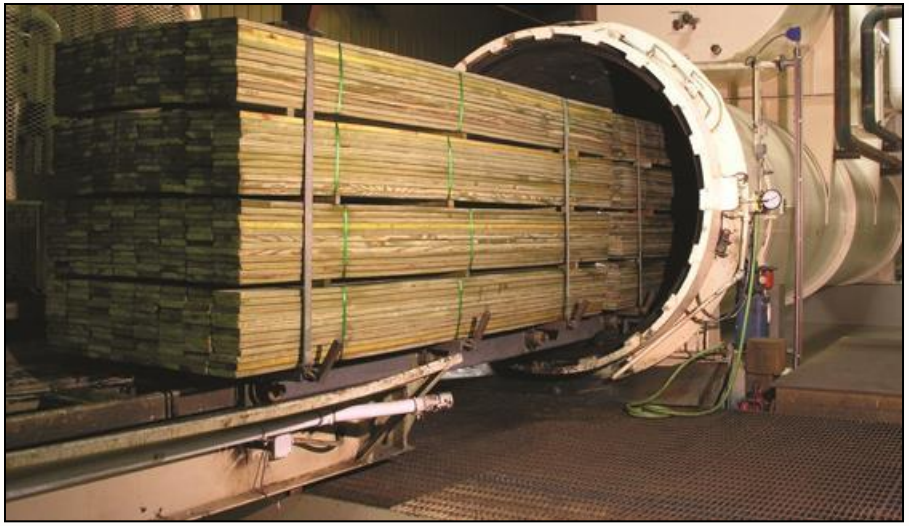
Chapter 23
Wood

ICC LEARNING center

2303.2.2 Fire-Retardant-Treated Wood

2018

- Engineered lumber of **FRT** wood to be **impregnated** with chemicals
- Paints, coating, stains and other **surface treatments not** an **approved** method



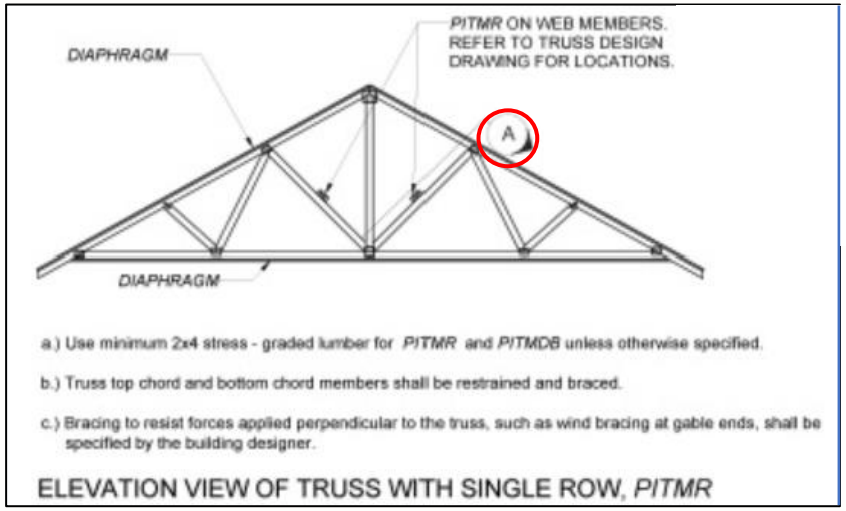
2303.4.1 Wood Truss Bracing 2021

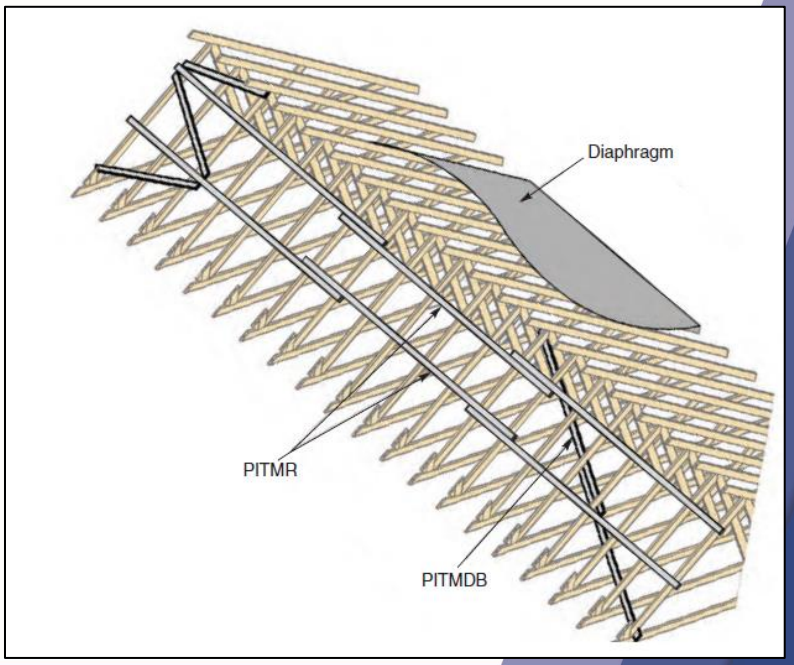
- Requirements have been **added** for permanent diagonal bracing and restraint purposes
- In addition, **new definitions** are provided in Section 202 for:
  - Permanent Individual Truss Member Restraint (**PITMR**)
  - Permanent Individual Truss Member Diagonal Bracing (**PITMDB**)

