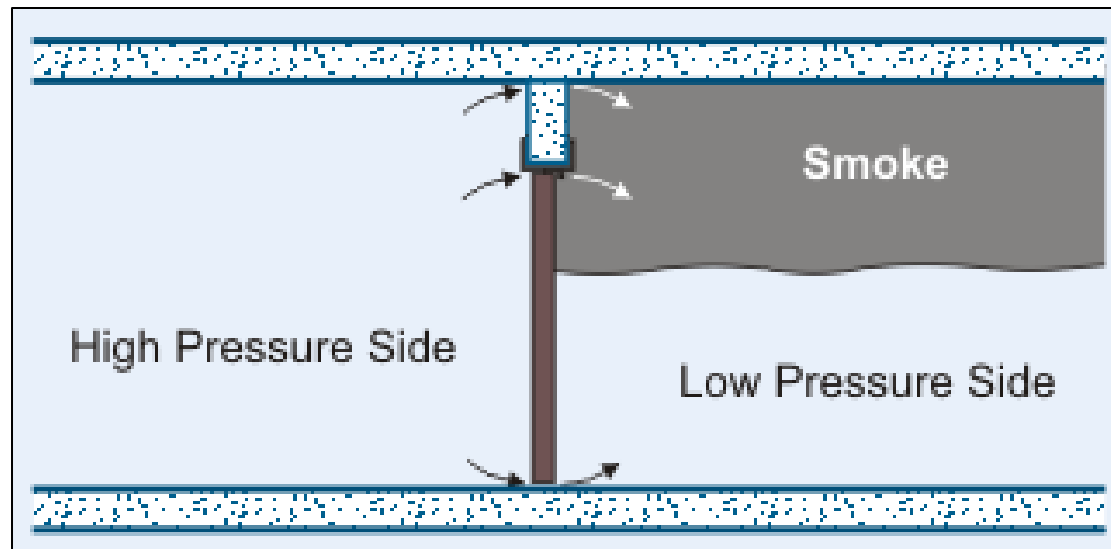


2015 IBC Use of Fire and Smoke Separations

Based on the 2015 *International Building Code*® (IBC®)

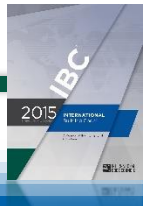
Course Description

- This seminar addresses the provisions of the 2015 International Building Code® (IBC®) regarding the use of fire and smoke separations



Objectives

- Upon completion, you will be better able to:
 1. **Identify** the general types of fire and smoke separations.
 2. **Identify** those specific components that make up fire and smoke separations.
 3. **Determine** where separations are required.
 4. **Determine** where separations are permitted as alternatives to other requirements.



Course Overview

- **Module 1** - Fire and Smoke Protection Concepts
- **Module 2** - Types of Fire and Smoke Separations
- **Module 3** - Fire and Smoke Separation Components
- **Module 4** - Fire and Smoke Separation Locations
- **Module 5** - Building Size, Use & Components
- **Module 6** – Means of Egress
- **Module 7** - Fire Limitation Features
- **Module 8** - Special Building Types
- **Module 9** - Special Occupancies & Uses
- **Module 10** - Special Building Features
- **Module 11** - Hazardous Uses





