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2021 IBC SIGNIFICANT CHANGES & REVIEW OF COMMON CODE MISSES

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2022 Oregon Structural Specialty Code (OSSC)

2022 Oregon Structural Specialty Code (OSSC) based on:

- 2021 International Building Code (IBC),
- 2021 International Fire Code (IFC) new construction provisions **OSSC Ch. 4**, and
- 2021 International Existing Building Code (IEBC) **OSSC Ch. 34**.
- Effective October 1, 2022,
- 6-month phase-in period (During the phase-in period, use of the 2019 OSSC or the 2022 OSSC is permitted)
- Mandatory April 1, 2023



2021 Oregon Energy Efficiency Specialty Code (OEEESC)

2021 OREGON ENERGY EFFICIENCY SPECIALTY CODE (Chapter 13 of the 2019 Oregon Structural Specialty Code)

The 2021 Oregon Energy Efficiency Specialty Code (OEEESC) consists of the following:

- Chapter 1 of the Oregon Structural Specialty Code (OSSC), including specific modifications as shown below.
- ANSI/ASHRAE/IES Standard 90.1 – 2019, including specific modifications as shown below.

SECTION E101 GENERAL

E101.1 Title. These provisions are Chapter 13 of the *Oregon Structural Specialty Code (OSSC)* for commercial energy compliance and shall be referred to herein as “this code.” The OSSC is referred to herein as the “*Building Code*.” Sections E102 through E105 are specific to this code and additional to the requirements of Chapter 1 of the *Building Code*.

SECTION E102 SCOPE AND ADOPTED STANDARDS

E102.1 Scope. This code applies to buildings designed and constructed under the *Building Code*.

E102.2 Intent. This code shall regulate the design and construction of buildings for the effective use of energy. This code is intended to provide flexibility to permit the use of innovative

E103.2 Existing structures. Except as specified in Sections E103.2.1 through E103.2.2.3, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

E103.2.1 Change in space conditioning. Where unconditioned space or semi heated space in a building is converted to a conditioned space, such conditioned space shall be brought into compliance with the applicable requirements of Standard 90.1 that would apply to the building envelope, heating, ventilating, air-conditioning, service water heating, power, lighting, and other systems and equipment of the space as if the building was new.

E103.2.2 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to energy provisions



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CHAPTER 2

Definitions



Stairway and Penthouse

202 Penthouse. An enclosed, unoccupied rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, stairways and vertical shaft openings.



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CHAPTER 3

Occupancy Classification and Use

City of Dallas
Certificate of Occupancy

Address: [REDACTED]

Owner: [REDACTED]

DBA: [REDACTED]

Land Use: [REDACTED]

Occupied Portion: [REDACTED]

C.O.#: [REDACTED]

Lot:	Block: 1345	Zoning: PD-8	PDD:	SUP:
Historic Dist:	Consv Dist:	Pro Park: 9	Req Park: 9	Park Agrmt: N
Dwlg Units:	Stories: 1	Occ Code: B	Lot Area: 200152	Total Area: 1831
Type Const: IIB	Sprinkler: All	Occ Load:	Alcohol: N	Dance Floor: N

Remarks: ALL WORK SUBJECT TO FIELD INSPECTOR APPROVAL. [REDACTED]

This certificate shall be displayed on the above premise at all times.

Sustainable Development and Construction | Building Inspection Division | 214/948-4480 | www.dallascityhall.com

Group F1 Occupancy Expanded

306.2 Moderate-hazard factory industrial, Group F-1:

Factory industrial uses that are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard and shall include, but not be limited to, the following:

- Energy storage systems (ESS) in dedicated use buildings
- Water/sewer treatment facilities
- (no changes to other listed uses)

307.1.1 Uses other than Group H:

An occupancy that stores, uses or handles hazardous materials as described in one or more of the following items shall not be classified as Group H, but shall be classified as the occupancy that it most nearly resembles.

18. Distilling or brewing of beverages conforming to the requirements of the International Fire Code.
19. The storage of beer, distilled spirits and wines in barrels and casks conforming to the requirements of the International Fire Code.

(no changes to other listed uses)



Group S1 Occupancy Expanded

311.2 Moderate-hazard storage, Group S-1:

Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

- **Beverages over 16-percent alcohol content**

(no changes to other listed uses)

311.3 Low-hazard storage, Group S-2:

Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

- Beverages up to and including 16-percent alcohol **~~in metal, glass or ceramic containers~~**

(no changes to other listed uses)

311.2 Moderate-hazard Factory Industrial, Group F-1:

- Beverages over 16-percent alcohol content (IBC/OSSC no change)

311.2 Low-hazard Factory Industrial, Group F-2:

- Beverages: up to and including 16-percent alcohol content (IBC/OSSC no change)
- Wood barrel and bottled wine aging facilities in wineries (OSSC Addition)

311.2 Moderate-hazard storage, Group S-1:

- Beverages over 16-percent alcohol content (IBC Addition – OSSC No change)

311.3 Low-hazard storage, Group S-2:

- Beverages up to and including 16-percent alcohol in wood barrels, metal, glass or ceramic containers (IBC Deletion / OSSC Addition)

Accessory Storage Spaces – Section 311.1.1

A room or space used for storage purposes that is accessory to another occupancy shall (OSSC may) be classified as part of that occupancy.

Different than Group S classification for large storage warehouses.

Regardless of size/square footage, storage unit **must be** accessory to another space.

Accessory space must pose little to no hazard to the occupancy they serve.



Incidental Use Areas

Table 302.1 Incidental Use Areas	
Room or Area	Separation ^a
Furnace room where largest piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic fire-extinguishing system
Boilers over 15 psi and horsepower	1-hour or provide automatic fire-extinguishing system
Refrigerant machinery rooms	1-hour or provide automatic fire-extinguishing system
Automotive parking garage in other than Group R-3	2-hours; 1 HOUR AND PROVIDE AUTOMATIC FIRE-EXTINGUISHING SYSTEM
Incinerator rooms	2-hours and automatic sprinkler system
Paint shops, not classified as a Group H, located in occupancies other than Group F	2-hours; or 1-hour and provide automatic fire-extinguishing systems
Laboratories and vocational shops, not classified as Group H, located in Group E and I-2 occupancies	1 hour or provide automatic fire-extinguishing system
* Storage rooms not classified as incidental use in 2015 IBC	

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CHAPTER 4

Special Detailed Requirements based on Occupancy and Use



Type IVA/IVB - Two Water Main Connections to Fire Pumps

403.3.2 Water Supply to Required Fire Pumps:

In all buildings that are more than 420 feet (128 m) in building height and buildings of Type IV-A and IV-B construction that are more than 120 feet (36 576 mm) in building height, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.



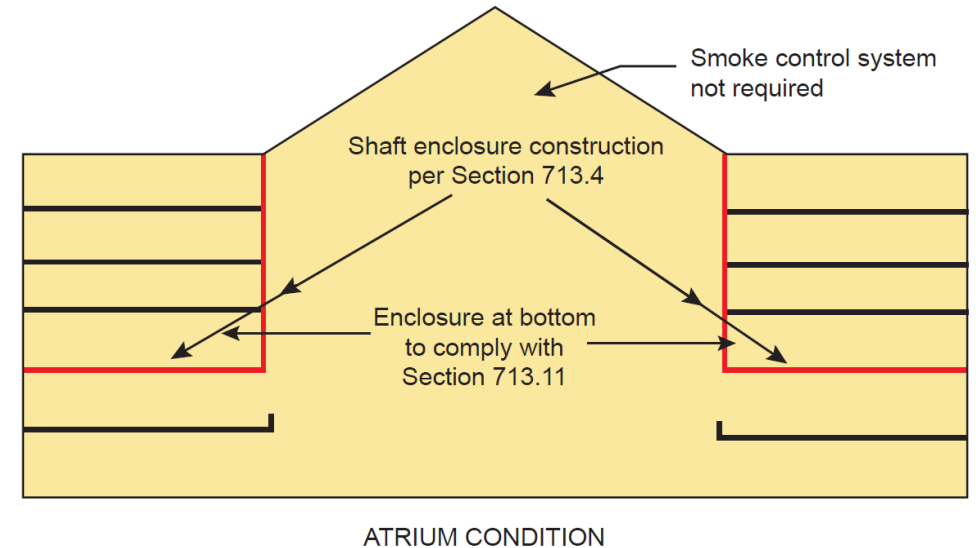
Atrium Smoke Control Alternate Codified

404.5 Smoke Control.

A smoke control system shall be installed in accordance with Section 909.

Exceptions:

1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for atriums that connect only two stories.
2. A smoke control system is not required for atriums connecting more than two stories when all of the following are met:
 - 2.1 Only the two lowest stories shall be permitted to be open to the atrium.
 - 2.2 All stories above the lowest two stories shall be separated from the atrium in accordance with the provisions for a shaft in Section 713.4.



Atrium and Other Floor Opening Relationship Defined

404.6 Enclosure of Atriums.

Atrium spaces shall be separated from adjacent spaces by a 1-hour fire barrier constructed in accordance with Section 707 or a horizontal assembly constructed in accordance with Section 711, or both.

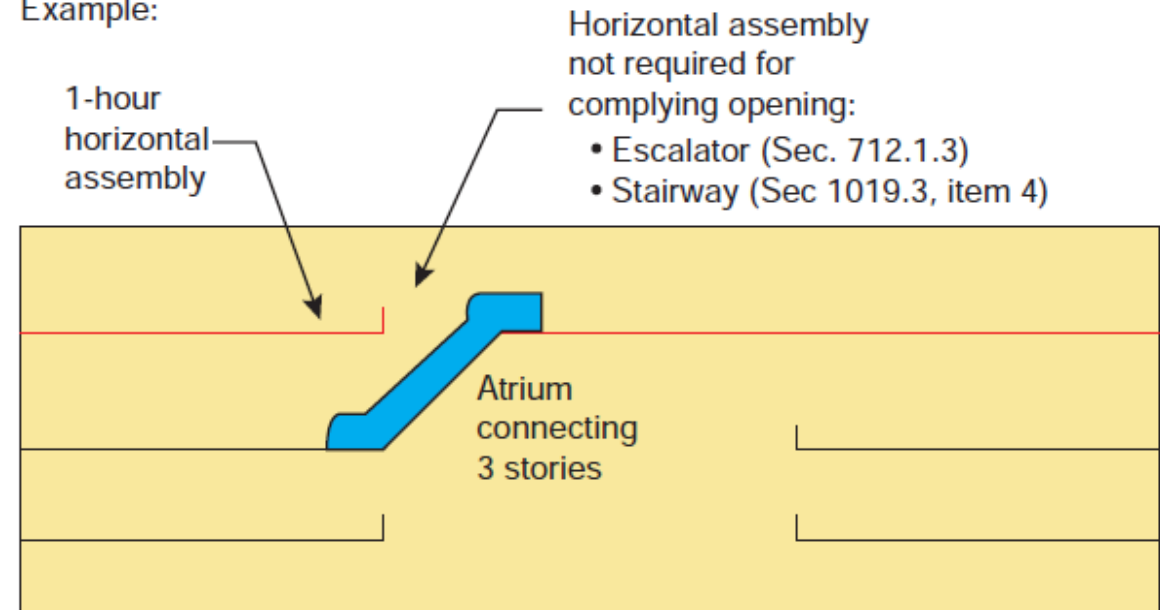
Exceptions:

(no changes to Exceptions 1-4)

5. A horizontal assembly is not required between the atrium and openings for escalators complying with Section 712.1.3.

6. A horizontal assembly is not required between the atrium and openings for exit access stairways and ramps complying with item 4 of Section 1019.3.

Example:

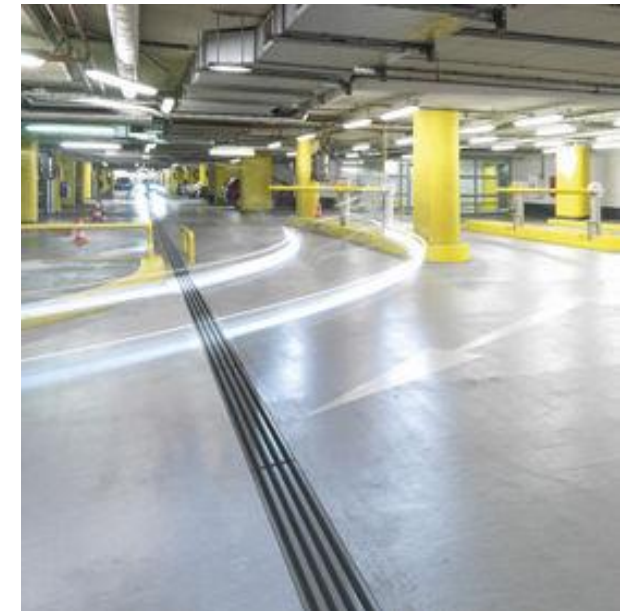


Parking Garage Floor Drainage

406.2.4 Floor Surfaces.

Floor surfaces shall be of concrete or similar approved noncombustible and nonabsorbent materials. The area of floor used for the parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway. The surface of vehicle fueling pads in motor fuel-dispensing facilities shall be in accordance with Section 406.7.1.

S2 Parking garage exception deleted.

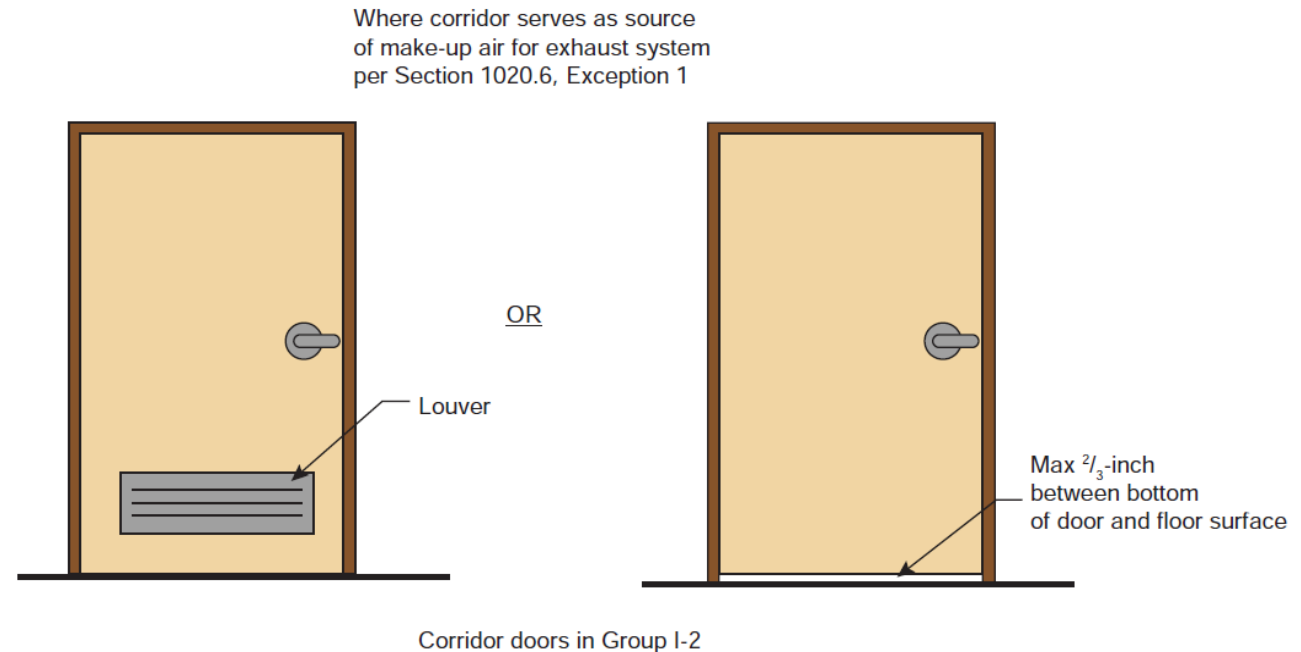


Healthcare Corridor Door Clarification

407.3.1.1 Door Construction.

Doors in corridors not required to have a fire protection rating shall comply with the following:

1. Solid doors shall have close-fitting operational tolerances, head and jamb stops.
2. Dutch-style doors shall have an astragal, rabbet or bevel at the meeting edges of the upper and lower door sections. Both the upper and lower door sections shall have latching hardware. Dutch-style doors shall have hardware that connects the upper and lower sections to function as a single leaf.
3. To provide makeup air for exhaust systems in accordance with Section 1020.6, Exception 1, doors are permitted to have louvers or to have a clearance between the bottom of the door and the floor surface that is 2/3-inch (19.1 mm) maximum.