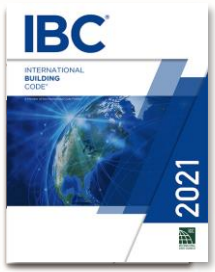
2303.4.1 Truss Web Member Bracing

2021

- Permanent Individual Truss Member Restraint (**PITMR**)- Restraint used to prevent local buckling of an individual truss chord or web member (T, L, or scab brace)
- Permanent Individual Truss Member Diagonal Bracing (**PITMDB**)- Structural member or assembly intended to permanently stabilize the PITMR's

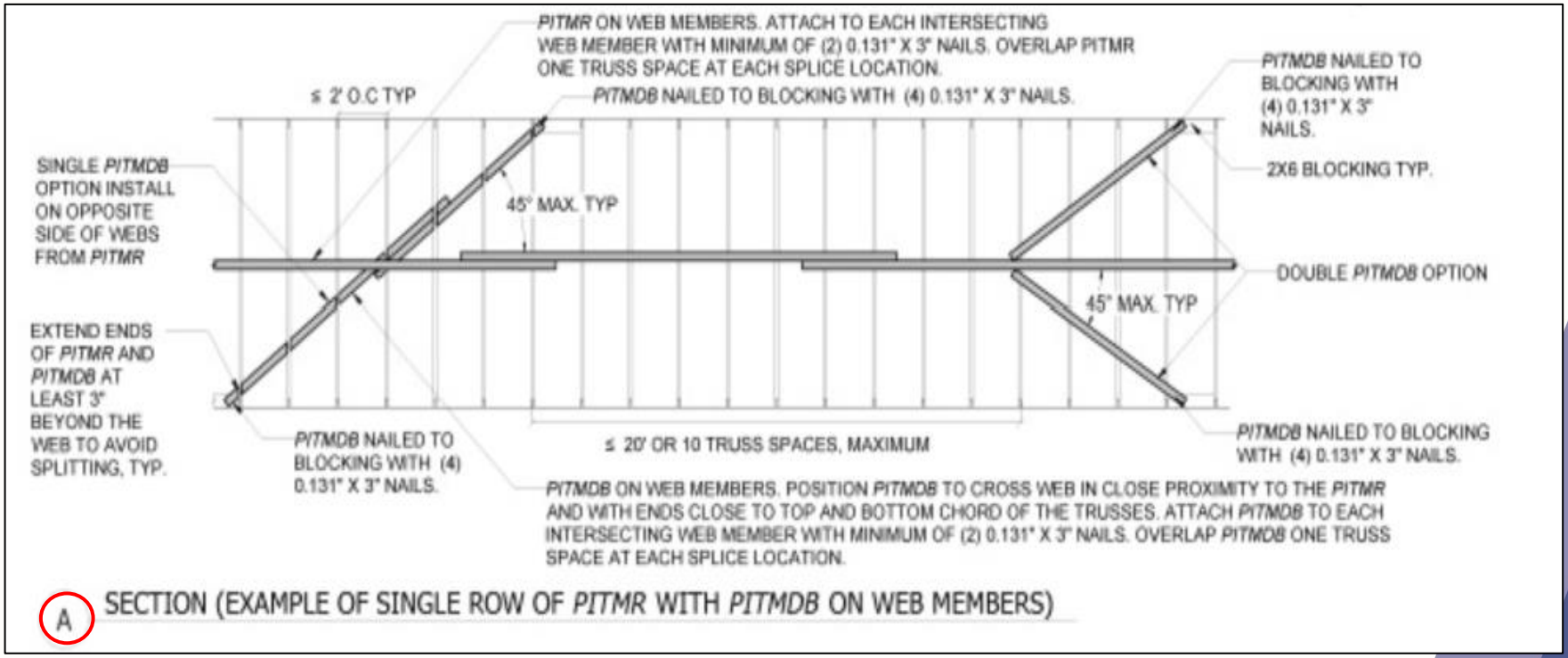


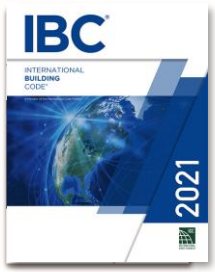




2303.4.1 Truss Web Member Bracing

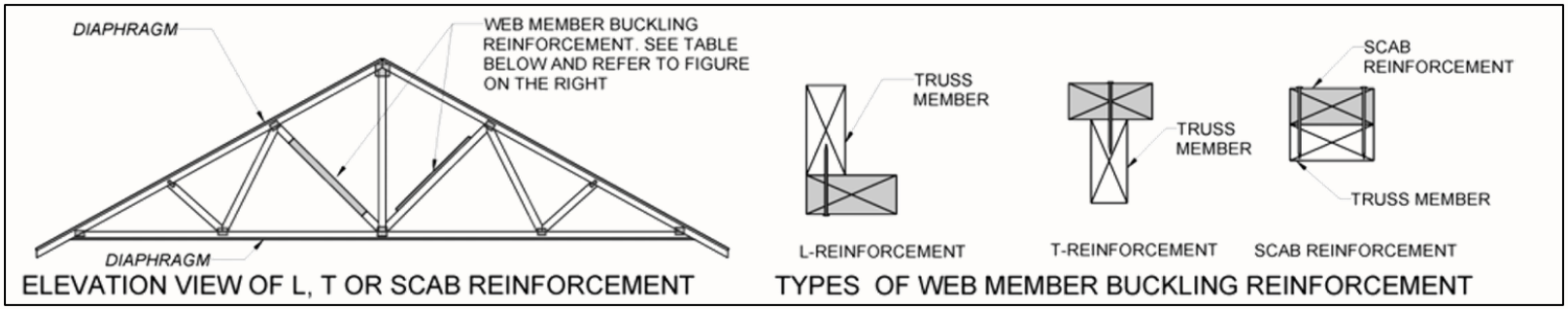
2021





2303.4.1.2 Alternative Bracing Installation

2021



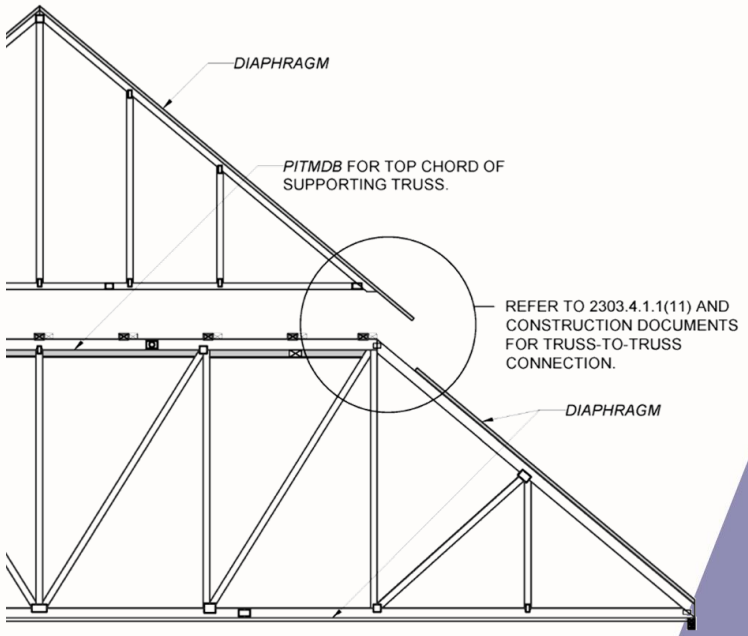
NUMBER OF ROWS OF PITMR SPECIFIED ON WEB MEMBER	SIZE OF TRUSS WEB	TYPE AND SIZE OF WEB REINFORCEMENT[1] FOR T, L OR SCAB[2]	GRADE OF WEB REINFORCEMENT	MINIMUM LENGTH OF WEB REINFORCEMENT	MINIMUM CONNECTION OF WEB REINFORCEMENT TO WEB
ONE	2x4	2x4	Same species and grade or better than web member	90% of web or extend to within 6" of end of web member, whichever is greater	(0.131" x 3") nails at 6" on-center[2]
	2x6	2x6			
	2x8	2x8			

[1]Maximum allowable web length is 14'
[2]Attach Scab reinforcement to web with two rows of minimum 0.131" x 3" nails at 6" on-center

2303.4.1.2.1 Bracing Assumptions

2021

- **Connections are prescriptive**
- Compression web lateral force ~ 1-2% axial force
- 4-0.131”x 3” nails = 375 lbs with SPF framing
- Top and bottom chords braced by diaphragms
- Registered design professional required if no diaphragms present



2304.11 Heavy-Timber Construction

2018

- **Heavy timber** provisions of **Chapter 23** have been **reorganized**