Module 1

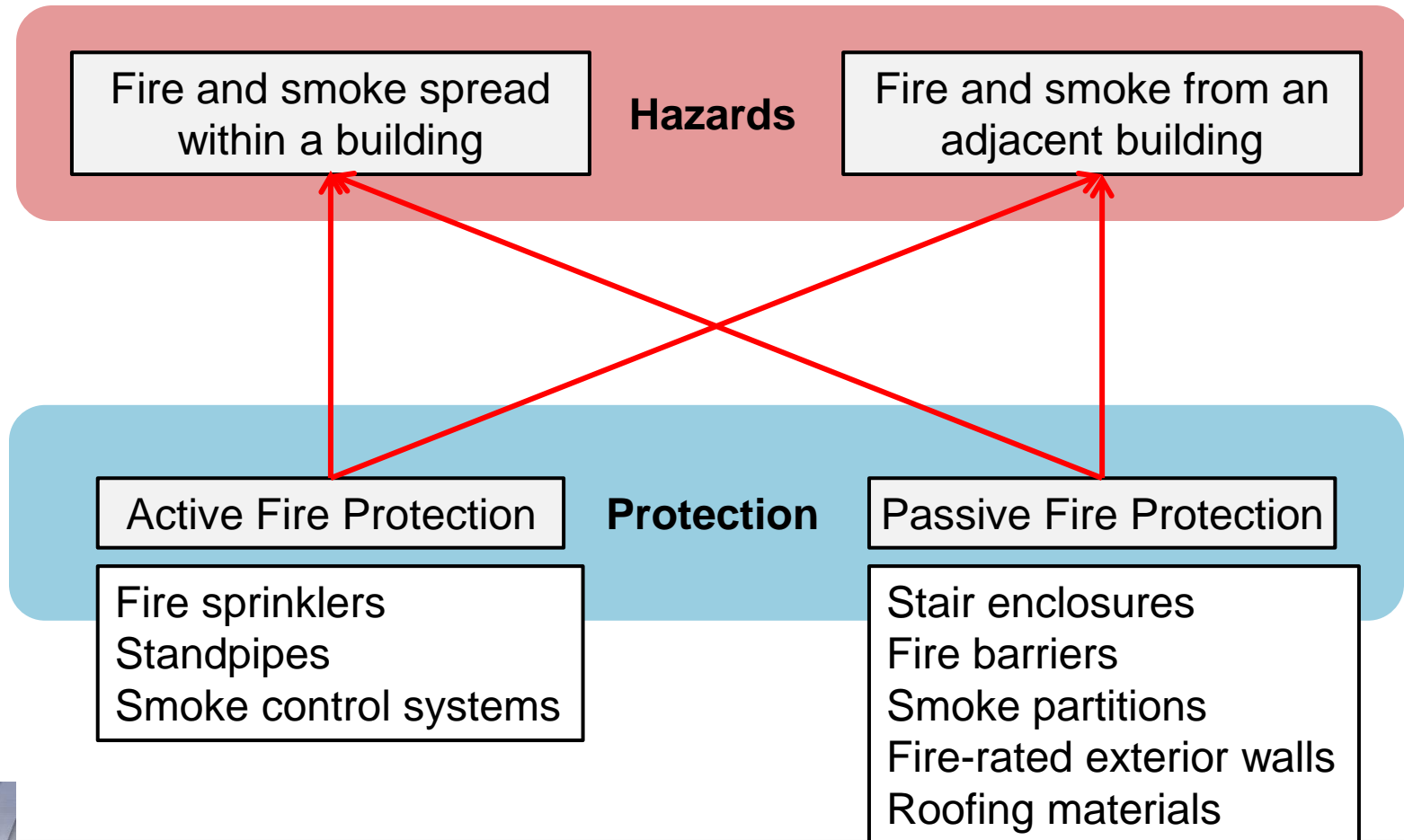
Fire and Smoke Protection Concepts

Fire and Smoke Protection Concepts

- IBC uses fire and smoke assemblies and protectives for a variety of purposes:
 - Structural integrity maintenance
 - Fire spread limitation
 - **Means of egress protection**
 - Radiant heat (exposure) protection
 - Smoke movement restriction



Spread of Fire and Smoke



Structural Integrity



- Larger and/or high-hazard occupancy buildings require specified fire-resistance levels for structural members
- IBC Chapter 6 “Type of Construction”

Structural Fire Resistance

- Structural fire resistance intended to **protect structural integrity** of building elements during fires
- Elements include:
 - Structural frame members
 - Bearing walls
 - Floor construction
 - Roof construction



Fire Spread Limitation

- Multiple conditions utilize fire-resistant separations to limit fire spread:
 - Complete and partial fire separations either mandated, or provided as an alternative, to address a variety of issues: generally hazardous occupancy or operations
 - Vertical and/or horizontal separations typically require opening protectives and other components to achieve full separation