Healthcare Care Suite Exit Access Clarified

407.4.4.1 Exit Access Through Care Suites:

Exit access from all other portions of a building not classified as a care suite shall **not pass through a care suite.**

407.4.4.3 Access to Corridor:

Every care suite shall **have a door leading directly to an exit access corridor or horizontal exit.** Movement from habitable rooms within a care suite shall not require more than **100 feet (30 480 mm) of travel within the care suite** to a door leading to the exit access corridor or horizontal exit. Where a care suite is required to have more than one exit access door by Section 407.4.4.5.2 or 407.4.4.6.2, **the additional door shall lead directly to an exit access corridor, exit or an adjacent suite.**

ALIGNED WITH NFPA 101 AND CLARIFICATION

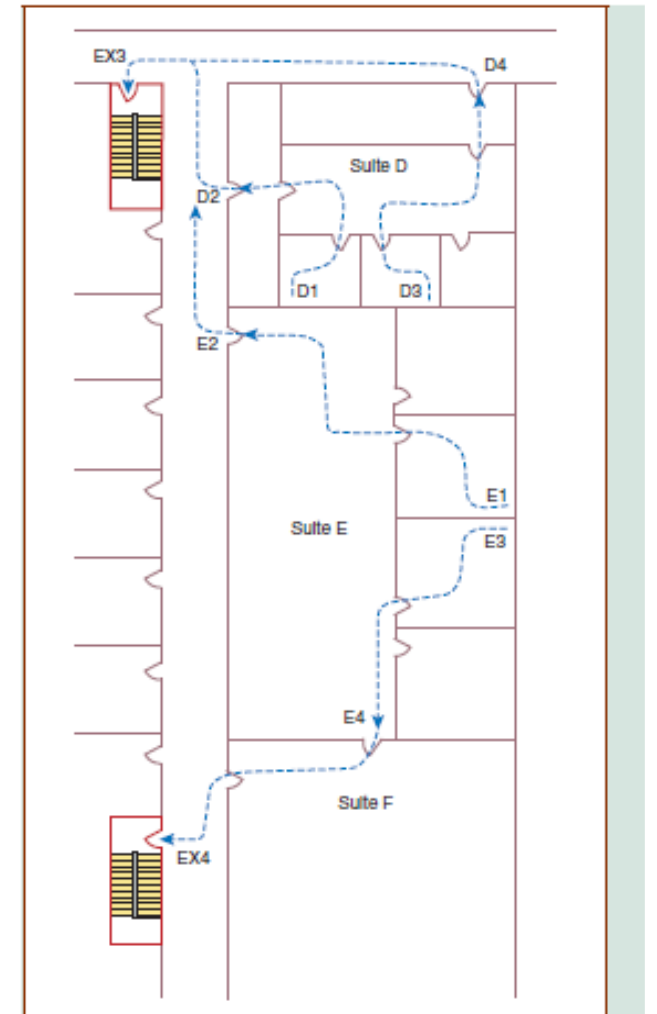


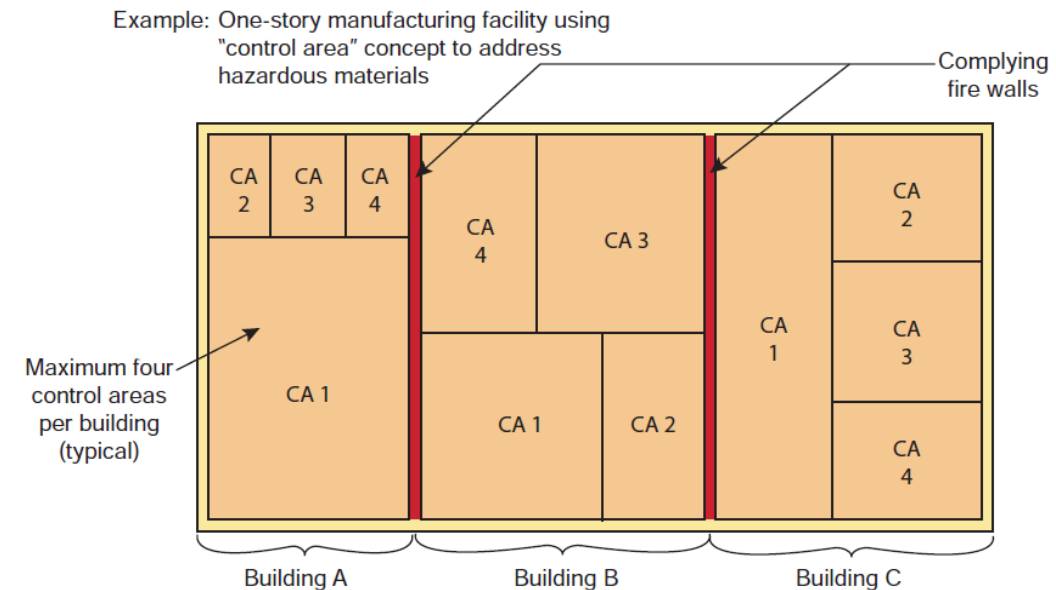
Exhibit 18/19.48 Non-sleeping suites for patient care.

Building Separation and Control Area Separation

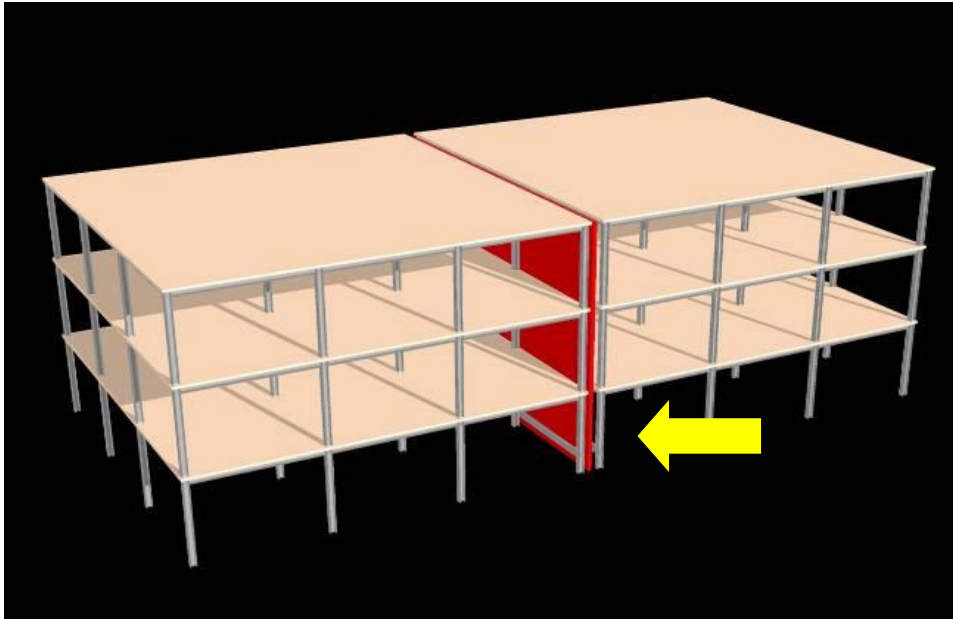
414.2.3 Number: The maximum number of control areas within a building shall be in accordance with Table 414.2.2. For the purposes of determining the number of control areas within a building, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered a separate building.

503.1 General

Unless otherwise specifically modified in Chapter 4 and this chapter, building height, number of stories and building area shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter. Building height, number of stories and building area provisions shall be applied independently. For the purposes of determining area limitations, height limitations and type of construction, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered to be a separate building



Fire Wall – Party Wall – Zero Lot Line Wall



Double Wall Assemblies.

Where either wall of a double wall is **laterally supported by a building frame with a fire resistance rating less than that required for the wall**, double wall assemblies shall be considered to have a combined assembly fire **resistance rating as specified in Table 4.6.**

PARTY WALL ON LOT LINE
(NO OPENINGS
PERMITTED)

DOUBLE WALLS ARE
ZERO LOT LINE WALLS OR
PER NFPA 221

Table 4.6 Fire Resistance Ratings for Double Wall Assemblies

Fire Resistance Rating of Each Wall (hr)	Equivalent to Single Wall (hr)
3	4
2	3
1	2



Fire Wall Terminates at Exterior Wall

Fire wall shall extend **18 inches beyond** exterior surface of exterior walls, or **Terminate at**

- **Combustible exterior sheathing** - 1-hour wall with 3/4-hour openings for 4 feet on both sides of fire wall
- **Non-sprinklered Noncombustible exterior sheathing** - Noncombustible sheathing/cladding 4 feet on both sides of wall (Not fire rated)
- **Sprinklered Noncombustible exterior sheathing** – No extension terminate at exterior wall

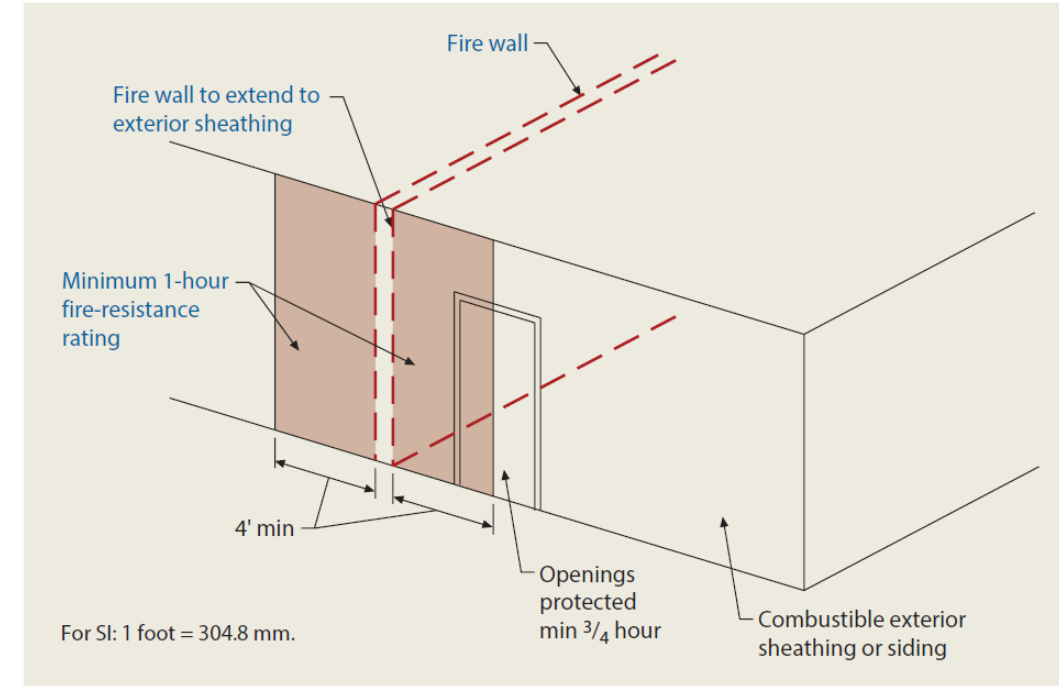
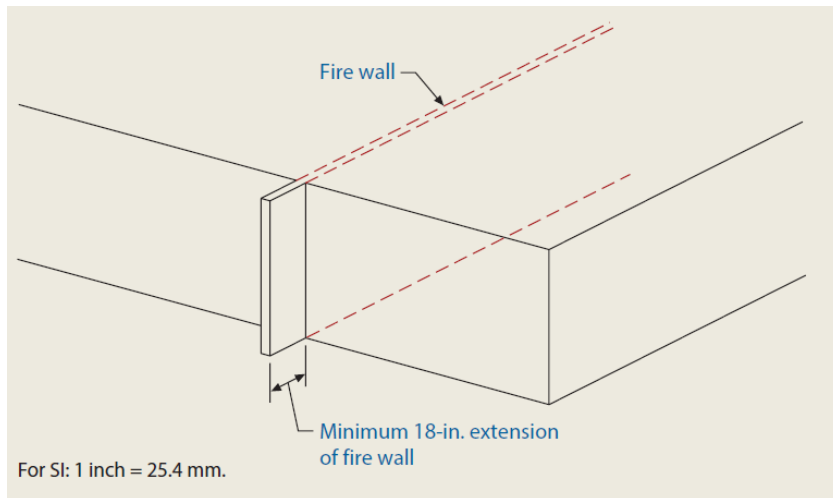


Figure 706-3 **Horizontal continuity.**

Fire Wall Intersects at Exterior Wall - Angle of wall 180 deg or less

706.5.1 Exterior Walls: Where the fire wall intersects exterior walls, the fire-resistance rating and opening protection of the exterior walls shall comply with one of the following:

1. **The exterior walls on both sides of the fire wall** shall have a **1-hour fire-resistance rating with 3/4-hour protection** where opening protection is required by Section 705.8. The fire-resistance rating of the exterior wall shall extend **not less than 4 feet** (1220 mm) on each side of the intersection of the fire wall to exterior wall. Exterior wall intersections at fire walls that form an angle equal to or greater than 180 degrees (3.14 rad) do not need exterior wall protection.
2. Buildings or spaces on both sides of the intersecting fire wall **shall assume to have an imaginary lot line at the fire wall and extending beyond the exterior of the fire wall**. The location of the assumed line in relation to the exterior walls and the fire wall shall be such that the exterior wall and opening protection meet the requirements set forth in Sections 705.5 and 705.8. Such protection is not required for exterior walls terminating at fire walls that form an angle equal to or greater than 180 degrees (3.14 rad)

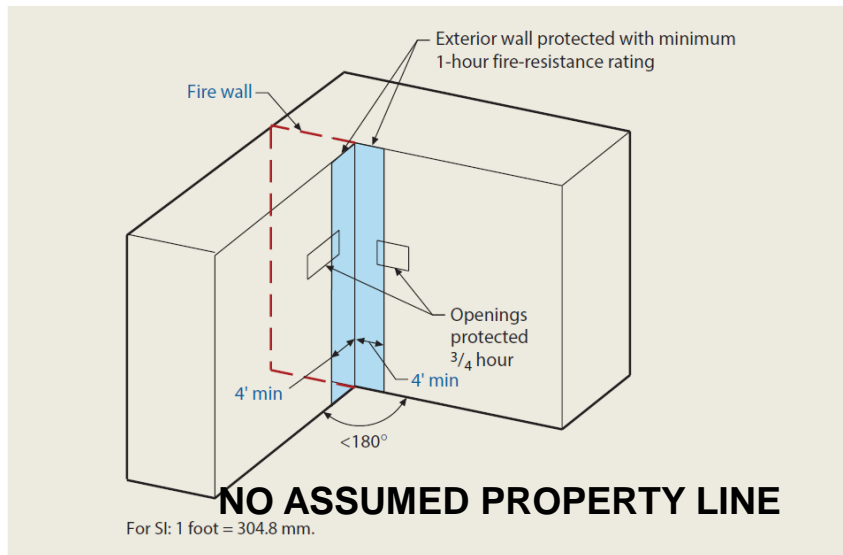


Figure 706-4 Fire wall intersection with exterior walls.

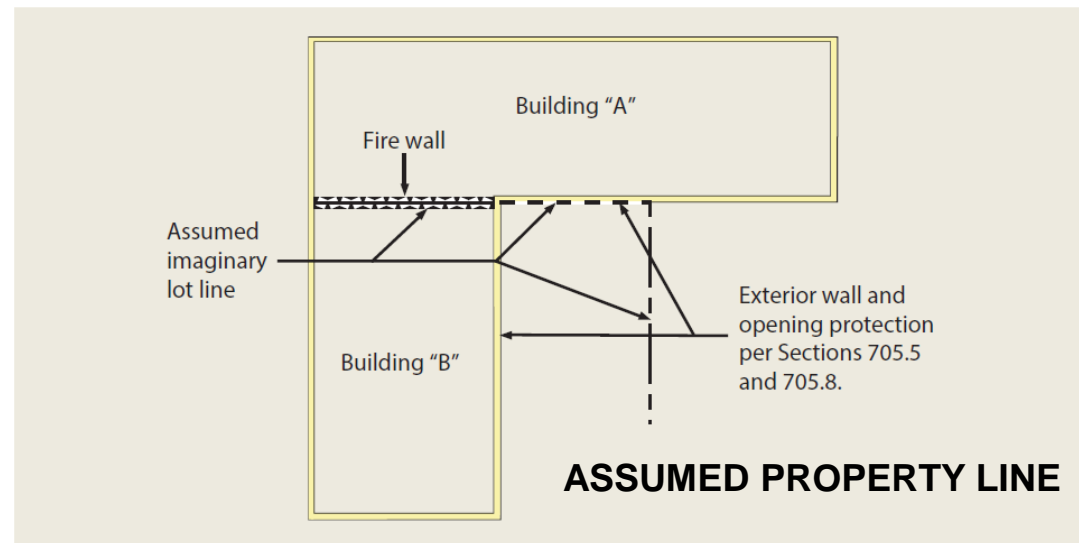


Figure 706-5 Imaginary lot line at extension of fire wall.

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CHAPTER 5/6

General Building Heights & Areas and Construction Types



Mass Timber Construction Types



Cross-Laminated Timber

A prefabricated engineered wood product of not less than three layers of solid-sawn lumber or structural composite lumber (SCL) where adjacent layers are cross-oriented and glued to form a solid wood element.

- Green building practices stimulated interest in wider use renewable materials with less embodied energy.
- New materials created new demands for wood products with different properties than existing construction methods.
- International pressure to apply new methods and materials.

Mass Timber Construction Type, Height, and Stories Basis

- **Construction Type IVA**
– Brock Commons
Tallwood House
- **Construction Type IVB**
– Framework Building
- **Construction Type IVB**
– Carbon 12 Building

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	<u>A</u>	<u>B</u>	<u>C</u>	HT	A	B
A-1	NS	UL	5	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	6	4	3	4	3	<u>9</u>	<u>6</u>	<u>4</u>	4	3	2
A-2	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-3	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-4	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	<u>1</u>	<u>1</u>	<u>1</u>	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL
B	NS	UL	11	5	3	5	3	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	S	UL	12	6	4	6	4	<u>18</u>	<u>12</u>	<u>9</u>	6	4	3
E	NS	UL	5	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	1	1
	S	UL	6	4	3	4	3	<u>9</u>	<u>6</u>	<u>4</u>	4	2	2
F-1	NS	UL	11	4	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	4	2	1
	S	UL	12	5	3	4	3	<u>10</u>	<u>7</u>	<u>5</u>	5	3	2
F-2	NS	UL	11	5	3	4	3	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	S	UL	12	6	4	5	4	<u>12</u>	<u>8</u>	<u>6</u>	6	4	3
H-1	NS ^{c, d}		1	1	1	1	1	<u>NP</u>	<u>NP</u>	<u>NP</u>	1	1	NP
	S		1	1	1	1	1	<u>1</u>	<u>1</u>	<u>1</u>	1	1	NP

Mass Timber Construction Type and Allowable Area Basis

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	<u>A</u>	<u>B</u>	<u>C</u>	HT	A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-4	NS	UL	UL	15,500	9,500	14,000	9,500	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-5	NS												
	S1	UL	UL	UL	UL	UL	UL	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL
	SM												
B	NS	UL	UL	37,500	23,000	28,500	19,000	<u>108,000</u>	<u>72,000</u>	<u>45,000</u>	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	<u>432,000</u>	<u>288,000</u>	<u>180,000</u>	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	<u>324,000</u>	<u>216,000</u>	<u>135,000</u>	108,000	54,000	27,000

- Type IV-C is 1.25 times the Type IV-HT allowable area factor.
- Type IV-B is 2.00 times the Type IV-HT allowable area factor.
- Type IV-A is 3.00 times the Type IV-HT allowable area factor.

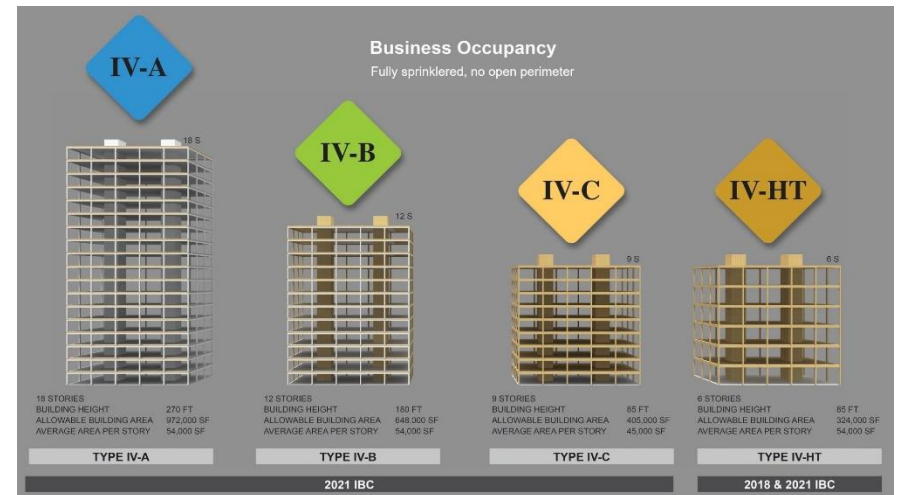
Mass Timber Allowable Area Basis

The allowable area factors of Table 506.2 for buildings of Type IV-HT construction were initially increased by the following multipliers:

- Type IV-C is 1.25 times the Type IV-HT allowable area factor.
- Type IV-B is 2.00 times the Type IV-HT allowable area factor.
- Type IV-A is 3.00 times the Type IV-HT allowable area factor.