- Table on engineered lumber dimensional equivalencies **relocated** from **Section 602.4**

2304.11 Heavy-Timber Construction

2018

~~TABLE 602.4~~TABLE 2304.11 ~~Wood Member Size Equivalencies~~ Minimum Dimensions of Heavy Timber Structural Members

Supporting	Heavy Timber Structural Elements	Minimum Nominal Solid Sawn Size		Minimum Glued-laminated Net Size		Minimum Structural Composite Lumber Net Size	
		Width, inch	Depth, inch	Width, inch	Depth, inch	Width, inch	Depth, inch
Floor loads only or combined floor and roof loads	• Columns; • Framed sawn or glue-laminated timber arches which spring from the floor line	8	8	6¾	8¼	7	7½
	• Framed timber trusses • Wood beams and girders	6	10	5	10½	5¼	9½
Roof loads only	• Columns (roof and ceiling loads) • Lower half of wood-frame or glue-laminated arches which spring from the floor line or from grade	6	8	5	8¼	5¼	7½
	• Upper half of wood-frame or glue-laminated arches which spring from the floor line or from grade	6	6	5	6	5¼	5½
	• Framed timber trusses and other roof framing[a]						
	• Framed or glue-laminated arches that spring from the top of walls or wall abutments	4[b]	6	3[b]	6⅞	3½[b]	5½

For SI: 1 inch = 25.4 mm.

a. Spaced members shall be permitted to be composed of two or more pieces not less than 3 inches (76 mm) nominal in thickness where blocked solidly throughout their intervening spaces or where spaces are tightly closed by a continuous wood cover plate of not less than 2 inches (51 mm) nominal in thickness secured to the underside of the members. Splice plates shall be not less than 3 inches (76 mm) nominal in thickness.

b. Where protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches (76 mm) nominal in width.