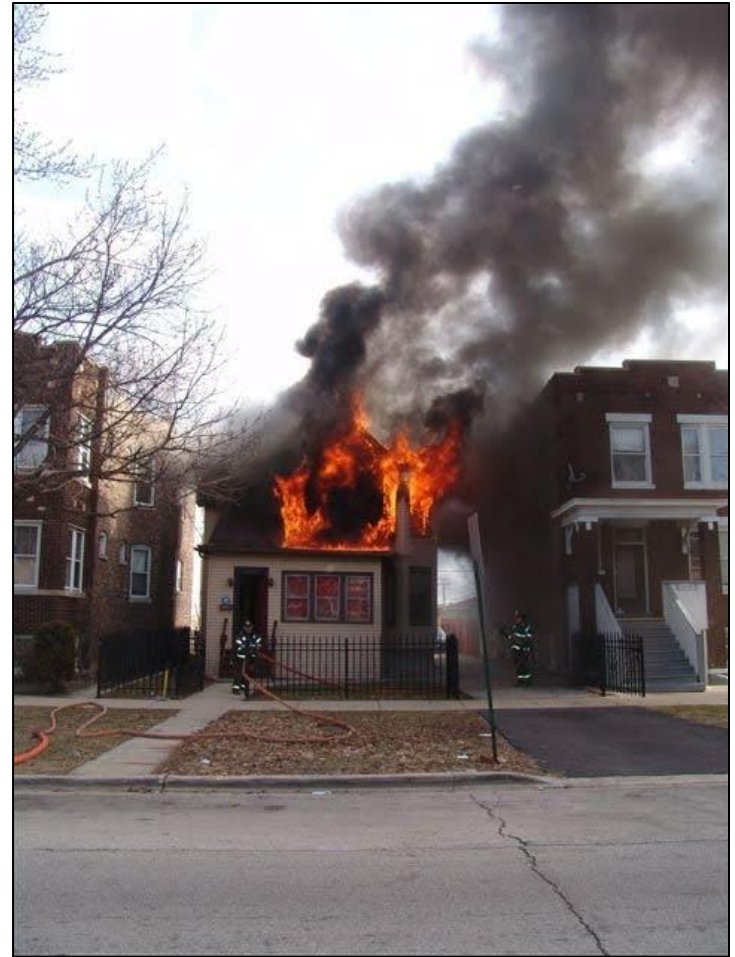
Egress Protection



- Fire-resistance-rated and/or smoke-resistant construction is often **mandated**:
 - “Exit” portion of the means of egress is typically where such protection must be afforded
 - Means of egress fire protection allows **extended travel** in large areas or multistory buildings

Radiant Heat Protection

- To prevent building-to-building fire spread due to radiant heat transfer
 - Fire-resistance-rated exterior walls required based on proximity to lot lines and other buildings on the same site
 - Fire separation distance



Smoke Movement Restriction

- Smoke-resistant construction often mandated where **occupants incapable of self preservation** and protect-in-place methods are employed
 - Institutional occupancies:
 - Hospitals, nursing homes
 - Prisons, jails, reformatories
 - Other conditions require separation both includes that smoke- and fire-resistance





Module 2

Fire and Smoke Separation Types

Fire-resistance-rated Separations

- IBC has variety of fire-resistance-rated separation “**types**”
- Each unique separation type serves a **distinct purpose** as reflected in its design details



Fire-resistance-rated Separations

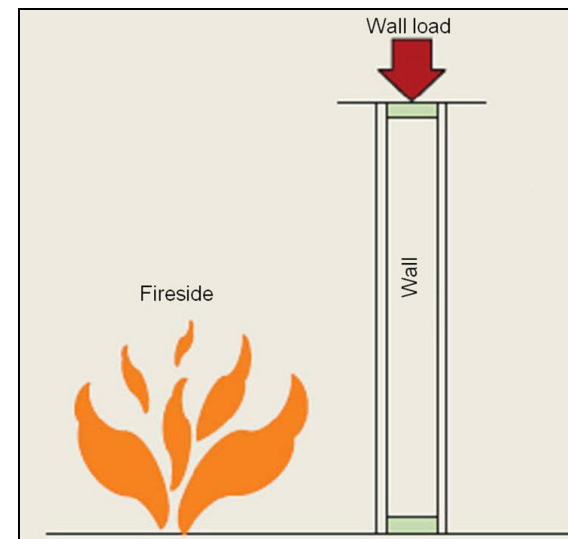
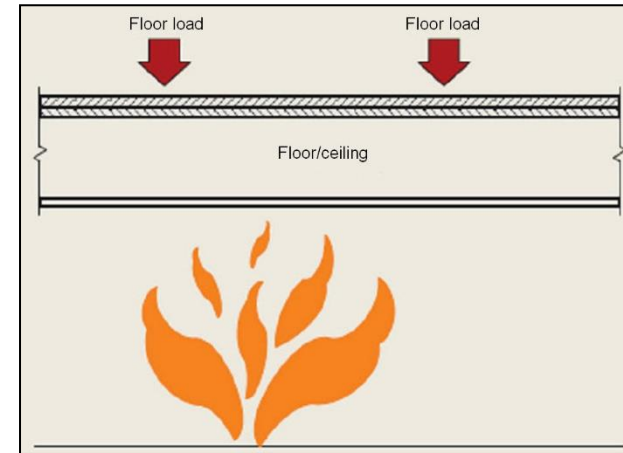
- Fire walls
- Fire barriers
- Fire partitions
- Smoke barriers
- Exterior walls
- Horizontal assemblies