The resulting allowable area factors were then reexamined on a case-by-case basis regarding their relative hazard and occupancy classification.

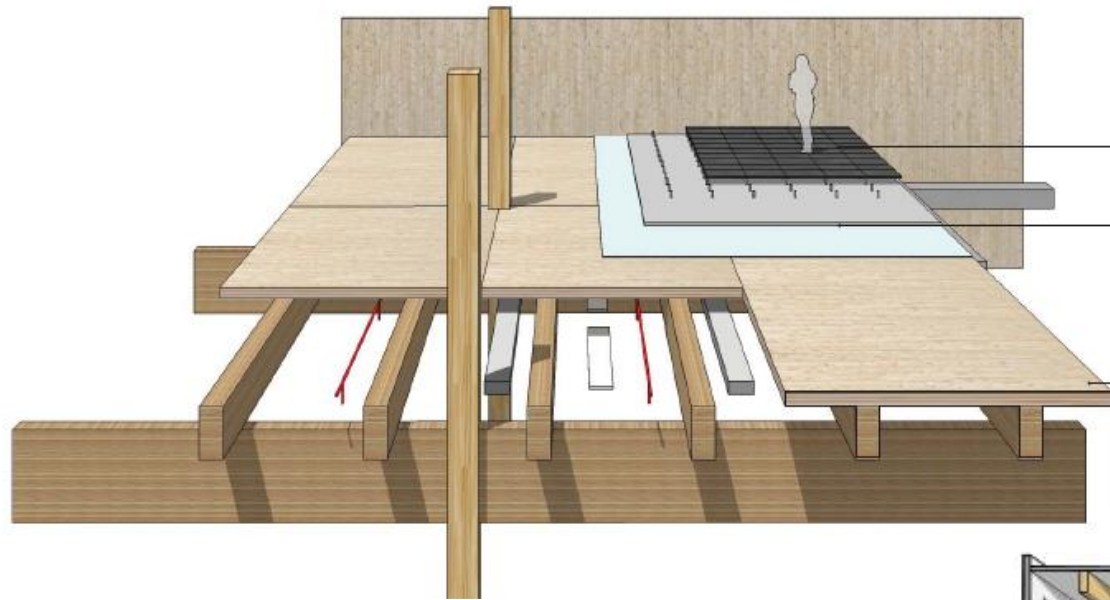
*Maintaining a conservative approach, some hazards were perceived to be of a greater concern, and the allowable area factors were adjusted downward. The two occupancy classifications considered as representing the most hazardous conditions, **Group I and Group H**, were ultimately assigned reduced factors from those determined solely by using the multipliers. Additionally, the allowable area factors for each occupancy were considered in conjunction with each occupancy's allowable height to conservatively address risks associated with allowable floor areas at specific heights.*



Type IV A-B-C-HT + IIIA/IIIB – Stories and Heights Sprinklered Building

CONST TYPE	IV-A	IV-B	IV-C	IV-HT/ III-A	III-B
HEIGHT	270 ft	180 ft	85ft	85ft	75 ft
B Business Occupancies	18 Story	12 Story	9 Story	6/6	4
A2/A3/M Assembly & Mercantile Occupancies	18 Story	12 Story	6 Story	4/4	3
S2 Parking Garage	12 Story	8 Story	5 Story	5/5	4
S1 Storage Occupancies	10 Story	7 Story	5 Story	5/4	3
I-2 Healthcare Occupancies	7 Story (65 ft)	5 Story (65 ft)	3 Story (65 ft)	3/3 (65 ft)	2 (55 ft)
I-3 Jails & Institutional Occupancies	7 Story (180 ft)	5 Story (120 ft)	3 Story	3/3	2
R1/R2 Residential Occupancies	18 Story	12 Story	8 Story	5/5	5

Mass Timber Structure Depth Impacts Building Height: Catalyst vs. flatworks



CONVENTIONAL RAISED FLOOR SYSTEM
WITH CARPET FINISH

ACOUSTIC TREATMENT
- 1 1/2" SILICA (FOR SOUND DAMPENING)
- 1/2" ACOUSTIC MAT (FOR IMPACT ISOLATION)

CLT/ GLULAM RIBBED PANEL SYSTEM - 10' X 30'
- 5-PLY CLT PANEL
- 8 3/4" X 10 1/2" GLULAM RIBS



Construction Type IV A-B-C – Fire Resistance

Building Element	Const IV-A (Brock Commons Tallwood House)	Const IV-B (Framework)	Const IV-C (Carbon 12)
Primary Structure	3 HR	2 HR	2 HR
Exterior Bearing Wall	3 HR	2 HR	2 HR
Exterior Wall - Face Protection	40 min (5/8" Type X GWB or 2 layers 1/2" Std GWB)		
Interior Covering	80 min, Non-Combustible		Exposed Wood Permitted
Interior Covering	No exposed Wood	20% Ceiling OR 40% Walls – 15ft buffer Fire Area or Dwelling Unit	Exposed Wood Permitted
Interior Bearing Wall	3 HR	2 HR	2 HR
Floor	2 HR	2 HR	2 HR
Concealed Space	80 min, Non-Combustible		40 min, Non-Combustible
Roof	1.5 HR	1 HR	1 HR

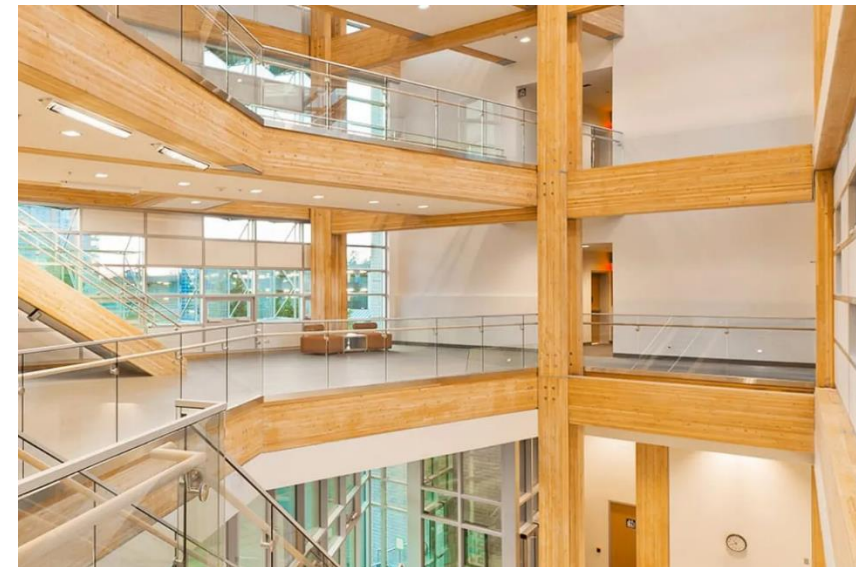


IBC 602.4.2.2.2 602.4.2.2.2 Protected area. Interior faces of mass timber elements,

Exceptions:

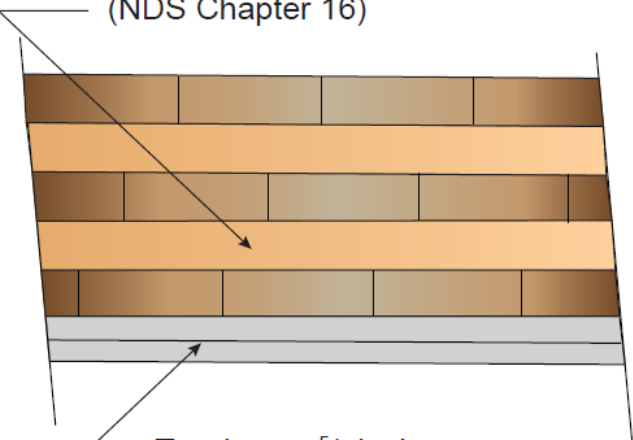
1.1. Unprotected portions of **mass timber ceilings**, including attached beams, shall be permitted and shall be limited to an area less than or equal to **20_100 percent of the floor area** in any dwelling unit or fire area.

1.2. Unprotected portions of **mass timber walls**, including attached columns, shall be permitted and shall be limited to an area less than or equal to **40 percent of the floor area** in any dwelling unit or fire area.



Mass Timber Construction – Calculated Fire resistance

Fire resistance of wood members and decking calculated per 722.1 Item 4 (NDS Chapter 16)



Two layers $\frac{5}{8}$ inch Type X gypsum board

- Each provides 40 min. protection contribution per Table 722.7.1(2)

Example

CLT time = 50 min.

$\frac{5}{8}$ " Type X = 40 min.

$\frac{5}{8}$ " Type X = 40 min.

Total = 130 min.

(Ok for 2-hour rating)

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)
<u>1</u>	<u>40</u>
<u>2</u>	<u>80</u>
<u>3 or more</u>	<u>120</u>

TABLE 722.7.1(2) Protection Provided by Noncombustible Covering Material

Noncombustible Protection	Protection Contribution (minutes)
<u>$\frac{1}{2}$-inch Type X gypsum board</u>	<u>25</u>
<u>$\frac{5}{8}$-inch Type X gypsum board</u>	<u>40</u>

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Example – calculating fire-resistance.

FIRE RESISTANCE – HYBRID SYSTEMS



Wallboard Membranes – Calculated Fire resistance

TABLE 722.6.2(1)
TIME ASSIGNED TO WALLBOARD MEMBRANES^{a, b, c, d}

DESCRIPTION OF FINISH	TIME ^e (minutes)
$\frac{3}{8}$ -inch wood structural panel bonded with exterior glue	5
$1\frac{5}{32}$ -inch wood structural panel bonded with exterior glue	10
$1\frac{9}{32}$ -inch wood structural panel bonded with exterior glue	15
$\frac{3}{8}$ -inch gypsum wallboard	10
$\frac{1}{2}$ -inch gypsum wallboard	15
$\frac{5}{8}$ -inch gypsum wallboard	30
$\frac{1}{2}$ -inch Type X gypsum wallboard	25
$\frac{5}{8}$ -inch Type X gypsum wallboard	40
Double $\frac{3}{8}$ -inch gypsum wallboard	25
$\frac{1}{2}$ -inch + $\frac{3}{8}$ -inch gypsum wallboard	35
Double $\frac{1}{2}$ -inch gypsum wallboard	40

For SI: 1 inch = 25.4 mm.

- These values apply only where membranes are installed on framing members that are spaced 16 inches o.c. or less.
- Gypsum wallboard installed over framing or furring shall be installed so that all edges are supported, except $\frac{5}{8}$ -inch Type X gypsum wallboard shall be permitted to be installed horizontally with the horizontal joints staggered 24 inches each side and unsupported but finished.
- On wood frame floor/ceiling or roof/ceiling assemblies, gypsum board shall be installed with the long dimension perpendicular to framing members and shall have all joints finished.
- The membrane on the unexposed side shall not be included in determining the fire resistance of the assembly. Where dissimilar membranes are used on a wall assembly, the calculation shall be made from the least fire-resistant (weaker) side.
- The time assigned is not a finished rating.

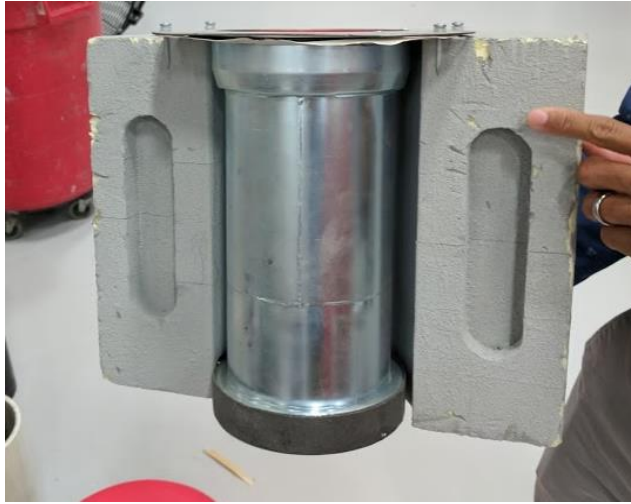
Concealed Fire Rated Joint Protection



FIRE CAULK
CONTINUOUS BEAD



CLT – Through Penetration Fire Stop



Mezzanine

The building construction type dictates the fire ratings of the building elements of the **Mezzanine** structure per the IBC commentary. Area is **limited to 1/3rd of the room or space** it is located in.



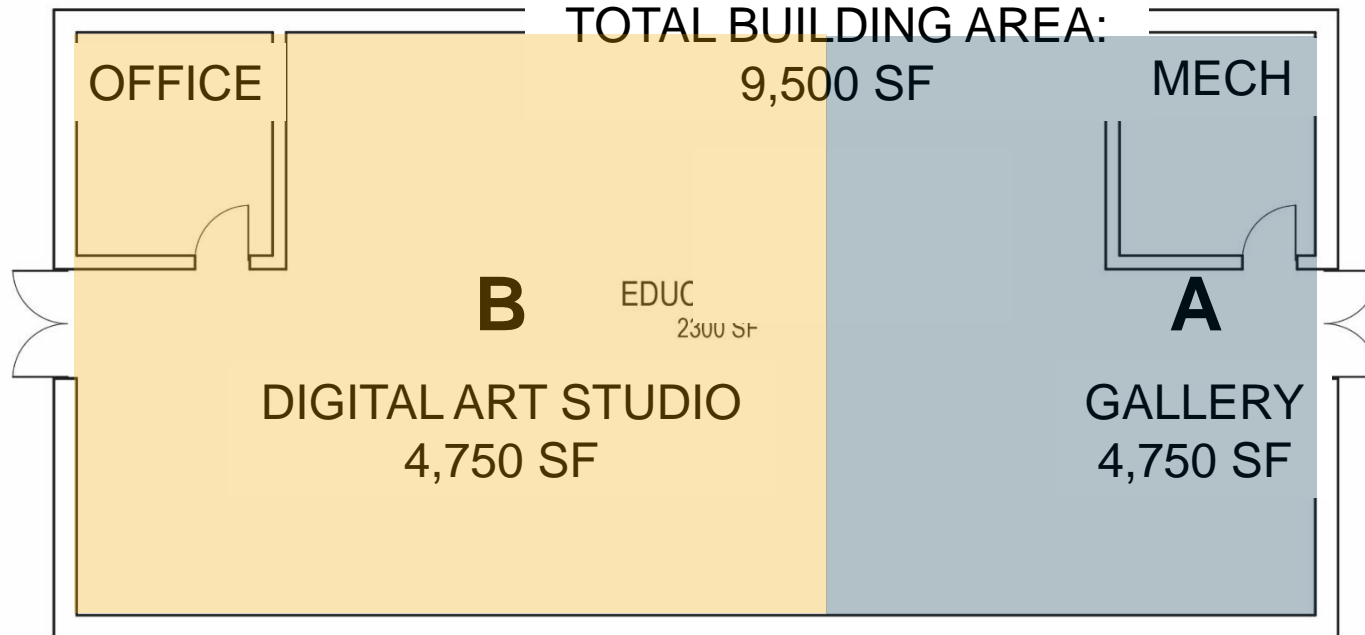
Equipment Platform

The IBC commentary is silent on the fire resistance of the **Equipment Platform** structure.

Follow building type. Area is **limited to 2/3rd of the room or space** it is located in