2304.11.3, 2304.11.4 Concealed Spaces in Type IV-HT

2021

- Concealed spaces are now **permitted** in floors and roofs of Type IV-HT construction
  - Details of limitations and protection methods set forth in **Section 602.4.4.3**

2304.12.2.4, 2304.12.2.5 Supporting Members for Permeable Floors and Roofs

2018
2021

- Where an **impervious** moisture barrier system is used to protect the wood structure supporting floors, **positive drainage** shall be provided for water that infiltrates the moisture-permeable floor topping

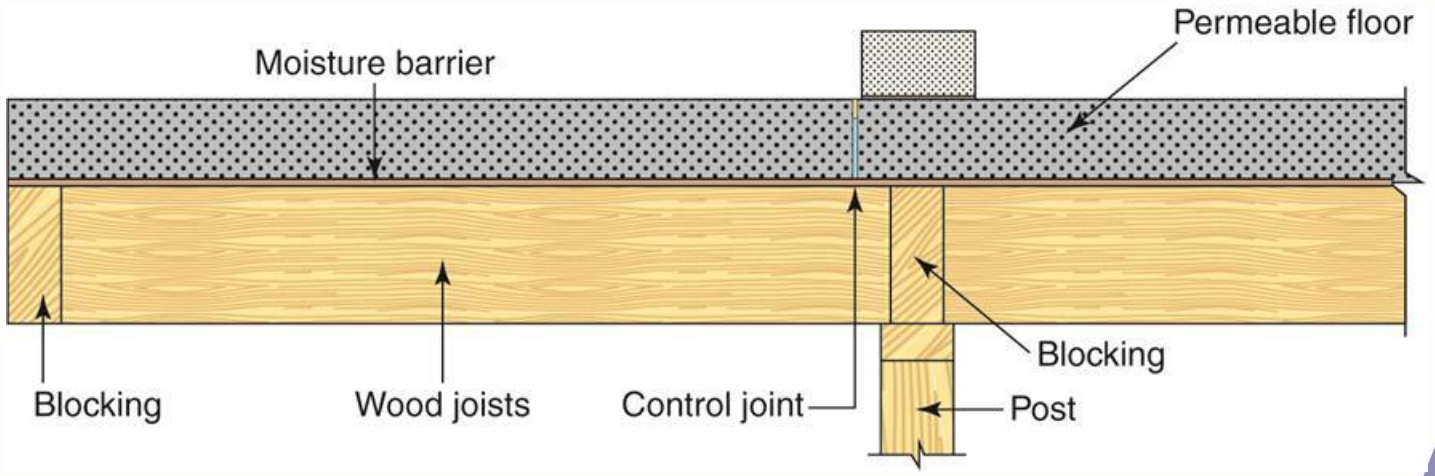


Table 2308.4.1.1 (1) Header and Girder Spans – Exterior Walls

2018

- The header and girder spans for the exterior bearing wall table are **updated** to allow **#2** Southern Pine design values **rather** than **#1** Southern Pine thereby **reducing** span lengths

TABLE 2308.4.1.1(1) Header and Girder Spans[a,b] for Exterior Bearing Walls

Headers and Girders Supporting	Size	Ground Snow Load (psf)[e] 30 — Building Width[c] (feet) 12 Span[f]	12 NJ[d]	24 Span[f]	24 NJ[d]	36 Span[f]	36 NJ[d]	50 — 12 Span[f]	50 — 12 NJ[d]
Roof and Ceiling	1-2 × 6	4 - 0	1	3 - 1	2	2 - 7	2	3 - 5	1
	1-2 × 8	5 - 1	2	3 - 11	2	3 - 3	2	4 - 4	2
	1-2 × 10	6 - 0	2	4 - 8	2	3 - 11	2	5 - 2	2
	1-2 × 12	7 - 1	2	5 - 5	2	4 - 7	3	6 - 1	2
	2-2 × 4	4 - 0	1	3 - 1	1	2 - 7	1	3 - 5	1
	2-2 × 6	6 - 0	1	4 - 7	1	3 - 10	1	5 - 1	1
	2-2 × 8	7 - 7	1	5 - 9	1	4 - 10	2	6 - 5	1
	2-2 × 10	9 - 0	1	6 - 10	2	5 - 9	2	7 - 8	2
	2-2 × 12	10 - 7	2	8 - 1	2	6 - 10	2	9 - 0	2
	3-2 × 8	9 - 5	1	7 - 3	1	6 - 1	1	8 - 1	1
	3-2 × 10	11 - 3	1	8 - 7	1	7 - 3	2	9 - 7	1
	3-2 × 12	13 - 2	1	10 - 1	2	8 - 6	2	11 - 3	2
	4-2 × 8	10 - 11	1	8 - 4	1	7 - 0	1	9 - 4	1
	4-2 × 10	12 - 11	1	9 - 11	1	8 - 4	1	11 - 1	1
	4-2 × 12	15 - 3	1	11 - 8	1	9 - 10	2	13 - 0	1
Roof, ceiling and one center-bearing floor	1-2 × 6	3 - 3	1	2 - 7	2	2 - 2	2	3 - 0	2
	1-2 × 8	4 - 1	2	3 - 3	2	2 - 9	2	3 - 9	2
	1-2 × 10	4 - 11	2	3 - 10	2	3 - 3	3	4 - 6	2