Floor or Wall Assembly Fire Test

Assembly must:

- Sustain applied load
- Have no passage of flame or gas hot enough to ignite cotton waste
- Have average temperature rise on unexposed surface $\leq 250^{\circ}\text{F}$ above initial temperature or $> 325^{\circ}\text{F}$ at any point
- Have no water pass through during hose stream test



Fire-resistance-rated Separations

Fire Wall (Area Separation):

A fire-resistance-rated wall having protected openings, which restrict the spread of fire and extends continuously from the foundation to or through the roof, with sufficient stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

Fire Barrier (Occupancy Separation):

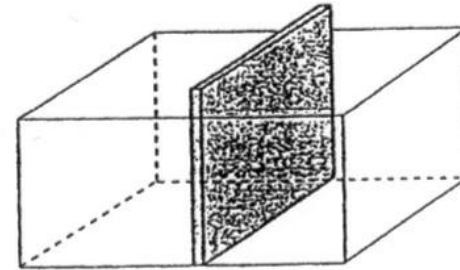
A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Fire Partition (Corridor Wall):

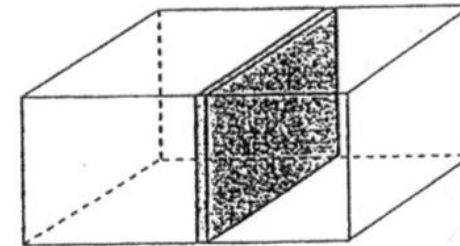
A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

Fire Area (Compartment):

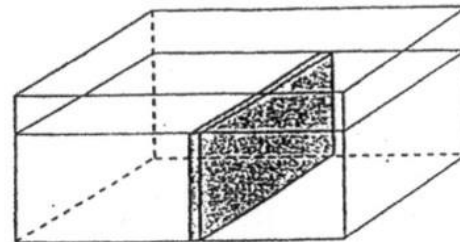
The aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projection of the roof or floor next above.



**Fire Wall
2, 3 or 4 Hour
Vertical**



**Fire Barrier
1, 2, 3 or 4 Hour
Vertical and
Horizontal**



**Fire Partition
1 Hour
Vertical**

Fire Walls

- Most complex and protective fire separation
 - Typically selected by the designer to provide an alternative solution to code compliance, fire wall creates **separate buildings** in the same structure:
 - Oversize buildings
 - Incompatible use separations
 - **Fire walls** required to be 2-, 3- or 4-hour assemblies



Table 706.4 - Fire Walls

**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

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

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

Fire Barriers

- Most common means of separating portions of a building with fire-resistance-rated construction:
 - Used under both mandatory and optional conditions, fire barriers divide a building into **separate areas** for a variety of purposes where full separation is desired
 - May be “vertical” or “horizontal”
 - Extend from the top of the floor/ceiling assembly below to the underneath side of floor assembly or roof assembly above
 - **Fire barriers** must be **1-, 2-, 3- or 4-hour** assemblies

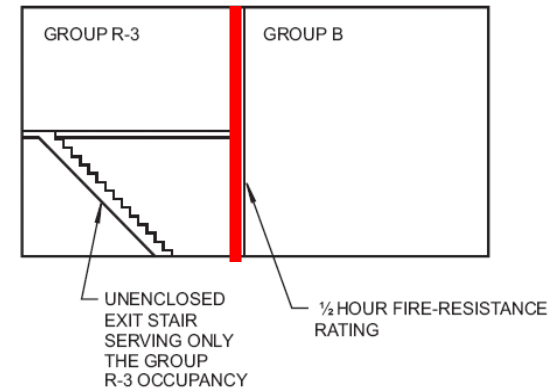


Table 707.3.10 - Fire Barriers

**TABLE 707.3.10
FIRE-RESISTANCE RATING REQUIREMENTS FOR
FIRE BARRIERS, FIRE WALLS OR HORIZONTAL
ASSEMBLIES BETWEEN FIRE AREAS**

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

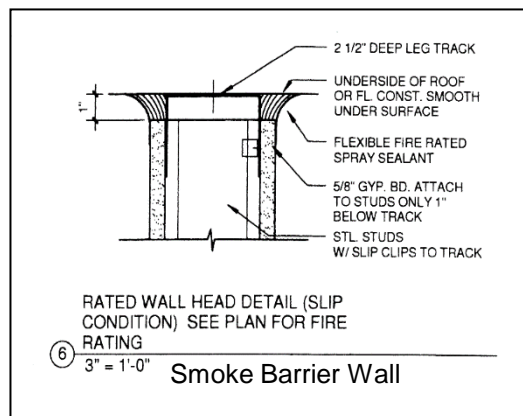
Fire Partitions

- Required where a limited degree of fire and smoke protection is warranted
 - Typical in locations where separation is important in the initial stages of building evacuation:
 - Walls separating dwelling/sleeping units
 - Walls separating tenant spaces in mall building
 - Corridor walls
 - Elevator lobby
 - **Fire partitions** are required to be minimum **1-hour** assemblies
 - Allowances for **½-hour** assemblies under specified conditions