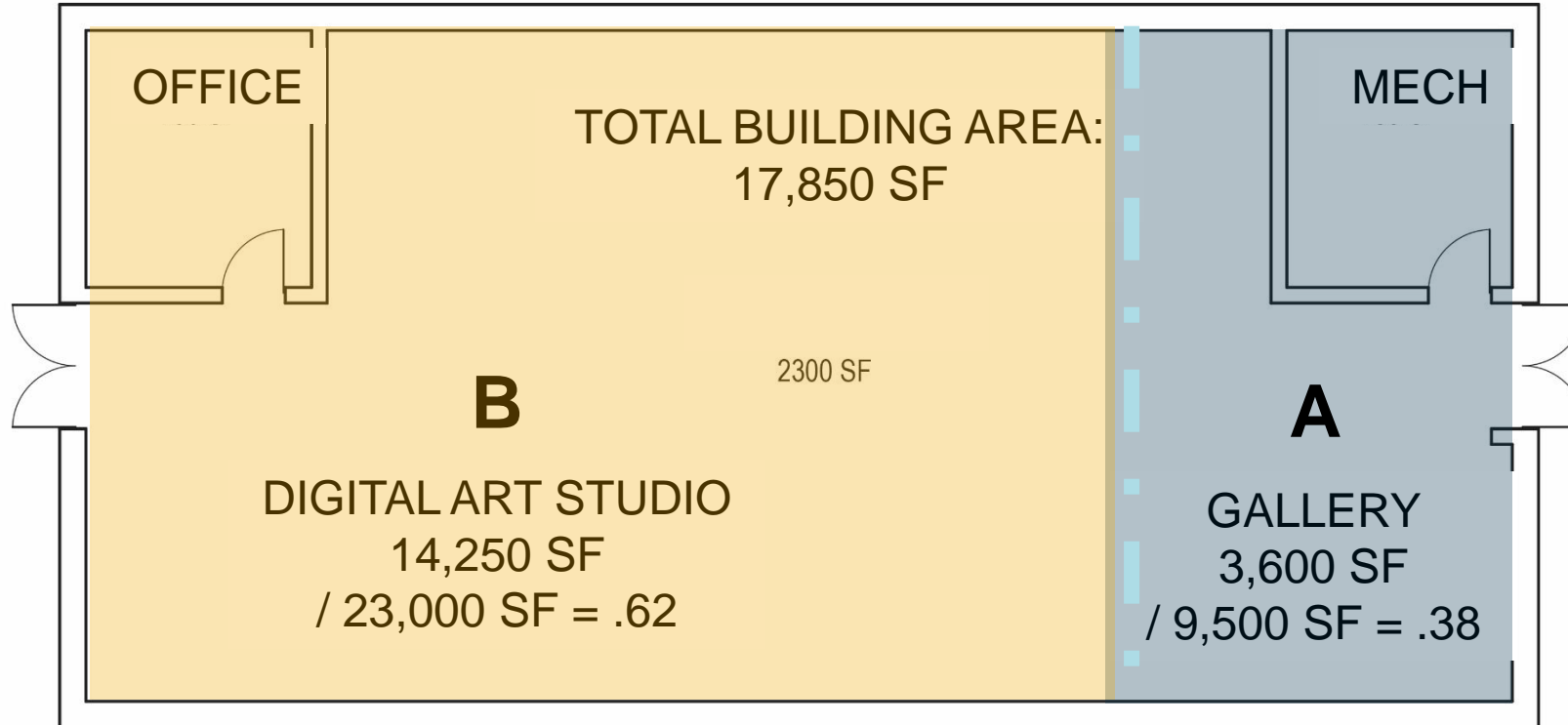


Mixed Occupancy – Non-Separated



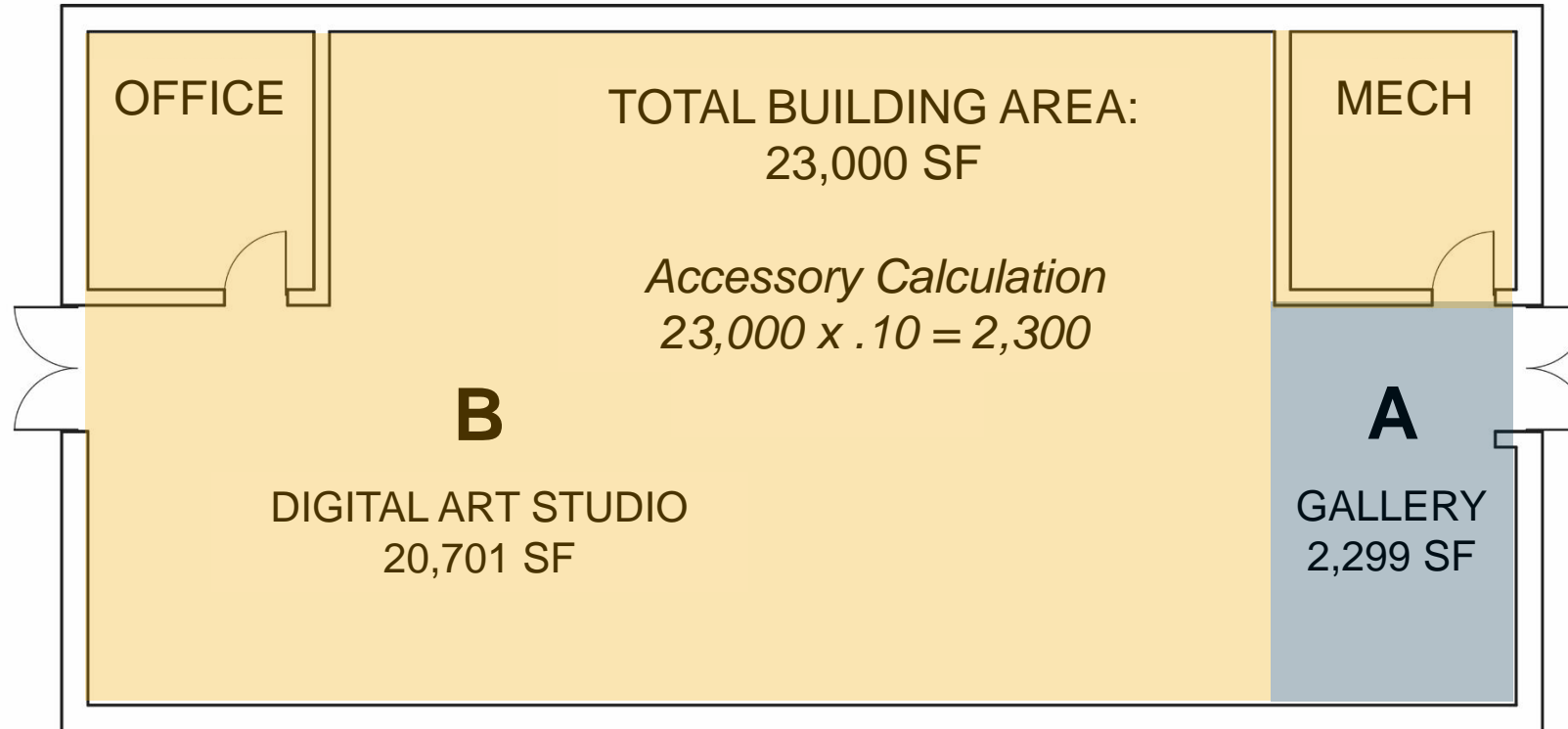
- Classified individually as the most similar occupancy group.
- Most restrictive allowable area, stories, and height applies.
- Most restrictive provision of Chapter 9 applies to total non-separated area.
- Other code requirements apply to each portion based on occupancy classification.

Mixed Occupancy – Separated



- Classified i
- Each separated space must comply with allowable area and stories for the most restrictive occupancy in that portion of the building.
- Each separated occupancy must comply with the building height limitations.
- Sum of the ratio of building areas cannot exceed 1. Separated according to Table 508.4.

Mixed Occupancy – Accessory use

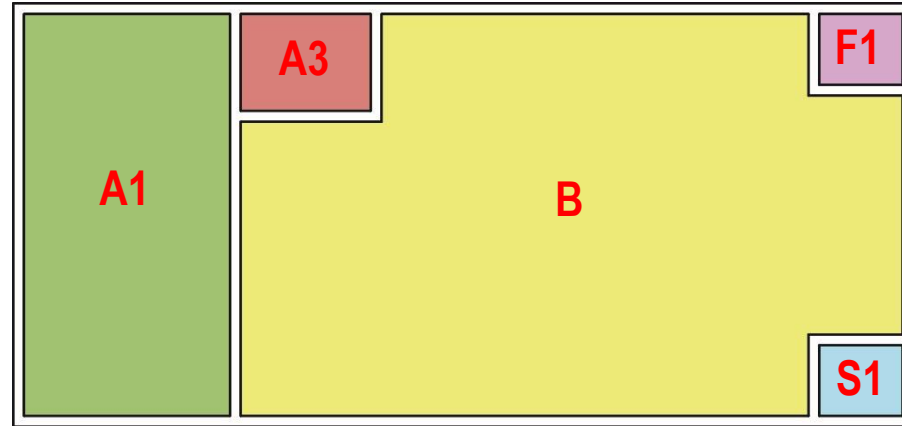


- Classified individually as the most similar occupancy group.
- Must be <10% of floor area of each level, not exceeding tabular value in Table 503.
- Must be located within allowable height and stories for that occupancy group but does not need to be separated from higher stories.

Mixed Occupancy – Accessory use

Mixed Occupancy Ratio [$S A_o/A_a$]			
OCCUPANCY	ACTUAL AREA OF OCCUPANCY A_o	ALLOWABLE FLOOR AREA A_a	AREA RATIO THIS FLOOR $[A_o/A_a]$
A1	15,450	40,375	0.38
A3	5,440	45,125	0.12
B	54,000	109,250	0.49
F1	2,500	73,625	0.03
S1	2,500	83,125	0.03
MIXED OCCUPANCY RATIO			1.06

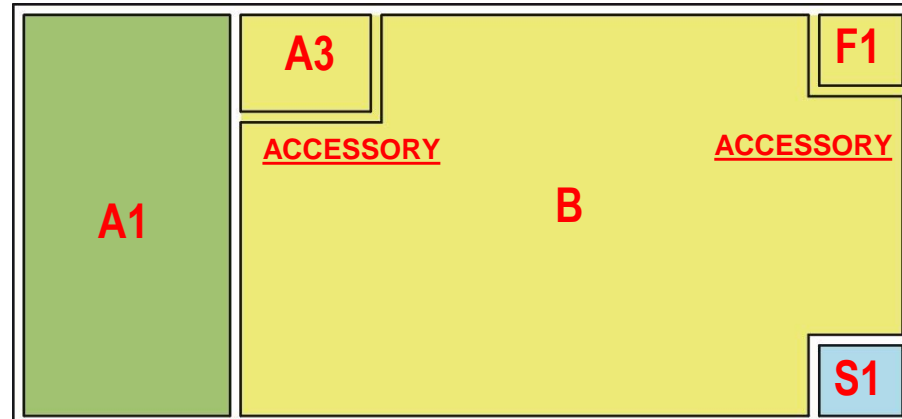
EXCEEDS



MIXED OCCUPANCY SEPARATED USE APPROACH

Mixed Occupancy Ratio [$S A_o/A_a$]			
OCCUPANCY	ACTUAL AREA OF OCCUPANCY A_o	ALLOWABLE FLOOR AREA A_a	AREA RATIO THIS FLOOR $[A_o/A_a]$
A1	15,450	40,375	0.38
A3	0	45,125	0.00
B	61,940	109,250	0.57
F1	0	73,625	0.00
S1	2,500	83,125	0.03
MIXED OCCUPANCY RATIO			0.98

COMPLIES

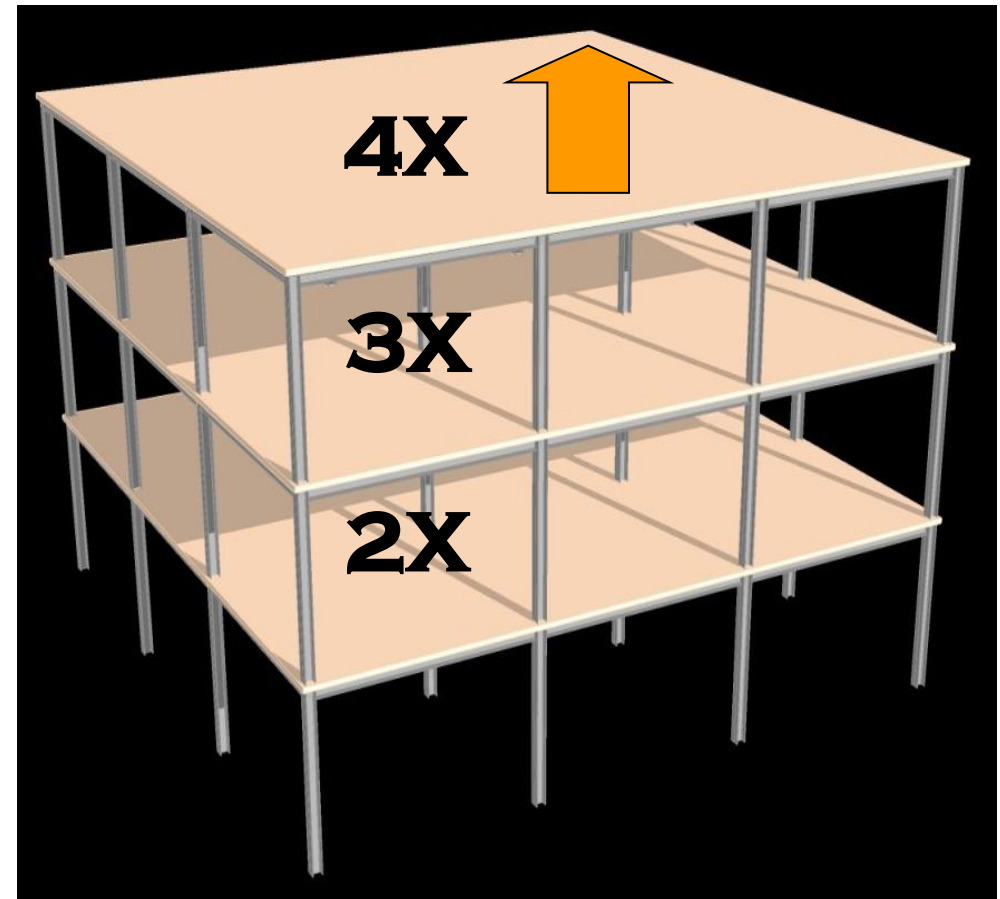


ACCESSORY USE APPROACH

ALLOWABLE AREA MULTI-STORY INCREASE

506.4 Area Determination

- + For two-story buildings, multiply by 2;
- + For three-story buildings, multiply by 3; and
- + **For four-story buildings multiply by 4 only if “R” occupancy & NFPA 13R sprinklers**
- + No story shall exceed the allowable area per floor (Aa), as determined for each occupancy on that floor



CHAPTER 7

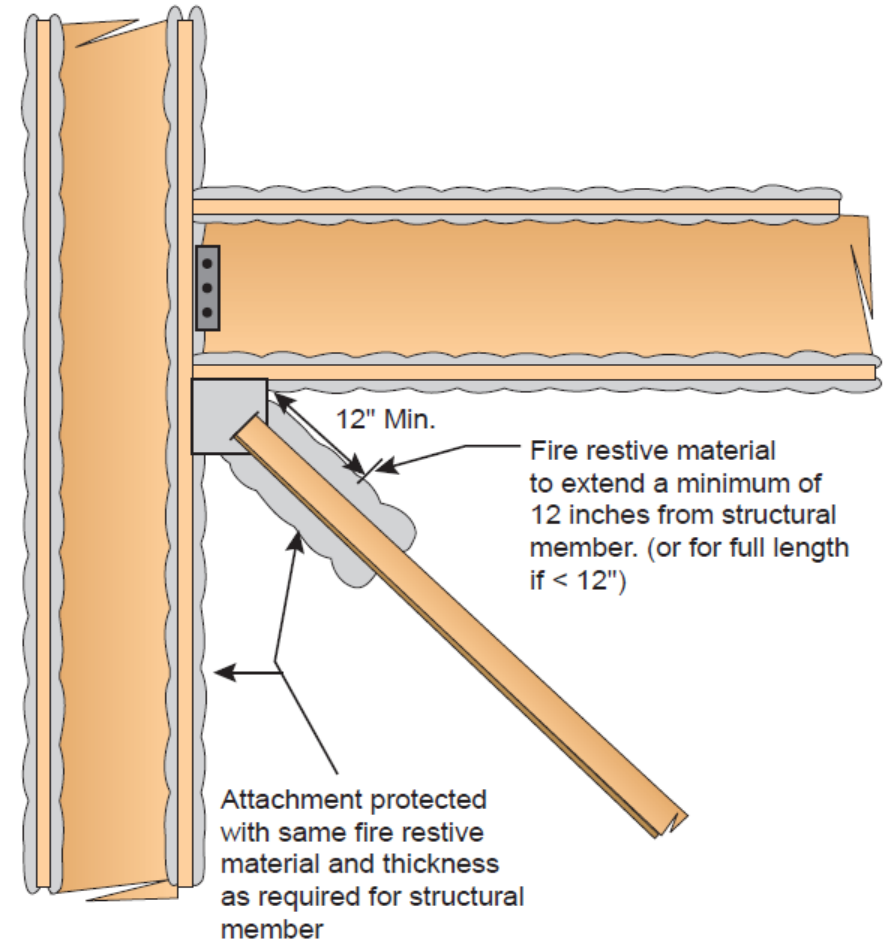
Fire Smoke Protection Features



Structural Fireproofing Extension on Secondary Steel Attachments

704.6.1

Secondary attachments to structural members. Where primary and secondary structural steel members require fire protection, secondary steel attachments to those structural members shall be protected with the same fire resistive material and thickness as required for the structural member. **The protection shall extend away from the structural member a distance of not less than 12 inches (305 mm) or shall be applied to the entire length where the attachment is less than 12 inches (305 mm) long.** Where an attachment is hollow and the ends are open, the fire-resistive material and thickness shall be applied to both the exterior and interior of the hollow steel attachment.



Protection of secondary attachments.

Shaft Enclosure at Top of Shaft & Termination at Roof

713.12 Enclosure at Top:

The top of shaft enclosures shall comply with one of the following:

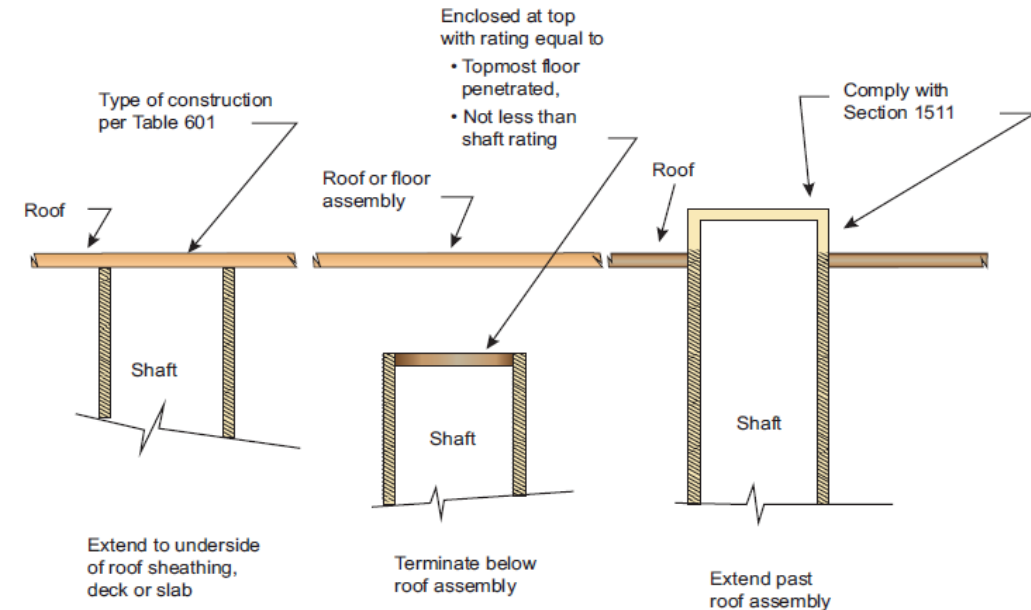
Extend to the underside of the roof sheathing, deck or slab of the building, and the roof assembly shall comply with the requirements for the type of construction as specified in Table 601.

Terminate below the roof assembly and be enclosed at the top with construction of the same fire-resistance rating as the topmost floor penetrated by the shaft, but not less than the fire-resistance rating required for the shaft enclosure.

Extend past the roof assembly and comply with the requirements of Section 1511.

713.12.1 Penthouse Mechanical Rooms:

A fire/smoke damper shall not be required at the penetration of the rooftop structure where shaft enclosures extend up through the roof assembly into a rooftop structure conforming to Section 1511. Ductwork in the shaft shall be connected directly to HVAC equipment.



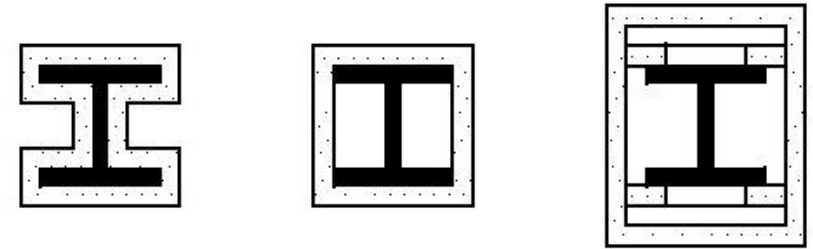
Enclosure options at the top of a shaft.