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir. ~~No. 1 or better grade lumber shall be used for Southern Pine.~~
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.
f. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2x8, 2x10, or 2x12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Table 2308.4.1.1 (2) Header and Girder Spans – Interior Walls

2018

- The header and girder spans for the exterior bearing wall table are **updated** to allow **#2** Southern Pine design values **rather** than **#1** Southern Pine thereby **reducing** span lengths

TABLE 2308.4.1.1(2) Header and Girder Spans[a,b] for Interior Bearing Walls

Headers and Girders Supporting	Size	Building Width[c] (feet) 12 Span[e]	12 NJ[d]	24 Span[e]	24 NJ[d]	36 Span[e]	36 NJ[d]
One floor only	2-2 × 4	4 - 1	1	2 - 10	1	2 - 4	1
	2-2 × 6	6 - 1	1	4 - 4	1	3 - 6	1
	2-2 × 8	7 - 9	1	5 - 5	1	4 - 5	2
	2-2 × 10	9 - 2	1	6 - 6	2	5 - 3	2
	2-2 × 12	10 - 9	1	7 - 7	2	6 - 3	2
	3-2 × 8	9 - 8	1	6 - 10	1	5 - 7	1
	3-2 × 10	11 - 5	1	8 - 1	1	6 - 7	2
	3-2 × 12	13 - 6	1	9 - 6	2	7 - 9	2
	4-2 × 8	11 - 2	1	7 - 11	1	6 - 5	1
	4-2 × 10	13 - 3	1	9 - 4	1	7 - 8	1
	4-2 × 12	15 - 7	1	11 - 0	1	9 - 0	2
Two floors	2-2 × 4	2 - 7	1	1 - 11	1	1 - 7	1
	2-2 × 6	3 - 11	1	2 - 11	2	2 - 5	2
	2-2 × 8	5 - 0	1	3 - 8	2	3 - 1	2
	2-2 × 10	5 - 11	2	4 - 4	2	3 - 7	2
	2-2 × 12	6 - 11	2	5 - 2	2	4 - 3	3
	3-2 × 8	6 - 3	1	4 - 7	2	3 - 10	2
	3-2 × 10	7 - 5	1	5 - 6	2	4 - 6	2
	3-2 × 12	8 - 8	2	6 - 5	2	5 - 4	2
	4-2 × 8	7 - 2	1	5 - 4	1	4 - 5	2
	4-2 × 10	8 - 6	1	6 - 4	2	5 - 3	2
	4-2 × 12	10 - 1	1	7 - 5	2	6 - 2	2

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir. ~~No. 1 or better grade lumber shall be used for Southern Pine.~~
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2x8, 2x10, or 2x12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

2308.5.6, 2308.6.6.2 Cripple Walls

2021

- For buildings in **Seismic Design Categories A, B and C**, cripple walls that are part of an interior wall line **no longer require** bracing by blocking or sheathing
- Cripple wall bracing in **Seismic Design Categories D and E** now limited to **14”** in height, **and** must be **blocked** on **both interior** and **exterior walls**

Part 7
Building Services, Special Devices and Special Conditions
Chapters 29 through 31, 33

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Chapter 29
Plumbing Systems

2902 Minimum Plumbing Facilities

2021

- When performing required number of fixtures calculations, **new exceptions** address both multiple-user and single-user facilities
  - In **multiple-user facilities** designed to serve all genders, minimum fixture count to be **calculated at 100%** based on **total occupant load**
    - Each fixture **type** to meet ICC A117.1
    - Each urinal to be in a stall
  - Where single-user toilet and bathing facilities are provided, **distribution** and designation of facilities based on sexes is **not required**
    - Single-user and family/assisted-use facilities must continue to be identified as being available for use by all persons regardless of sex

2902 Minimum Plumbing Facilities

MINIMUM REQUIRED NUMBER OF PLUMBING FIXTURES

2021

Multiple-User Facility for Serving All Genders

Given: Business Classification having an Occupant Load of 60. Toilet facility design chosen to be one multiple-user facility to serve all genders.

Per Table 2902.1:

Water Closet Ratio:	1 per 25 for the first 50 and 1 per 50 for the remainder > 50
Lavatory Ratio:	1 per 40 for the first 80 and 1 per 80 for the remainder > 80

Calculations:

WCs: 50/25 + (60-50)/50 = 2.2	Round up to **3 water closets minimum.**
LAVs: 60/40 = 1.5	Round up to **2 lavatories minimum.**

Single-User Facilities

Given: Business Classification having an Occupant Load of 60. Toilet facility design chosen to be all single-user facilities.