Structural Frame

Columns required to have fire-resistance rating need to be protected by **individual encasement**

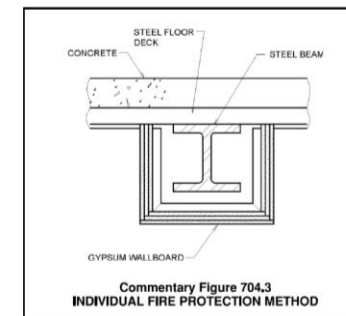
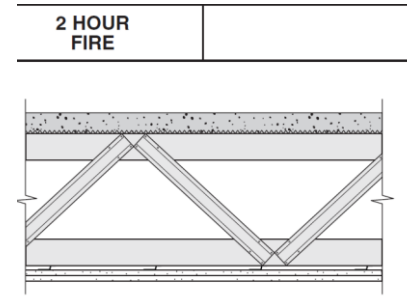
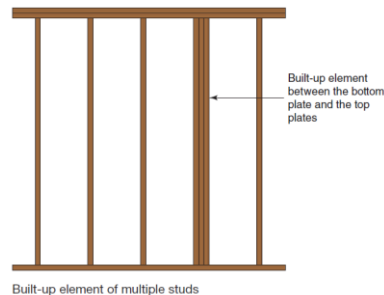
Primary **structural frame members other than columns** required to have fire-resistance rating need to be protected by individual encasement where supporting:

- **More than two floors, or**
- **More than one floor and roof, or**
- **Load-bearing or non-loadbearing wall more than two stories high**



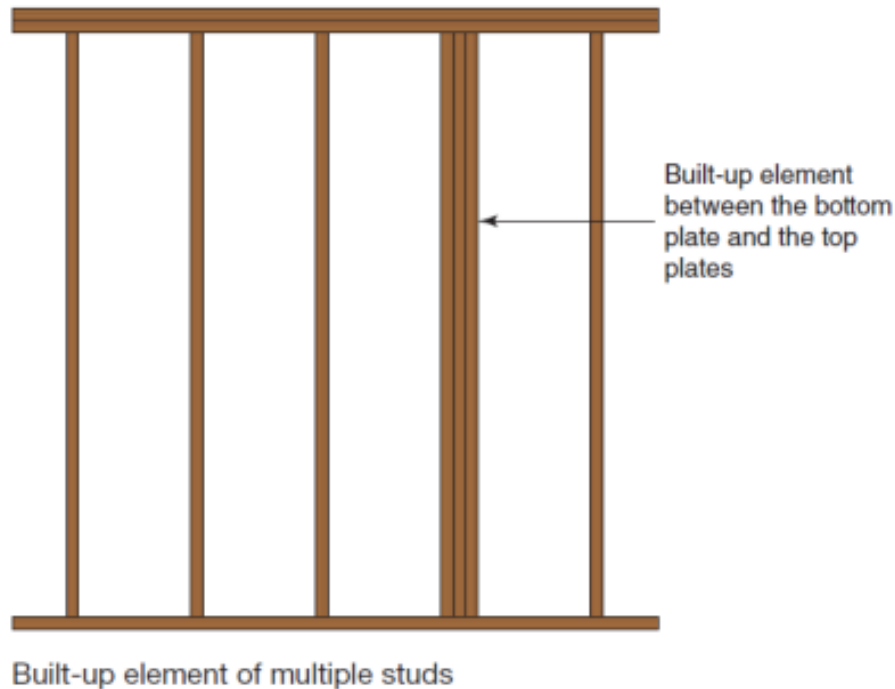
Secondary structural members required to have fire-resistance rating need to be protected by individual encasement

- Horizontal assemblies can be protected by membrane or ceiling assemblies
- Light frame vertical members located within top and bottom plate/track can be protected by wall membrane



Fire-resistance Of Structural Members

2015 IBC	2018 IBC	SUBJECT	SUMMARY OF CHANGE
§704.2	Modified §704.2	Column protection	<i>Exception: Columns that meet the limitations of Section 704.4.1.</i>
§704.4.1	Modified §704.4.1	Light-frame construction	<i>Studs, <u>columns</u>, and boundary elements that are integral elements in load bearing walls of light-frame construction and are located entirely between the top and bottom plates or <u>tracks</u> shall be permitted to have required fire-resistance ratings provided by the membrane protection provided for the load-bearing wall.</i>



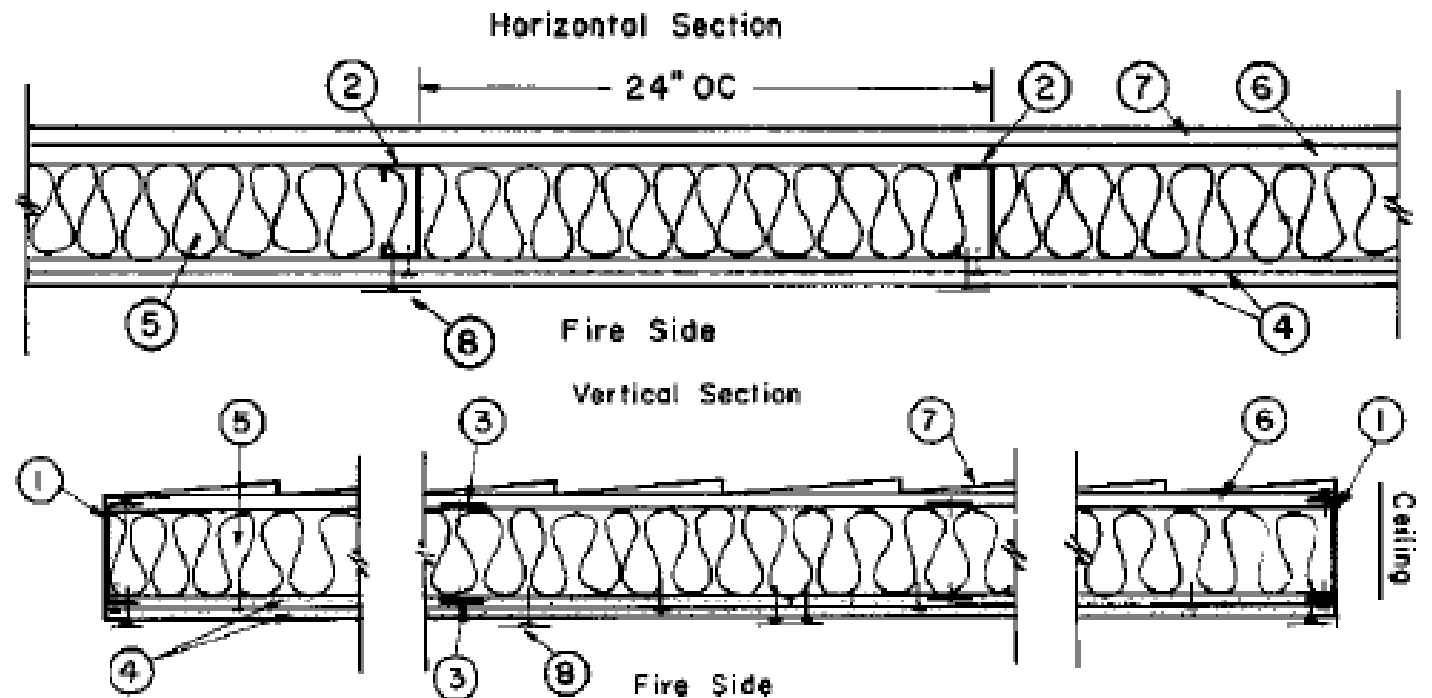
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Fire Exposure On One Side Only

705.5 Fire-resistance Ratings.

The required fire-resistance rating of exterior walls with a fire separation distance of less than or equal to 10 feet (3048 mm) shall be rated for exposure to fire from both sides.

Design No. U418
(Exposed to Fire on Interior Face Only)
Bearing Wall Rating — 45 Min., 1 or 2 HR.
(See Item 4)



Types of Construction - Table 601

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	3 ^{a, b}	2 ^{a, b}	1 ^b	0	1 ^b	0	3 ^a	2 ^a	2 ^a	HT	1 ^b	0
Bearing walls Exterior ^{e, f} Interior	3 3 ^a	2 2 ^a	1 1	0 0	1 1	0 0	3 3	2 2	2 2	2 1/HT	1 1	0 0
Nonbearing walls and partitions - Exterior	See Table 602											
Nonbearing walls and partitions - Interior ^d	0 for all except HT (See Section 2304.11.2 for HT)											
Floor construction and associated secondary members	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary members	1 ^{1/2} ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0 ^c	1 ^{1/2}	1	1	HT	1 ^{b, c}	0

Table 601 – Footnotes

- a. **Roof supports:** Fire-resistance ratings of primary structural frame and bearing walls are permitted to be **reduced by 1 hour, where supporting a roof only.**
- 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.**
- c. In all occupancies, **heavy timber** complying with Section 2304.11 shall be allowed **where a 1-hour or less fire-resistance rating is required.**
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.



h. For the purpose of determining the fire-resistance rating of joints, penetrations, openings and ducts in concrete floor and roof two-way slabs having direct connections to the columns, the fire-resistance rating for associated secondary members shall be used.

i. All reinforcing steel and post-tensioning tendons in concrete floor and roof two-way slabs having direct connections to the columns shall have concrete coverage adequate to provide the fire-resistance rating required for primary structural frame elements..

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

(All other parts of Table 601 remain unchanged)

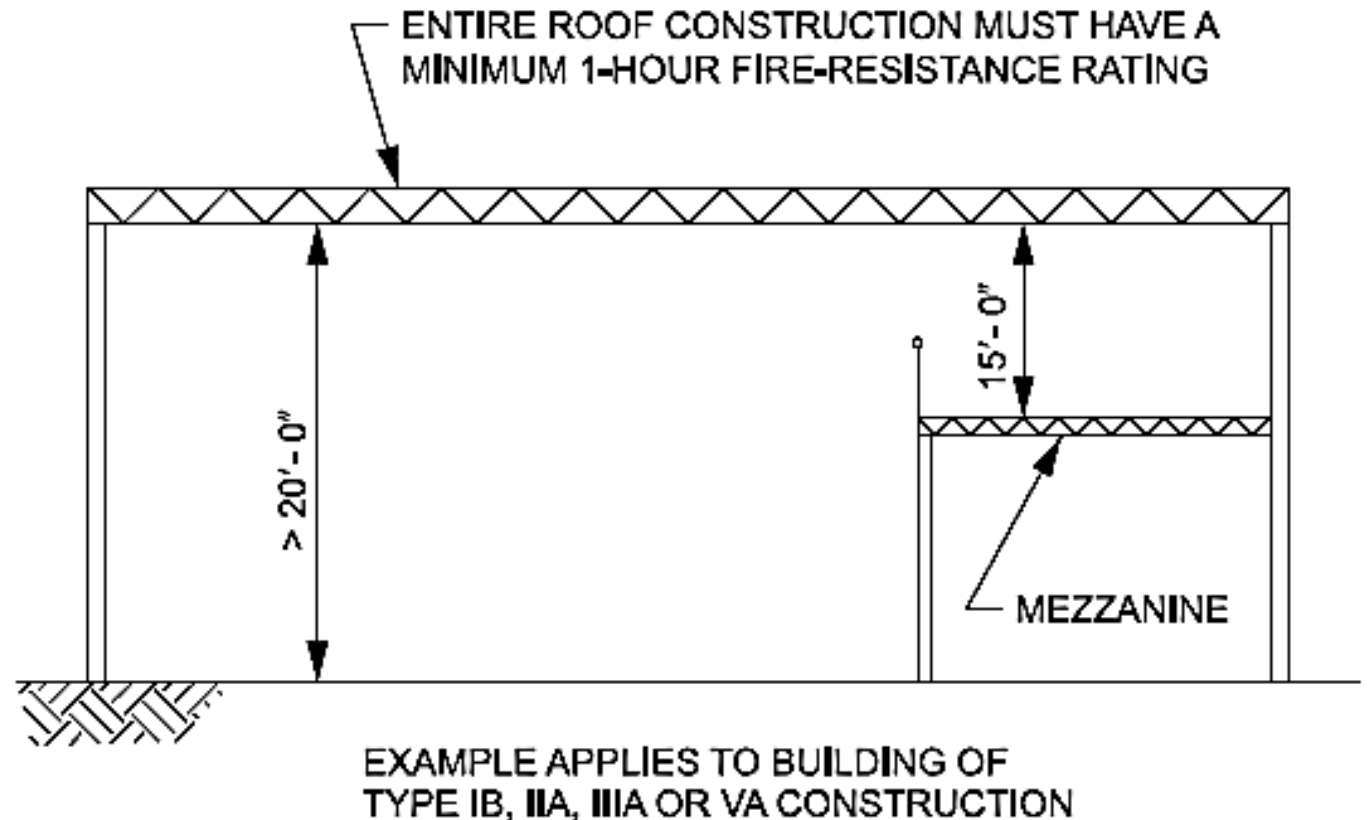
BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^{f,i} (see Section 202)	3 ^{a,b,h}	2 ^{a,b,c}	1 ^{b,c}	0 ^c	1 ^{b,c}	0	3 ^a	2 ^a	2 ^a	HT	1 ^{b,c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only. This reduction is not applicable to occupied roofs or to roofs supporting rooftop structures regulated by Section 1511, vegetative roofs and landscaped roofs.
- 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.
- 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.
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.
- 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.
- h. For the purpose of determining the fire-resistance rating of joints, penetrations, openings and ducts in concrete floor and roof two-way slabs having direct connections to the columns, the fire-resistance rating for associated secondary members shall be used.
- i. All reinforcing steel and post-tensioning tendons in concrete floor and roof two-way slabs having direct connections to the columns shall have concrete coverage adequate to provide the fire-resistance rating required for primary structural frame elements.

Roof Construction

In other than Groups F-1, H, M and S-1 occupancies, fire protection of structural members not required, including protection of roof framing and decking, where every part of roof construction 20 feet or more above any floor immediately below.



FRT Roof Construction

In buildings of **Type I and Type II** construction, **fire-retardant-treated wood allowed in roof construction**, including girders, trusses, framing and decking.

In Buildings of **Type IA construction** and **greater than two stories**, the roof construction has to be **more than 20 feet** (6096 mm) above the floor to use FRT wood.



Exterior Wall Ratings

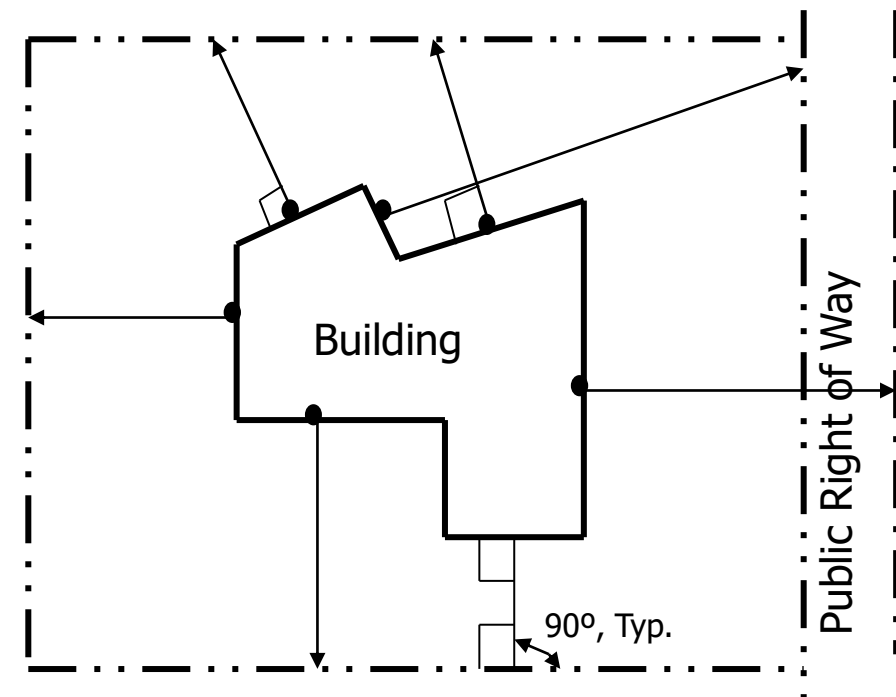
2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
Table §602	Table §705.5	Exterior Wall Rating	<i>Moved from Chapter 6 to Chapter 7</i>

TABLE-602 705.5 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance^{a,d,g}

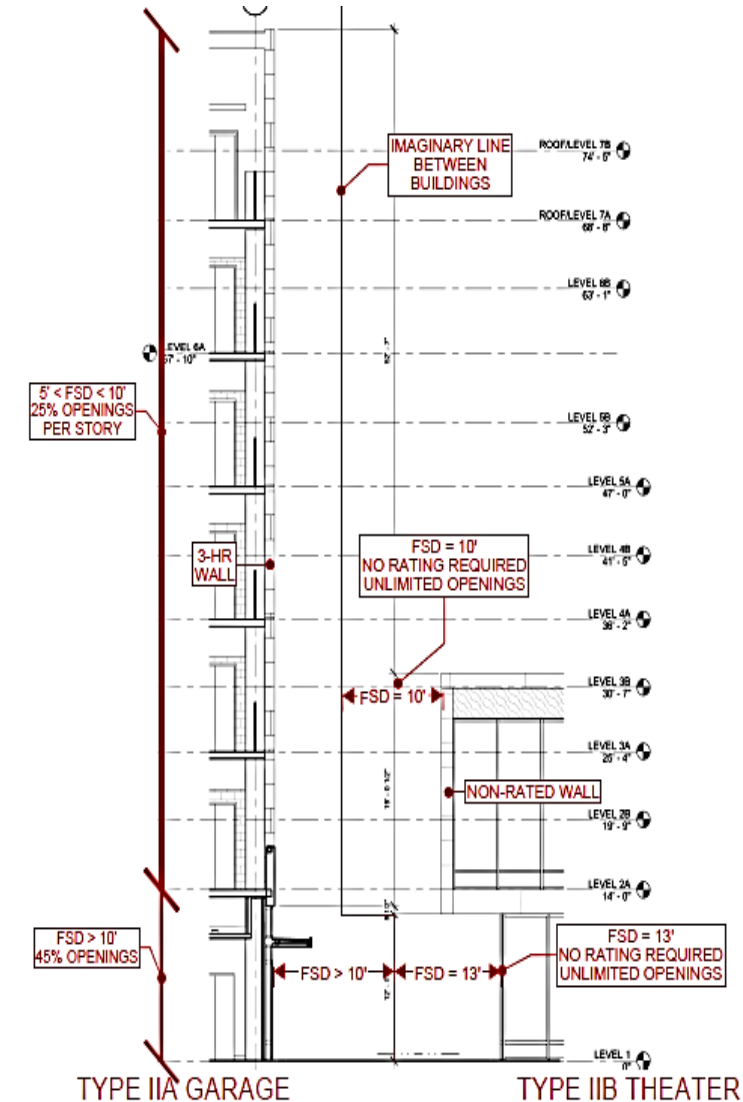
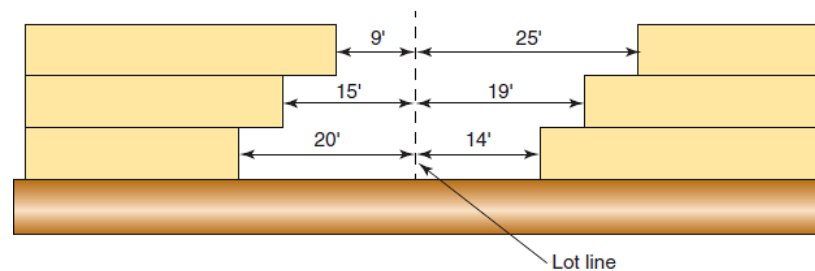
Fire Separation Distance = X (feet)	Type Of Construction	Occupancy Group H ^e	Occupancy Group F-1, M, S-1 ^f	Occupancy Group A, B, E, F-2, I, R ⁱ , S-2, U ^h
$X < 5^b$	All	3	2	1
$5 \leq X < 10$	IA, IV-A	3	2	1
	Others	2	1	1
$10 \leq X < 30$	IA, IB, IV-A, IV-B	2	1	1 ^c
	IIB, VB	1	0	0
	Others	1	1	1 ^c
$X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