Per Table 2902.1:

Water Closet Ratio:	1 per 25 for the first 50 and 1 per 50 for the remainder > 50
Lavatory Ratio:	1 per 40 for the first 80 and 1 per 80 for the remainder > 80

Calculations:

WCs: 50/25 + (60-50)/50 = 2.2	Round up to **3 water closets minimum.**
LAVs: 60/40 = 1.5	Round up to 2. However, because each single-user facility requires a LAV, **3 lavatories minimum.**

2902 Minimum Plumbing Facilities

2021

- **Separate** facilities are **not required** to be designated by sex where **single-user** toilet rooms are provided per **Section 2902.1.2**
- **Separate** facilities are **not required** where rooms having both water closets and lavatory fixtures are designed for use by both sexes, where:
  - Water closet privacy provided per IPC, and
  - Urinals, **where provided**, to be in an area visually separated from the remainder of the facility
- Where accessible urinal is required, criteria for accessible stall not provided in A117.1 or IBC
  - Should be configured to allow for presence of a wheelchair, as well as user transfer to a standing position in front of urinal

2902.3.3 Toilet Fixtures in Storage Facilities

2021

- Location (**within one story vertically**) and distance (**500’**) travel limits to required toilet facilities **may** be exceeded in **Group S** occupancies
  - Travel limits to be specifically approved by building official
- Applicable to **both** public and employee facilities
- Generally consistent with allowance for employee facilities in **Group F** occupancies
- **New allowance** applicable to large warehouses, parking garages with attendants, self-storage facilities, etc.

Chapter 30

Elevators and Conveying Systems

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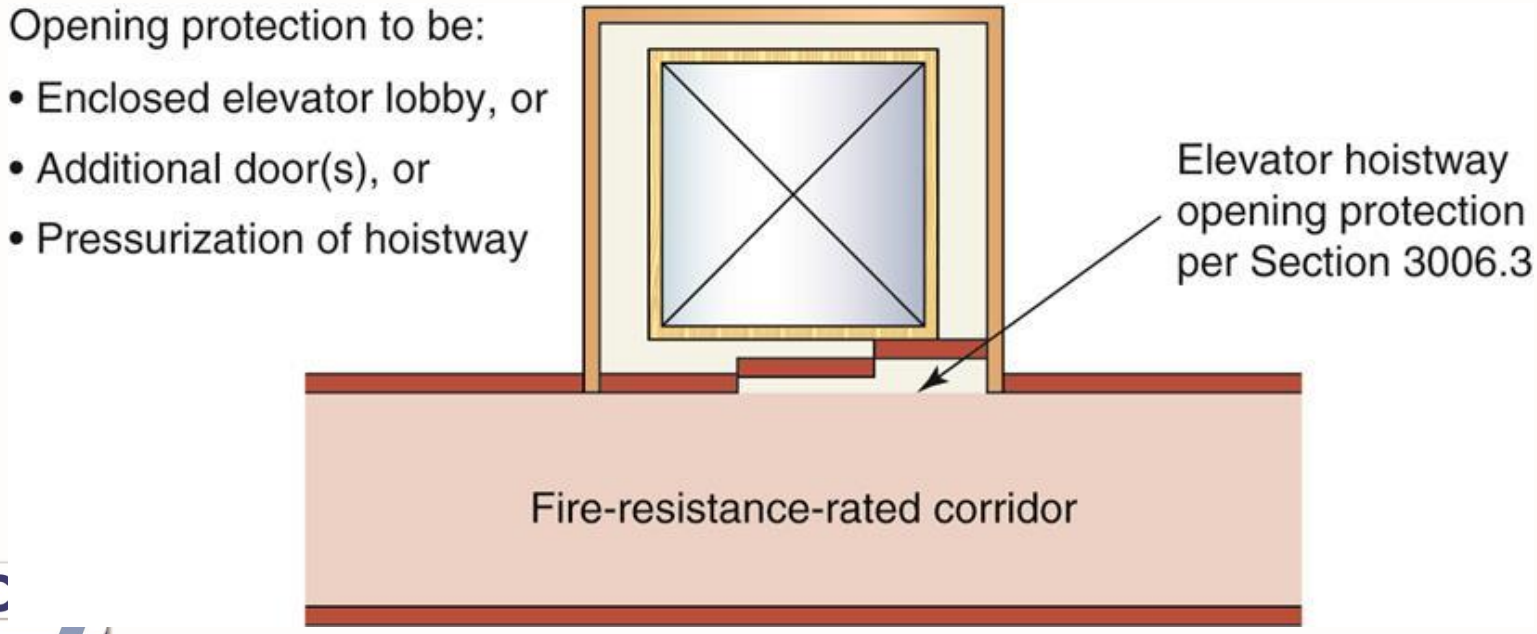
3006.2.1 Corridors Adjacent to Elevator Hoistway Openings