Exterior Wall Rating & Opening Protection

2015 IBC	2018 IBC	SUBJECT	SUMMARY OF CHANGE
§705.8.1	§705.8.1	Allowable Area of Openings	<i>2018 Code: 705.8.1 Allowable area of openings. The maximum area of unprotected and protected openings permitted in an exterior wall in any story of a building shall not exceed the percentages specified in Table 705.8 based on the fire separation distance of each individual story.</i>



Fire Separation Distance (feet)	Allowable Area (Percentage of the area of the exterior wall, per story)		
	Protected Openings	Unprotected Openings Sprinklered Building	Unprotected Openings Nonsprinklered Building
9	25%	25%	10%
14	45%	45%	15%
15	75%	75%	25%
19	75%	75%	25%
20	Unlimited	Unlimited	45%
25	Unlimited	Unlimited	70%



Opening Protection

- Exterior wall opening protection based on Fire Separation Distance
- Party Walls – No openings
- Fire walls – Limited openings (NS-156 ft² - sprinkler exception; 25% of wall length – no exception)
- Fire barriers – Openings based on wall requirements (NS-156 ft² – sprinkler exception; 25% of wall length - some exceptions)
- Fire partitions – Openings based on wall requirements
- Smoke Barriers/Smoke Partitions – Restrictions on smoke migration

Opening Protection - Doors

TYPE OF ASSEMBLY	WALL ASSEMBLY (hours)	FIRE DOOR (hours)	DOOR VISION PANEL SIZE ^b
Fire walls and fire barriers fire rating greater than 1 hour (Fire Protection = Fire Door/Window Assembly) (Fire Resistance = ASTM E119 tested Fire Barrier/Fire Wall)	4	3	ASTM E119 TESTED
	3	3 ^a	ASTM E119 TESTED
	2	1½	100 sq. in. (Fire Rated Glazing)
	1½	1½	100 sq. in. (Fire Rated Glazing)
Enclosures for shafts, interior exit stairways and interior exit ramps	2	1½	100 sq. in. ^c
Horizontal exits in fire walls ^d	4	3	100 sq. in.
	3	3 ^a	100 sq. in.
1-Hour Fire barriers: shafts, exit access stairways/ramps, interior exit stairways/ramps; and exit passageway walls	1	1	100 sq. in.
Other fire barriers	1	¾	MAXIMUM SIZE TESTED AS A DOOR ASSEMBLY
Fire partitions: Corridor walls	1	⅓ ^b	
	0.5	⅓ ^b	
Other fire partitions	1	¾	
	0.5	⅓	
Smoke Barriers	1	⅓	

Opening Protection - Windows

TYPE OF WALL ASSEMBLY	WALL ASSEMBLY (hours)	WINDOW ASSEMBLY (hours)	FIRE-RATED GLAZING MARKING
Fire walls	All	NP except ASTM E119	W-XXX ^b
Fire barriers	>1	NP except ASTM E119	W-XXX ^b
	1	NP except ASTM E119	W-XXX ^b
Atrium separations, Incidental use areas, Mixed occupancy separations	1	3/4	OH-45 or W-60
Fire partitions	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Smoke barriers	1	3/4	OH-45 or W-60
Exterior walls	>1	1 1/2	OH-90 or W-XXX ^b
	1	3/4	OH-45 or W-60
	0.5	1/3	OH-20 or W-30
Party wall	All	NP	Not Applicable

W=Window, D = Door, H = Hose stream, O = Opening, XXX = Minutes

2021 IBC - SIGNIFICANT CHANGES

CHAPTER 9

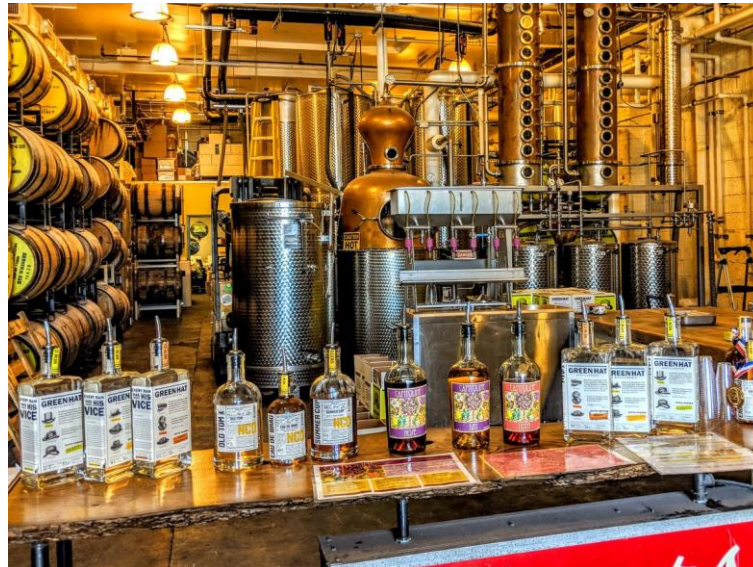
Fire Protection and Life Safety Systems



Group F1/M/S1 Fire Areas that require sprinklers

Group F1/M/S1 – Special Use Areas Requiring Sprinklers

- **Woodworking Operations** in excess of 2,500 square feet that generate finely divided combustible waste or use finely divided combustible materials.
- Throughout F1/S1 fire area that includes preparation and storage of **Distilled Spirits(F1/S1) and Wine(S1)**.
- Throughout fire area where F1/S1 **Upholstered Furniture or Mattresses** and exceeds 2,500 square feet and Group M over 5,000 square feet



Group R Occupancies Permitted to Use NFPA 13R Systems Restricted

903.3.1.2 NFPA 13R Sprinkler Systems:

Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. **Four stories or fewer** above grade plane.
2. The **floor level of the highest story is 30 feet** (9144 mm) or less above the lowest level of fire department vehicle access.
3. The **floor level of the lowest story is 30 feet** (9144 mm) or less below the lowest level of fire department vehicle access.

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be **measured from grade plane.**





903.3.1.2 NFPA 13R Sprinkler Systems:

Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. **Four stories or fewer** above grade plane.
2. **For other than Group R2 occupancies** the **floor level of the highest story is 30 feet** (9144 mm) or less above the lowest level of **required** fire department vehicle access. For Group R-2 occupancies, the roof assembly is less than 45 feet (13716 mm) above the lowest level of required fire department vehicle access. The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance or Group R2 occupancies, the roof assemblies
3. The **floor level of the lowest story is 30 feet** (9144 mm) or less below the lowest level of fire department vehicle access.

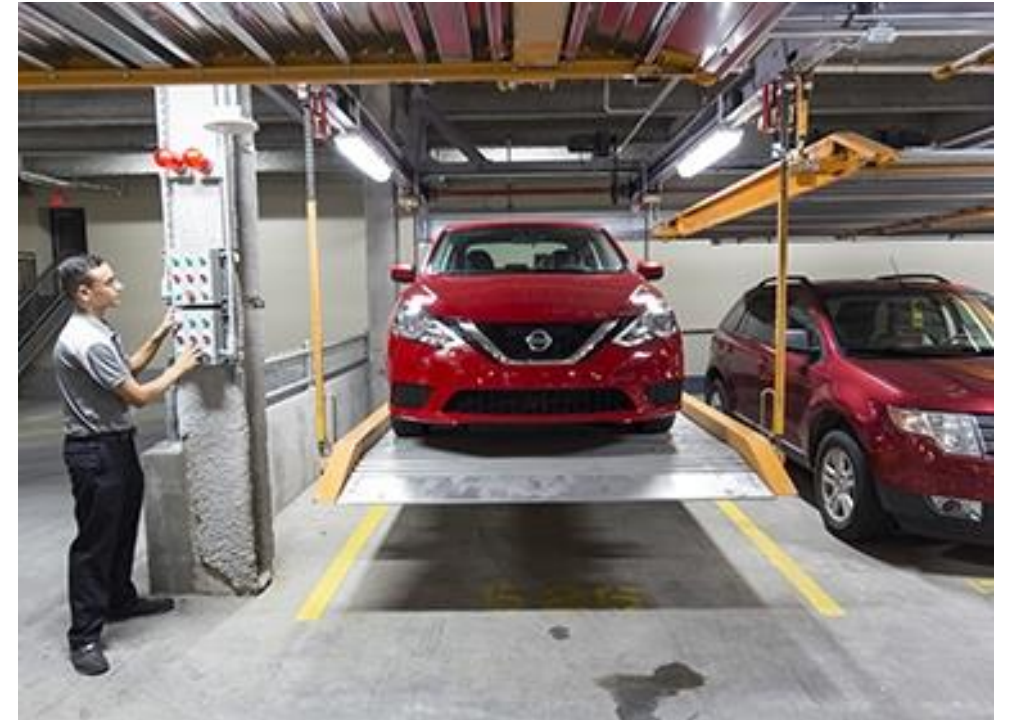
The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be **measured from grade plane.**



Mechanical Parking Garages

903.2.10.2 Mechanical-Access Enclosed Parking Garages:

An approved automatic sprinkler system shall be provided throughout buildings used for the storage of motor vehicles in a mechanical-access enclosed parking garage. The portion of the building that contains the mechanical-access enclosed parking garage shall be protected with a specially engineered automatic sprinkler system.



[F] 907.2 Where Required — New Buildings and Structures

An approved fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

Not fewer than one manual fire alarm box shall be provided in an approved location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

For Group R-2 occupancies, the manual fire alarm box shall not be located in an area that is open to the public.

907.5.2.3.3 Group R-2. In Group R-2 occupancies required by Section 907 to have a fire alarm system, **visual alarms shall be provided within common and public areas, and are not required within individual dwelling units**

915.1.1 Where required.

915.1.1.1 Group R. Carbon monoxide detection shall be provided in Group R occupancies in the locations specified in Section 915.2.

915.1.1.2 Group I and E. Carbon monoxide detection shall be provided in Group I-1, I-2, and I-4 ~~and R~~ occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

Removed “Dwelling Units” from sections 915.1.2 through 915.1.5

Kept **2019 OSSC** provisions of 915.2.1 Dwelling units and 915.2.4 Three or more dwellings.

Fire Command Center in Large Warehouses and Manufacturing Facilities

911.1 General:in all F-1 and S-1 occupancies with a building footprint of over 500,000 square feet

911.1.1 Location and Access: The location and access to the fire command center shall be approved by the fire code official.

911.1.2 Separation:separated from the remainder of the building by not less than a 1-hour fire barrier

[F] 911.1.3 Size: building footprint greater than 500,000 square feet (46 452 m²) in area, the fire command center shall have a minimum size of 96 square feet (9 m²) with a minimum dimension of 8 feet (2348 mm) where approved by the fire code official.

Other FCC's not less than 0.015 percent of the total building area of the facility served or 200 square feet (19 m²) in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area or 10 feet (3048 mm), whichever is greater.



CHAPTER 10

Means of Egress



Egress from Mechanical Penthouse

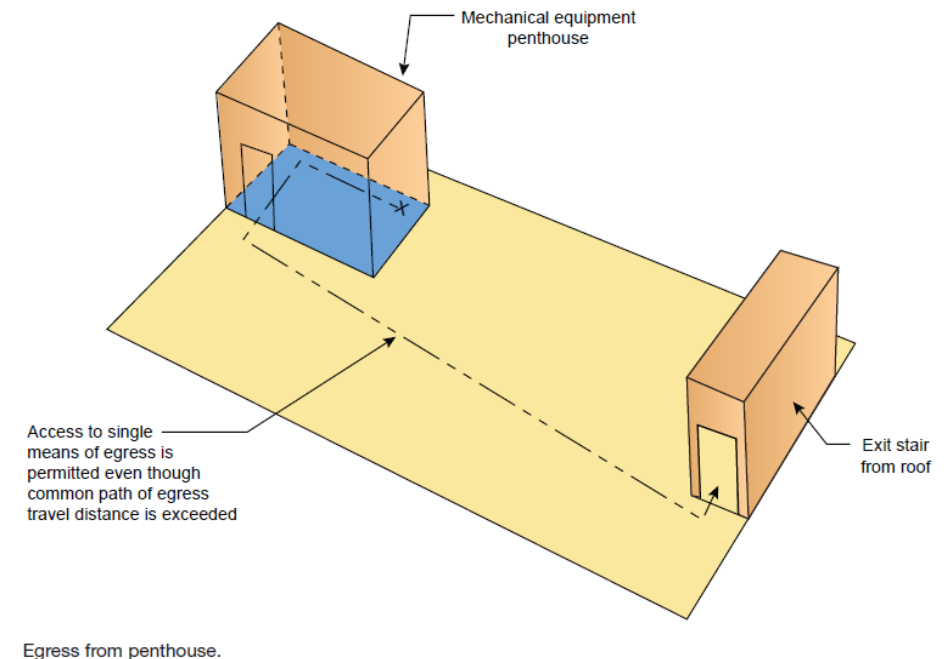
2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1006.2.1	§1006.2.1	Egress from stories and occupied roofs	<i>The common path of travel distance limitations for unoccupied mechanical rooms and penthouses have been eliminated.</i>

1006.2.1 Egress Based On Occupant Load and Common Path Of Egress Travel Distance.

Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1. The cumulative occupant load from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

- Unoccupied mechanical rooms and penthouses are not required to comply with the common path of egress travel distance measurement.**



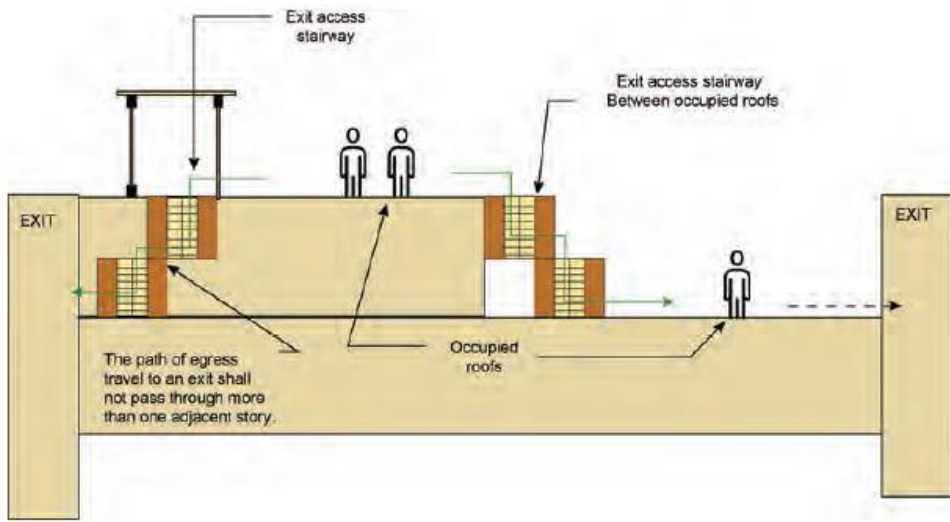
1006.2.2.1 Boiler Incinerator and furnace rooms. Two exit access doorways are required in incinerator and furnace rooms where the area is over 500 square feet (46 m²) and any fuel-fired equipment exceeds 400,000 British thermal units (Btu) (422 000 KJ) input capacity. Where two exit access doorways are required, one is permitted to be a fixed ladder or an alternating tread device. Exit access doorways shall be separated by a horizontal distance equal to one-half the length of the maximum overall diagonal dimension of the room.

1006.2.2.2 Equipment rooms containing boilers. Equipment rooms containing one or more boilers shall be provided with two exit access doorways where the room area is over 500 square feet (46 m²) and there are one or more boilers having a combined fuel capacity of 1,000,000 Btu/hr (293 kW) or more. Where two exit access doorways are required, one is permitted to be a fixed ladder or an alternating tread device. Exit access doorways shall be separated by a horizontal distance greater than or equal to one-half the length of the maximum overall diagonal dimension of the room.

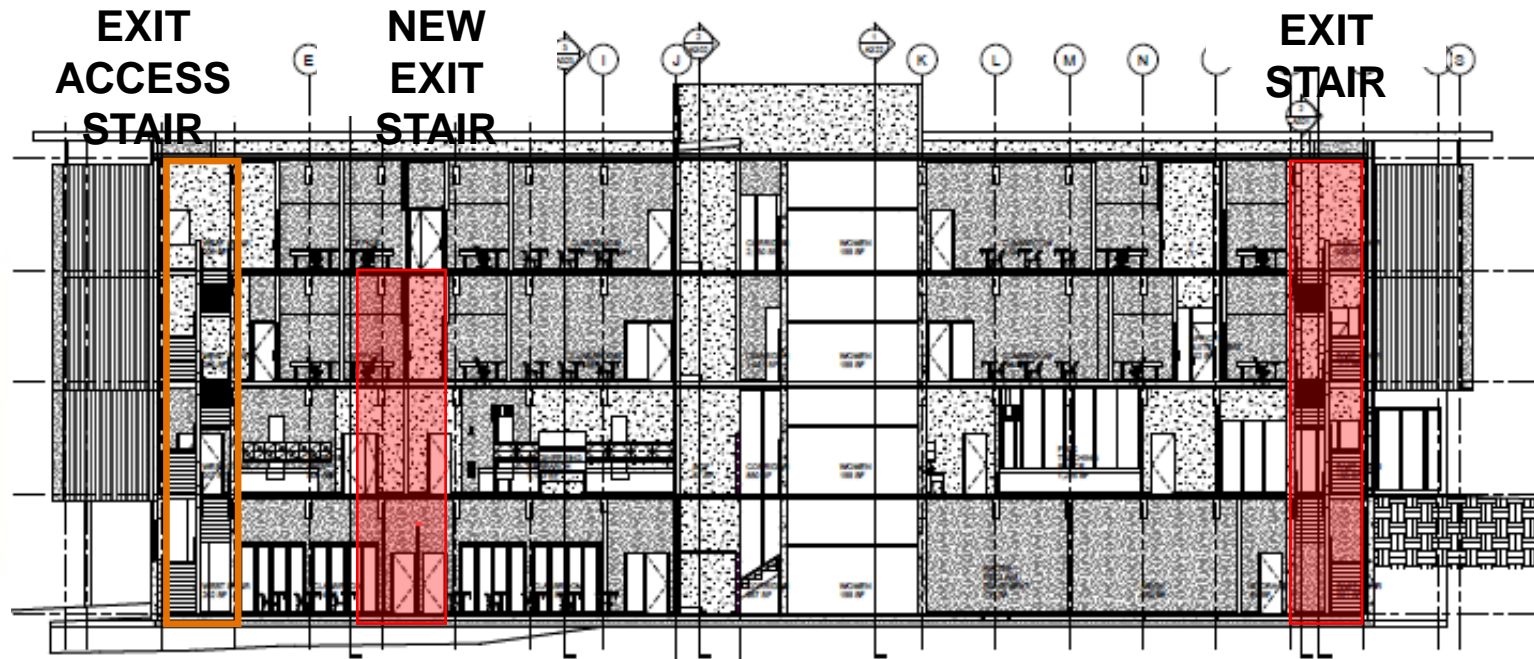


Exit Through Adjacent Floors

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1006.3.1	§1006.3.2	Egress from stories and occupied roofs	<i>New section added to clarify that exit access stairs in atriums and multi-level occupied roofs are exempt</i>



Egress from occupied roofs.

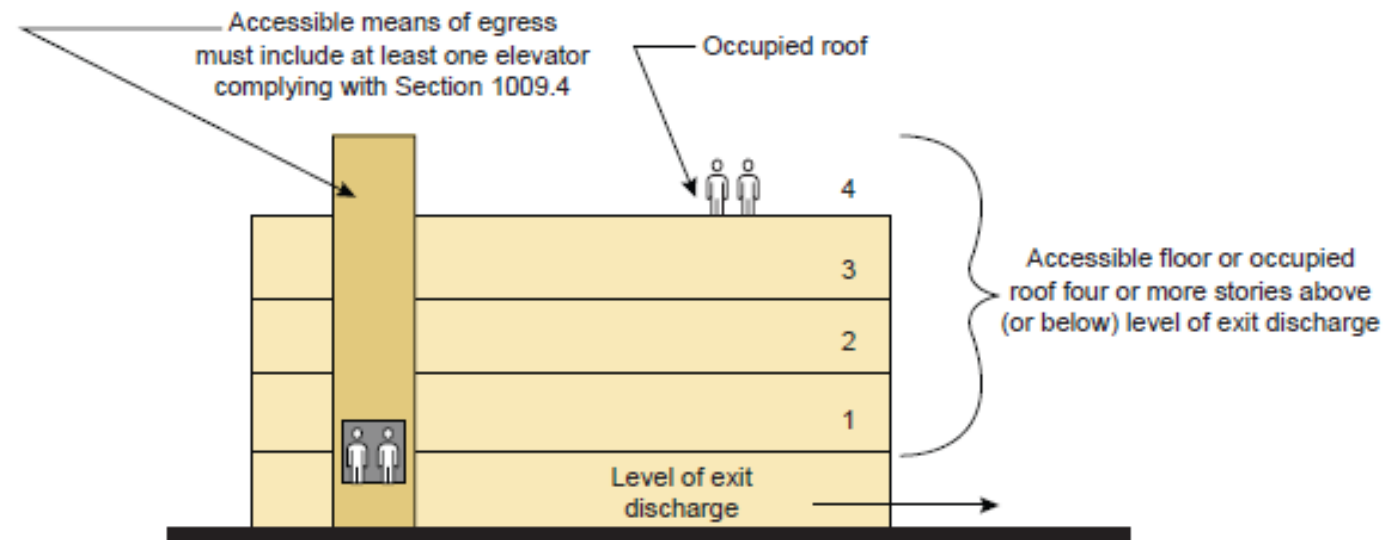


Accessible Elevators

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1009.2.1	§1009.2.1	Accessible elevator to stories <u>and occupied roofs</u>	<i>An elevator serving an occupied roof must now be considered as one of the required accessible means of egress where the roof is located directly above the third story above the level of exit discharge.</i>

1009.2.1 Elevators required.

In buildings where a required accessible floor or occupied roof is four or more stories above or below a level of exit discharge, not less than one required accessible means of egress shall be an elevator complying with Section 1009.4.



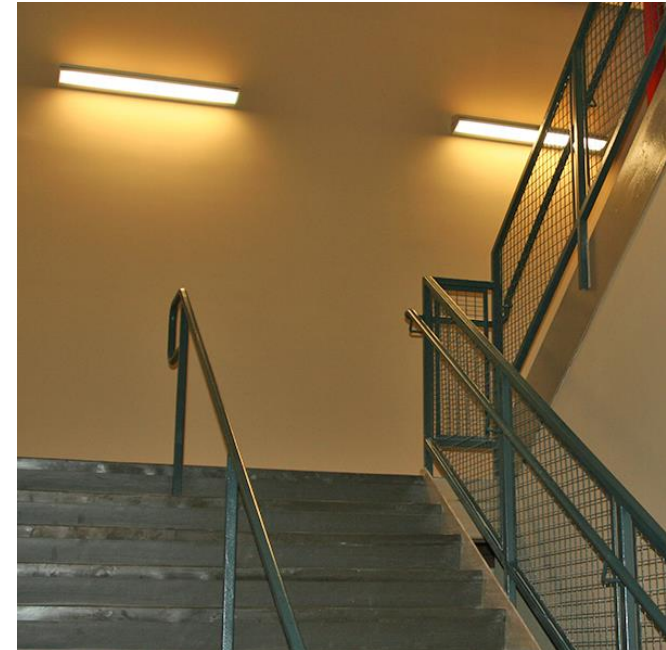
Accessible means of egress from occupied roof.

Exit Illumination

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1008.2.1	§1008.2.1	Illumination level under normal power.	<i>The minimum illumination level for both exit and exit access stairways has been increased from 1 foot-candle to 10 foot-candles.</i>

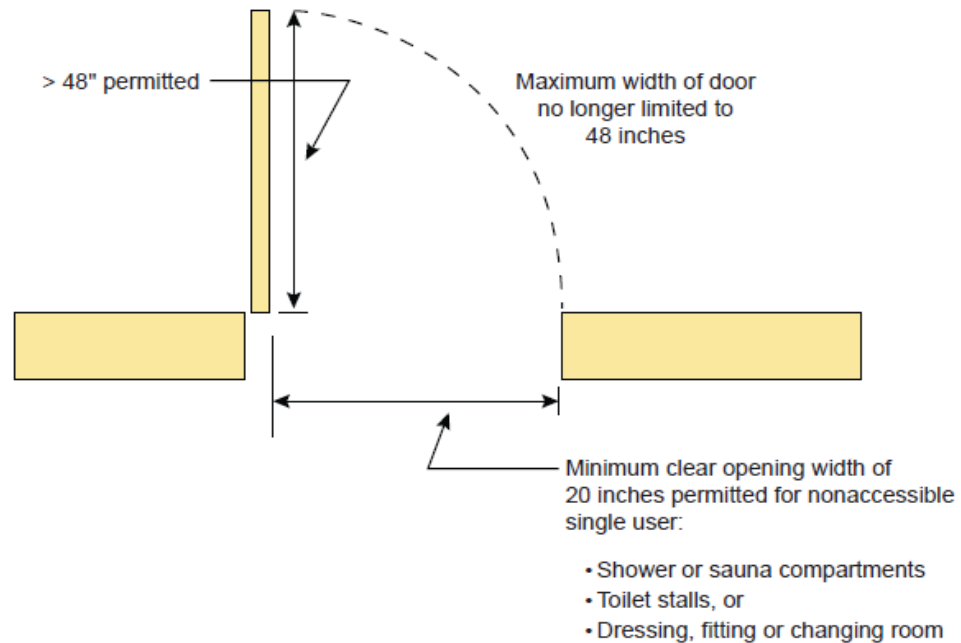
1008.2.1 Illumination Level Under Normal Power.

The means of egress illumination level shall be not less than 1 footcandle (11 lux) at the walking surface. Along exit access stairways, exit stairways and at their required landings, the illumination level shall not be less than 10 footcandles (108 lux) at the walking surface when the stairway is in use.



Maximum Door Leaf Size Not Limited

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1010.1.1	§1010.1.1	Size of doors.	<p><i>The maximum width for a swinging door is no longer regulated and exception now allows for reduced door sizes, when serving single-user showers, saunas and toilet compartments, as well as dressing, fitting and changing rooms.</i></p>



Door Locking Educational Occupancies – E/B/I4

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1010.1.4.4	§1010.2.8	Locking arrangement E, B, and now I4	<i>Group I-4 occupancies are now regulated under the special locking arrangements allowed for other “educational occupancies.”</i>

1010.2.8 Locking Arrangements in Educational Occupancies.

In Group E and occupancies, Group B educational occupancies and Group I-4 occupancies, egress doors from classrooms, offices and other occupied rooms with locking arrangements designed to keep intruders from entering the room shall comply with all of the following conditions:

1. The door shall be capable of being unlocked from outside the room with a key or other approved means.
2. The door shall be openable from within the room in accordance with Section 1010.1.9 1010.2.
3. Modifications shall not be made to listed panic hardware, fire door hardware or door closers.
4. Modifications to fire door assemblies shall be in accordance with NFPA 80.

Remote locking or unlocking of doors from an approved location shall be permitted in addition to the unlocking operation in Item 1.

Door Locking Arrangements

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1010.1.9.4	§1010.2.4	Locks and latches	<i>The general locking provisions have been expanded to allow locked doors in the egress system when desired due to the clinical needs of care recipients or where exterior areas egress back through the building.</i>

- Group I-1, Condition 2 and Group I-2 occupancies where the clinical needs of persons receiving care
- Other than egress courts, where occupants must egress from an exterior space through the building for means of egress,.....
- Locking devices are permitted on doors to balconies, decks or other exterior spaces serving individual dwelling or sleeping
- Locking devices are permitted on doors to balconies, decks or other exterior spaces of 250 square feet (23.23 m²) or less serving a private office space.



Exit Access Stairs

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1019.3	§1019.3	Exit access stairs	<p><i>The allowance exempting the enclosure of exit access stairways that only serve two stories has been clarified by mandating that the stories be adjacent.</i></p>

1019.3 Occupancies other than Groups I-2 and I-3.

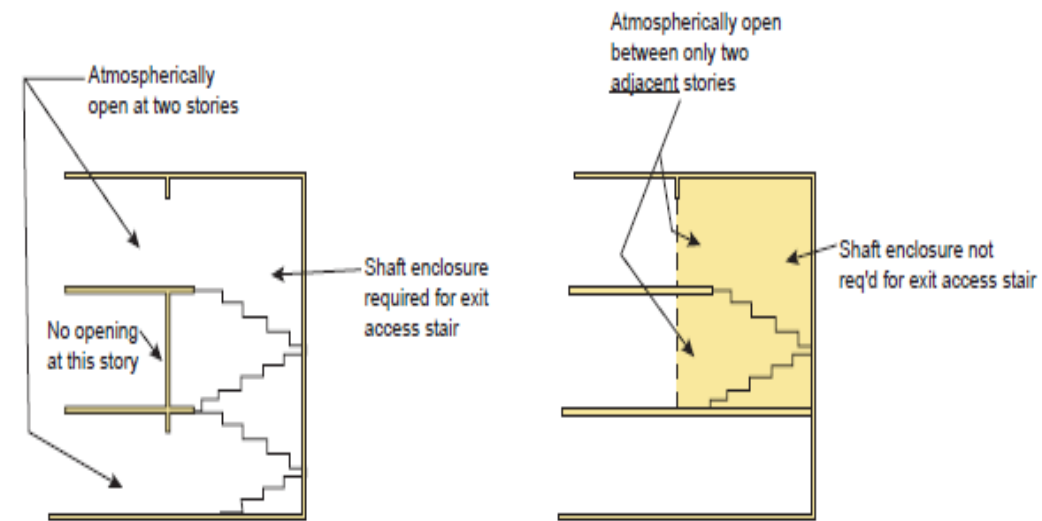
In other than Group I-2 and I-3 occupancies, floor openings containing exit access stairways or ramps shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

Exceptions:

1. Exit access stairways and ramps that serve or atmospherically communicate between **only two adjacent stories**. Such interconnected stories shall not be open to other stories.

2 – 8 No Change

9. **Exterior exit access stairways or ramps between occupied roofs.**



Exit access stair connecting stories.

Deadend Corridor

2018 IBC	2021 IBC	SUBJECT	SUMMARY OF CHANGE
§1020.4	§1020.5	Deadend corridors	<i>In hospitals, a corridor that does not serve patient rooms or treatment spaces is now allowed a maximum 30-foot dead end.</i>

1020.5 Dead ends.

Where more than one exit or exit access doorway is required, the exit access shall be arranged such that dead-end corridors do not exceed 20 feet (6096 mm) in length.

Exceptions:

1.....

4. **In Group I-2, Condition 2 occupancies, the length of dead-end corridors that do not serve patient rooms or patient treatment spaces shall not exceed 30 feet (9144 mm).**



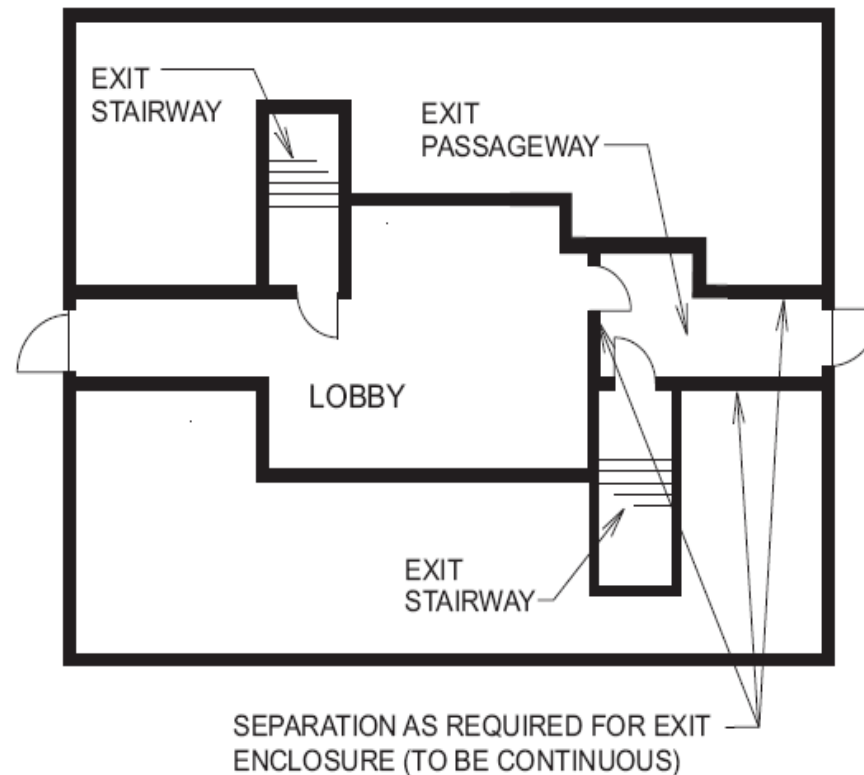
Stairway Extensions

Section 1023.3.1

Where interior exit stairways and ramps extended by an exit passageway shall be separated from the exit passageway by a fire barrier constructed in accordance with Section 707 or a horizontal assembly constructed in accordance with Section 711, or both....

Exception: Separation not required when there are no openings in the exit passageway.

New exception: Separation not required when the interior exit stairway and the exit passageway extension are pressurized in accordance with Section 909.20.5.



Exit Door & 2nd Exit Requirements

1010.1.2.1 Direction of swing.

Pivot or side-hinged swinging doors shall swing in the direction of egress travel where serving a room or area **containing an occupant load of 50 or more persons** or a Group H occupancy.