2018

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



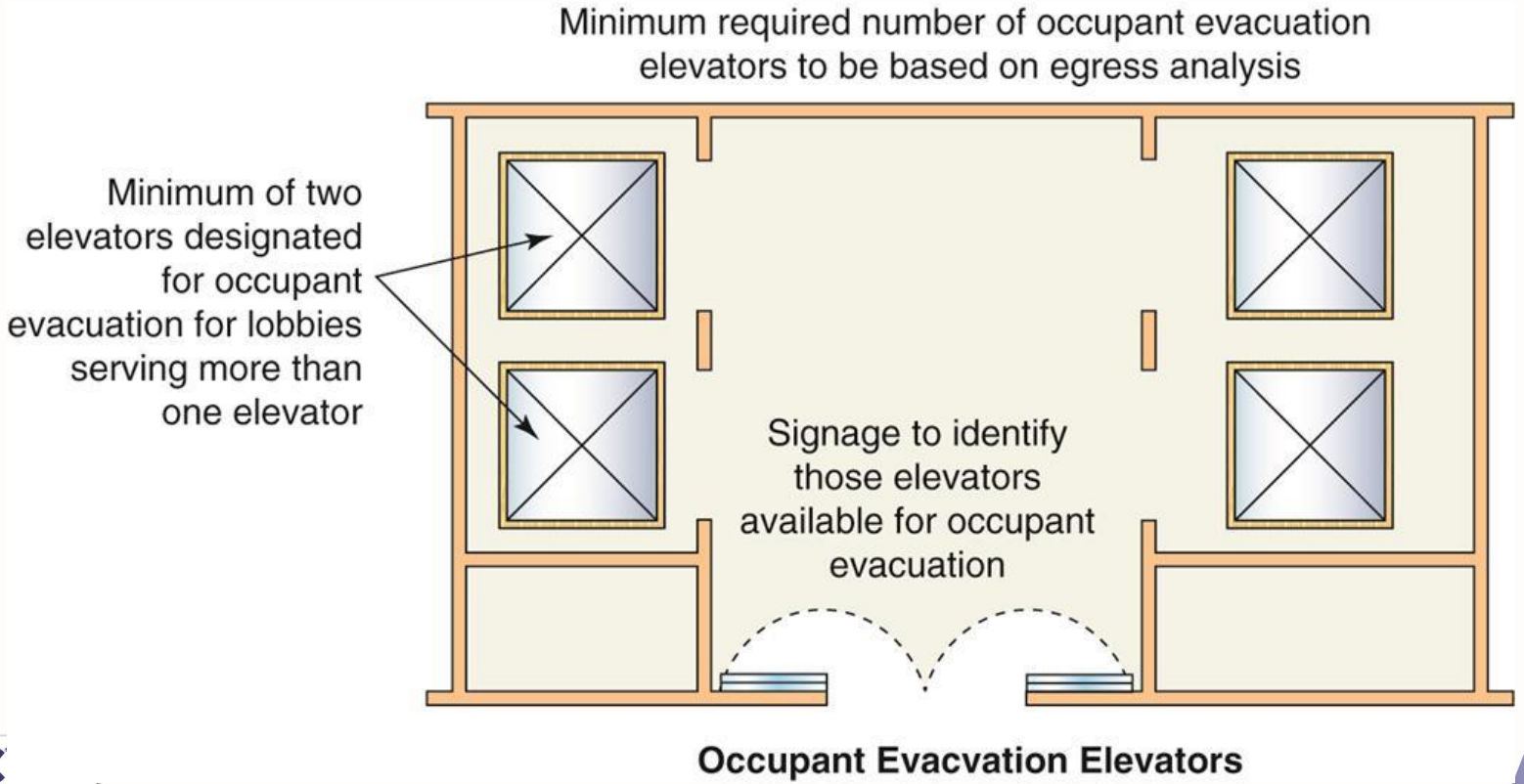
3008.1.1 Required Number of Occupant Evacuation Elevators

2018

- **Minimum** number of required occupant evacuation elevators based on one of two egress scenarios:
  - Full building evacuation in **≤1 hour**, **or**
  - Evacuation of **5 consecutive floors** with highest accumulated occupant load in **<15 minutes**
  - A **reduction** in the minimum number of elevators that must be considered as occupant evacuation elevators now reflects a more reasonable **performance-based approach** while still **retaining** the capacity to evacuate a high-rise building more quickly than stairs alone

3008.1.1 Required Number of Occupant Evacuation Elevators

2018



Occupant Evacvation Elevators

Chapter 31

Special Construction

3103.1 Special Event Structures

2021

- Special event structures are now **regulated** in the types of temporary structures regulated by **Section 3103**
- Such structures, defined in the 2018 IFC, are now similarly defined in the IBC
  - **SPECIAL EVENT STRUCTURE-** Any ground-supported structure, platform, stage, stage scaffolding or rigging, canopy, tower or similar structure supporting entertainment-related equipment or signage
- In addition to significant IFC requirements, key criteria are also addressed in IBC, including:
  - Code conformance for structural strength, fire safety, means of egress, accessibility, light, ventilation, sanitation
  - Permits
  - Construction documents
  - Location
  - Means of egress

3113 Relocatable Buildings

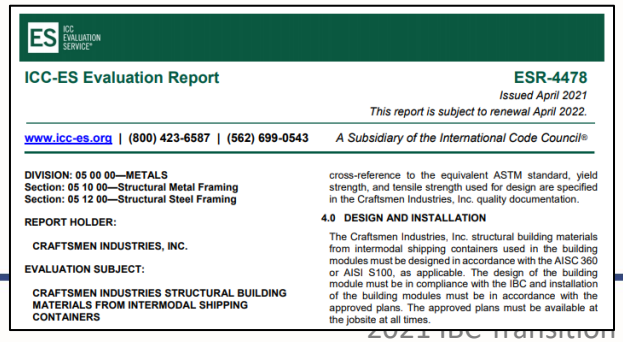
2018

- Compliance required as for **new** construction
- Provisions address:
  - Supplemental information
  - Manufacturer's **data plate**
  - Inspection agencies

3115 Intermodal Shipping Containers

2021

- Use of intermodal shipping containers as buildings and structures now addressed in code.
  - **INTERMODAL SHIPPING CONTAINERS.** A six-sided steel unit originally constructed as a general cargo container used for the transport of goods and materials.
- Previously, approval based on Section 104.11 addressing alternate methods and materials
  - **ICC G5-2019 Guideline for the Safe Use of ISO Intermodal Shipping Containers Repurposed as Buildings and Building Components**
  - Evaluation Reports



ES ICC EVALUATION SERVICE

ICC-ES Evaluation Report **ESR-4478**

Issued April 2021

This report is subject to renewal April 2022.

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DIVISION: 05 00 00—METALS
Section: 05 10 00—Structural Metal Framing
Section: 05 12 00—Structural Steel Framing

REPORT HOLDER:

CRAFTSMEN INDUSTRIES, INC.

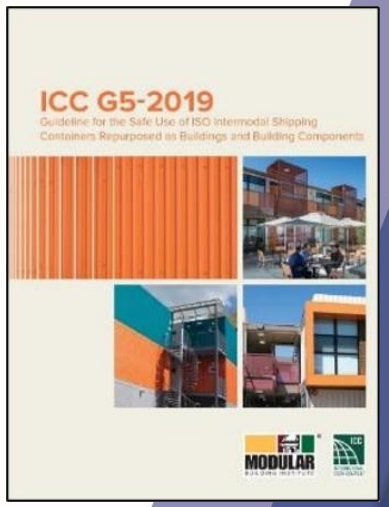
EVALUATION SUBJECT:

CRAFTSMEN INDUSTRIES STRUCTURAL BUILDING MATERIALS FROM INTERMODAL SHIPPING CONTAINERS

cross-reference to the equivalent ASTM standard, yield strength, and tensile strength used for design are specified in the Craftsmen Industries, Inc. quality documentation.

4.0 DESIGN AND INSTALLATION

The Craftsmen Industries, Inc. structural building materials from intermodal shipping containers used in the building modules must be designed in accordance with the AISC 360 or AISI S100, as applicable. The design of the building module must be in compliance with the IBC and installation of the building modules must be in accordance with the approved plans. The approved plans must be available at the jobsite at all times.



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2021 IBC Transition from the 2015 IBC

3115 Intermodal Shipping Containers

2021

- **New requirements** designed to provide a consist set of code provisions that cover minimum safety requirements without duplicating existing code provisions
- **Mandates** verification of a container's construction, condition and structural integrity to assist structural engineer in the evaluation for building construction
- Provides for **specific pointers** to IBC provisions addressing protection against decay and termites, under-floor ventilation, roof assemblies and joints/voids
- Introduces **structural provisions** unique to such containers

3115 Intermodal Shipping Containers

2021

- Provisions intended to **supplement** existing applicable IBC requirements, as well as :
  - Inspection by approved agency
  - Verification of data plate
  - Method of structural design (detailed design procedure or simplified method for single-units)
- Three ISO reference standards relevant to construction of intermodal shipping containers have been added to **Chapter 35**
- **New provisions** intended to eliminate need for patchwork of potentially conflicting or duplicative requirements

Chapter 33

Safeguards During Construction

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3314 Fire Watch During Construction

2018
2021

- Fire watch **required during non-working hours**
- Applicable where:
  - Construction **>40'** above lowest adjacent grade, **or**
  - Where multistory construction >**50,000 sq. ft**., **or**
  - **As required by fire code official**

Appendix N

Guidelines for Replicable Buildings

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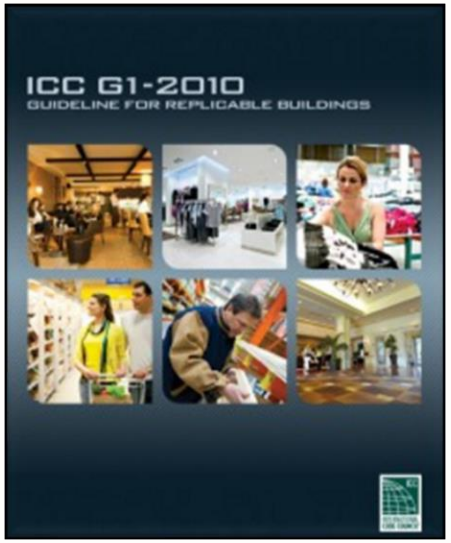
Appendix N Guidelines for Replicable Buildings

2018

- Based on **ICC Guideline G1**
- Benefits include:
  - More **uniform** review process
  - **Elimination** of repetitive reviews
  - **Reduces time** between permit submittal and construction mobilization



Questions?

Thank you for your attendance.

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