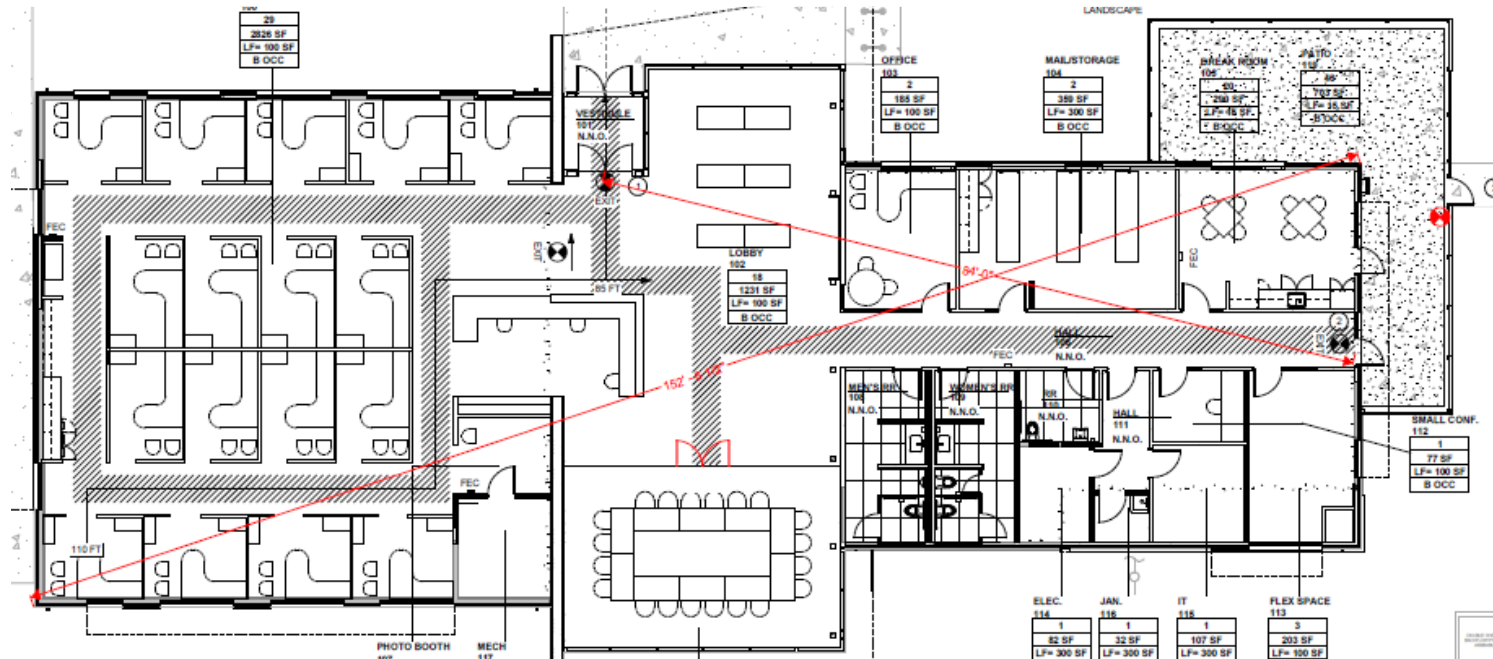
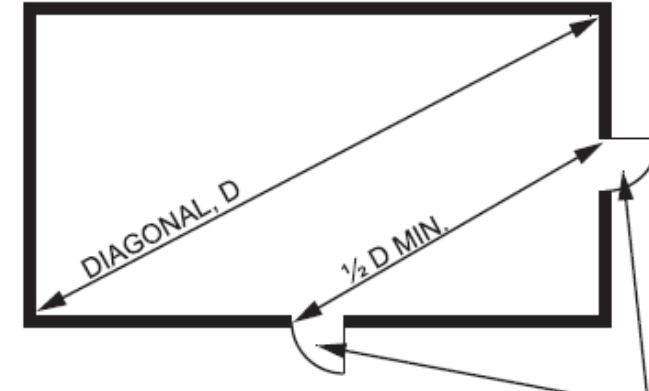
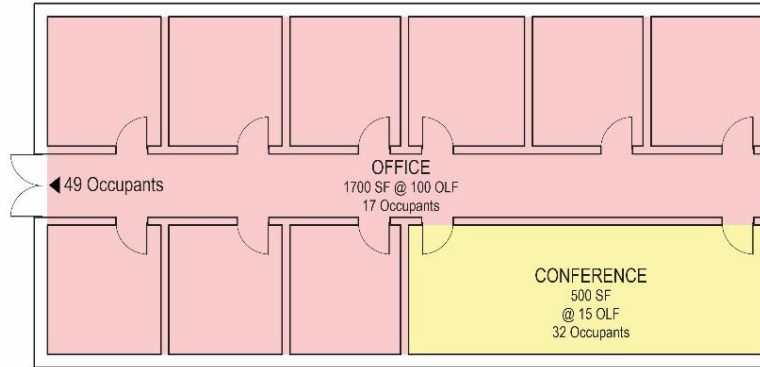
1010.1 Doors.

Means of egress doors shall meet the requirements of this section. Doors serving a means of egress system shall meet the requirements of this section and Section 1022.2. Doors provided for egress purposes **in numbers greater than required by this code shall meet the requirements of this section.**

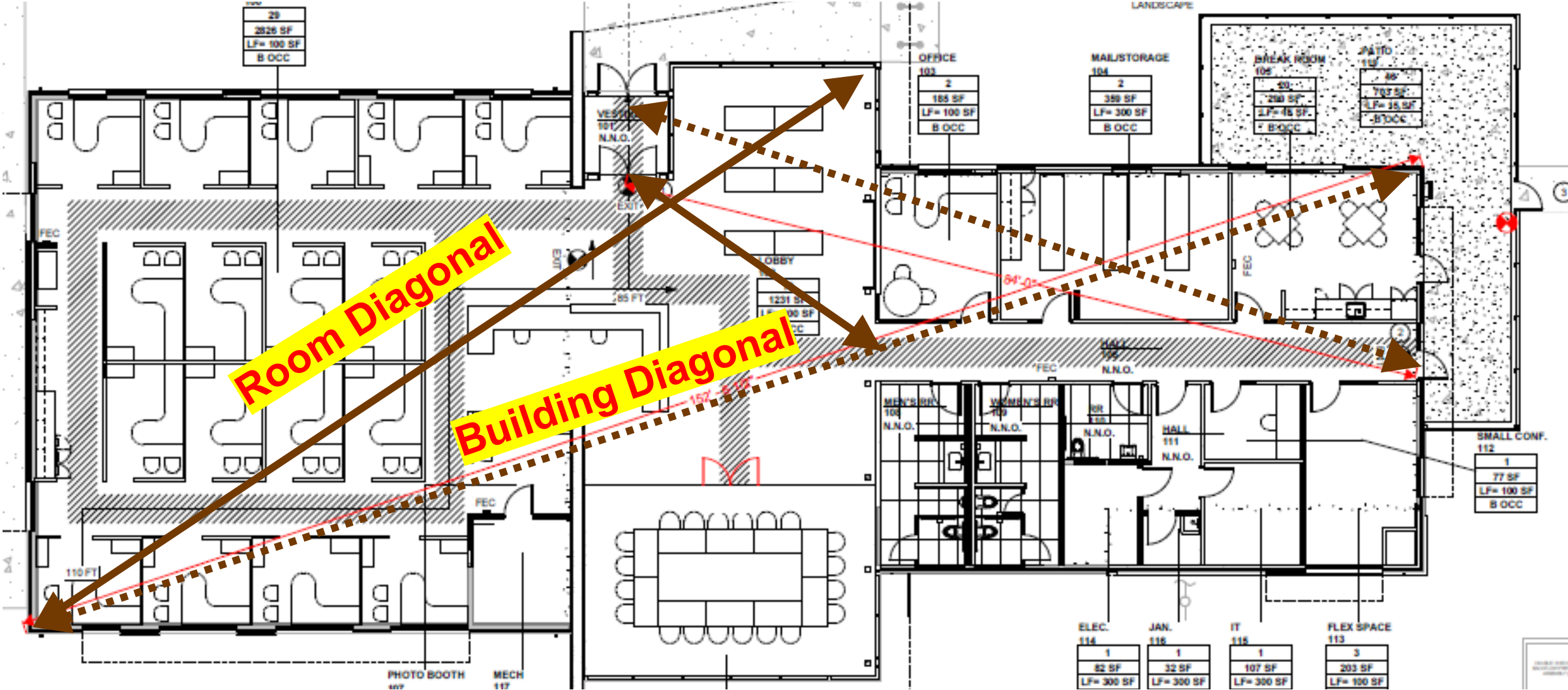
1007.1.1.1

Measurement point. The separation distance required in Section 1007.1.1 shall be measured in accordance with the following:

1. The separation distance to exit or exit access doorways shall be measured to **any point along the width of the doorway.**



Second Exit and Exit Separation Example



2021 IBC - SIGNIFICANT CHANGES

CHAPTER VARIES

Other Changes



Combustible Lockers

806.9 Combustible Lockers:

Where lockers constructed of combustible materials are used, the lockers shall be considered to be interior finish and shall comply with Section 803.

Exception: Lockers constructed entirely of wood and noncombustible materials shall be permitted to be used wherever interior finish materials are required to meet a Class C classification in accordance with Section 803.1.2.



Special Inspections of Mass Timber Construction

1705.5.3 Mass Timber Construction:

Special inspections of mass timber elements in Types IV-A, IV-B and IV-C construction shall be in accordance with Table 1705.5.3.

1705.20 Sealing of Mass Timber:

Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.7 is applied to mass timber building elements as designated in the approved construction documents.

TABLE 1705.5.3 Required Special Inspections of Mass Timber Construction

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

Type IV HT: Concealed Space Allowed with Restricted Contents or Protection

2304.11.3 Floors:

Floors shall be without concealed spaces or with concealed spaces complying with Section 602.4.4.3.....

2304.11.4 Roof Decks:

Roofs shall be without concealed spaces or with concealed spaces complying with Section 602.4.4.3.....

602.4.4.3 Concealed Spaces:

Concealed spaces shall not contain combustible materials other than building elements and electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code. Concealed spaces shall comply with applicable provisions of Section 718. Concealed spaces shall be protected in accordance with one or more of the following:

1. The building shall be sprinklered throughout in accordance with Section 903.3.1.1 and automatic sprinklers shall also be provided in the concealed space.
2. The concealed space shall be completely filled with noncombustible insulation.
3. Surfaces within the concealed space shall be fully sheathed with not less than 5/8-inch Type X gypsum board.

Exception: Concealed spaces within interior walls and partitions with a 1-hour or greater fire-resistance rating complying with Section 2304.11.2.2 shall not require additional protection.

Water Supply for Fire Protection – Combustible Construction

3313.3 Vertical Construction of Types III, IV and V Construction:

Prior to commencement of vertical construction of Type III, IV or V buildings that utilize any combustible building materials, the fire flow required by Sections 3313.3.1 through 3313.3.3 shall be provided, accompanied by fire hydrants in sufficient quantity to deliver the required fire flow and proper coverage.

3313.3.1 Fire Separation Up to 30 Feet:

Where a building of Type III, IV or V construction has a fire separation distance of less than 30 feet (9144 mm) from property lot lines, and an adjacent property has an existing structure or otherwise can be built on, the water supply shall provide either a minimum of 500 gallons per minute (1893 L/m), or the entire fire flow required for the building when constructed, whichever is greater.

3313.3.2 Fire Separation of 30 Feet Up to 60 Feet:

Where a building of Type III, IV or V construction has a fire separation distance of 30 feet (9144 mm) up to 60 feet (18 288 mm) from property lot lines, and an adjacent property has an existing structure or otherwise can be built on, the water supply shall provide a minimum of 500 gallons per minute (1893 L/m), or 50 percent of the fire flow required for the building when constructed, whichever is greater.

3313.3.3 Fire Separation of 60 Feet or Greater:

Where a building of Type III, IV or V construction has a fire separation of 60 feet (18 288 mm) or greater from a property lot line, a water supply of 500 gallons per minute (1893 L/m) shall be provided.

Intermodal Shipping Containers – New Section Added

3115.1 General:

The provisions of Section 3115 and other applicable sections of this code shall apply to intermodal shipping containers that are repurposed for use as buildings or structures, or as a part of buildings or structures.

Exceptions:

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.
2. Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the International Fire Code.
3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.
4. Intermodal shipping containers housing or supporting experimental equipment are exempt from the requirements of Section 3115, provided that they comply with all of the following:
 - Such units shall be single stand-alone units supported at grade level and used only for occupancies as specified under Risk Category I in Table 1604.5.
 - Such units are located a minimum of 8 feet (2438 mm) from adjacent structures, and are not connected to a fuel gas system or fuel gas utility.
 - In hurricane-prone regions and flood hazard areas, such units are designed in accordance with the applicable provisions of Chapter 16.

Intermodal Shipping Containers – New Section Added

- 3115.2 Construction Documents
- 3115.3 Intermodal Shipping Container Information
- 3115.4 Protection Against Decay and Termites
- 3115.5 Under-Floor Ventilation
- 3115.6 Roof Assemblies
- 3115.7 Joints and Voids
- 3115.8 Structural
 - 3115.8.1 Foundations
 - 3115.8.1.1 Anchorage
 - 3115.8.2 Welds
 - 3115.8.3 Structural Design
 - 3115.8.4 Detailed Design Procedure
 - 3115.8.4.1 Material Properties
 - 3115.8.4.2 Seismic Design Parameters
 - 3115.8.4.3 Allowable Shear Value
 - 3115.8.5 Simplified Structural Design of Single-Unit Containers
 - 3115.8.5.1 Limitations
 - 3115.8.5.2 Simplified Structural Design
 - 3115.8.5.3 Allowable Shear





2019 OSSC	2022 OSSC	SUBJECT	SUMMARY OF CHANGE
§2902.2	§2902.2	Separate Facilities	<p>Single user toilet room permitted in</p> <ol style="list-style-type: none"> In all facilities where employees and customers do not exceed 30 B occupant load including employees and customers is 50 or less Separate facilities shall not be required where the operational needs of a facility necessitate other approved configurations.
2015 IBC	2018 IBC	SUBJECT	SUMMARY OF CHANGE
§2902.2	§2902.2	Separate Facilities	<p>Single user toilet room permitted in</p> <ol style="list-style-type: none"> In all facilities where employees and customers do not exceed 15 30 M maximum occupant load of 100 or less B occupant load including employees and customers is 50 or less

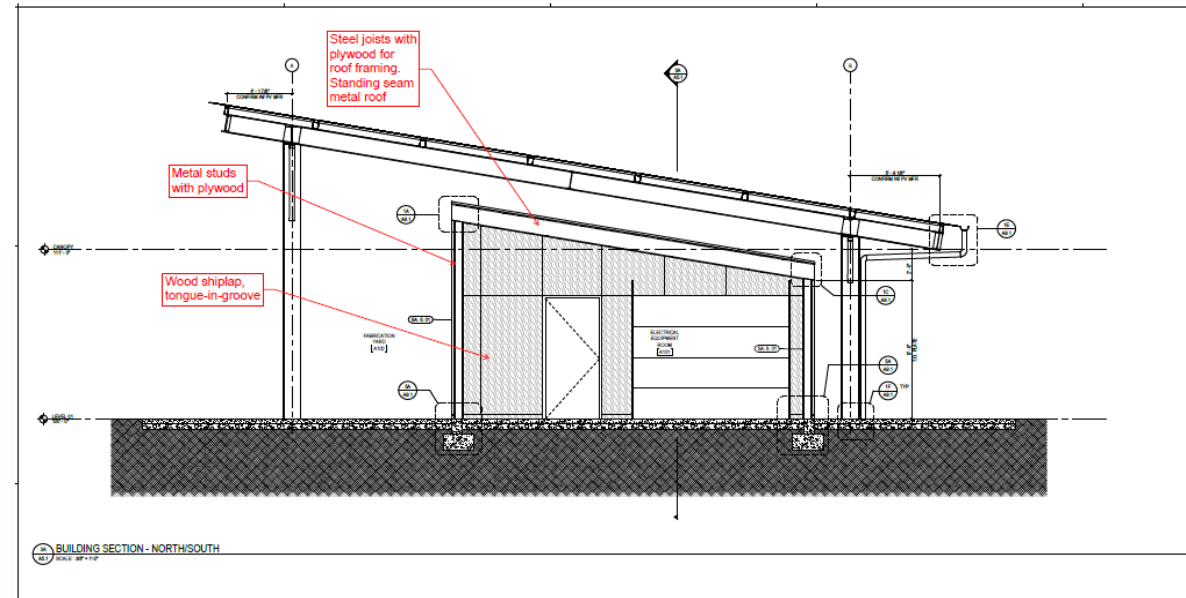


2902.1.1 Fixture calculations. Exceptions: (Exceptions 1 and 3 remain unchanged)

- Where multiple-user facilities are designed to serve all genders, **the minimum fixture count shall be calculated 100 percent**, based on total occupant load. In such multiple-user user facilities, each fixture type shall be in accordance with ICC A117.1 **and each urinal that is provided shall be located in a stall.**

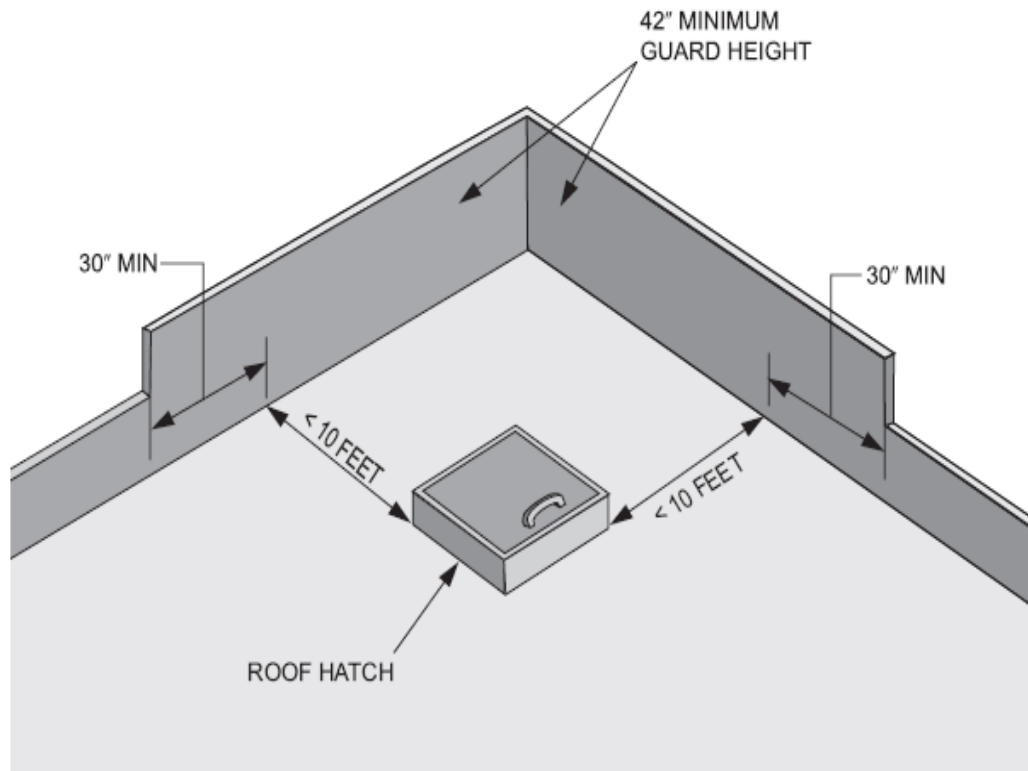


3111 Solar Energy Systems – New Expanded Section for OSSC



Guards at Roof Access

2012 IBC	2015 IBC	2018 IBC	SUBJECT	SUMMARY OF CHANGE
	§1015.6	Modified §1015.6	Guards for Mechanical Equipment	<u>Exception: Guards are not required where personal fall arrest anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.</u>



1015.6 Mechanical equipment, systems and devices.

Guards shall be provided where various components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such components. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

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- + National Fire Protection Association (NFPA)
- + Society of Fire Protection Engineers (SFPE)
- + International Code Council (ICC)
- + Institute of Electrical and Electronics Engineers (IEEE)
- + Underwriters Laboratory (UL)
- + Fire Protection Research Foundation (FPRF)
- + American Society for Testing and Materials (ASTM)
- + Automatic Fire Alarm Association (AFAA)
- + American Society of Mechanical Engineers (ASME)
- + American Nuclear Society (ANS)
- + American Institute of Steel Construction (AISC)
- + American Iron and Steel Institute (AISI)
- + American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- + ASIS International (ASIS)
- + Council on Tall Buildings and Urban Habitat (CTBUH)
- + National Association of Fire Investigators (NAFI)
- + Joint Army-Navy-NASA-Air Force Safety and Environmental Protection (JANNAF)
- + World Organization of Building Officials (WOBO)
- + Various Fire Inspector and Fire Chiefs Associations Nationwide



OUR TEAM HOLDS

330⁺
Committee Positions

ON NFPA CODES AND STANDARDS ALONE

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