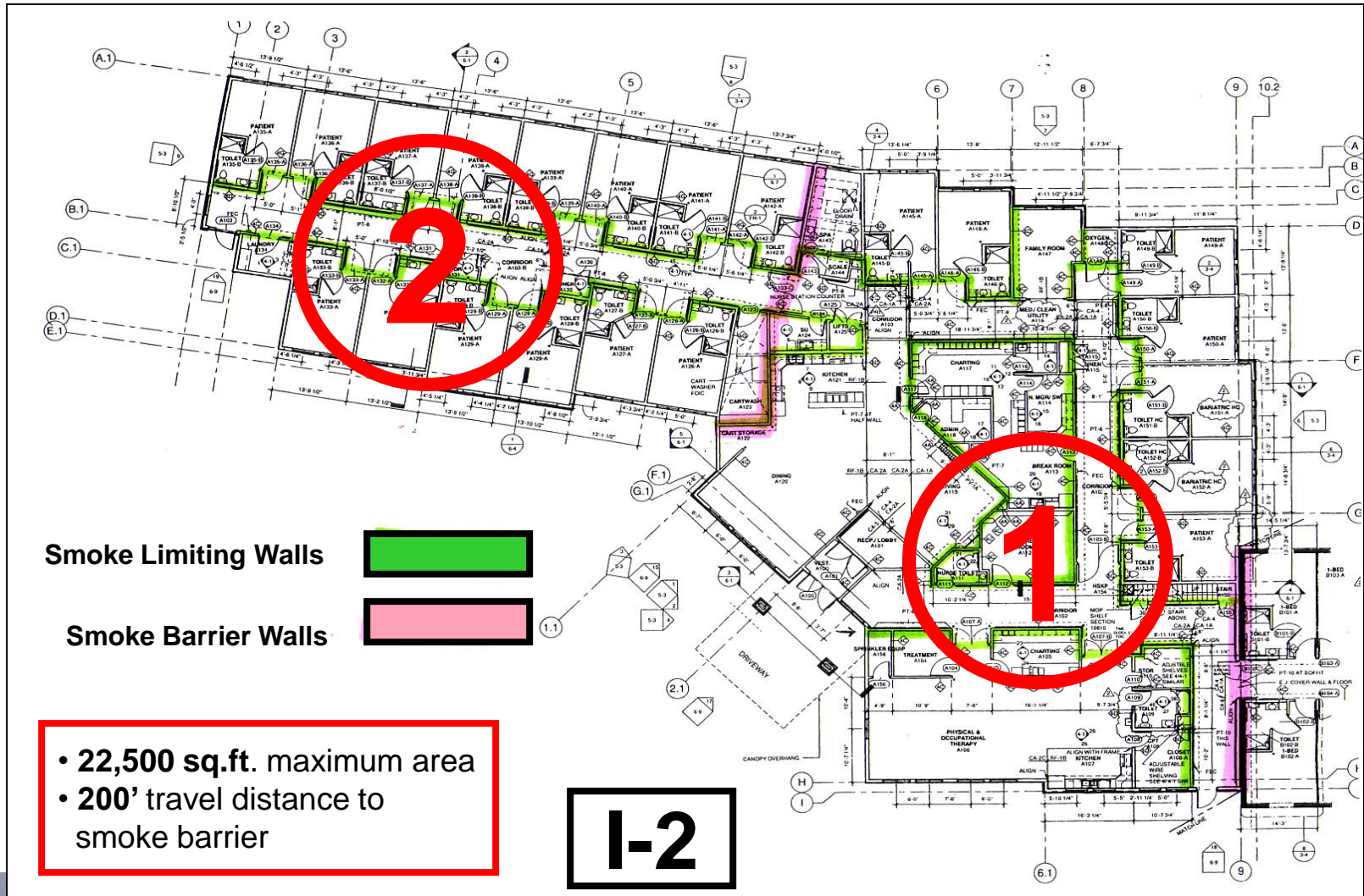


Smoke Barriers

- Mandated where a high degree of both fire and smoke protection is desired:
 - Used to create **refuge compartments** that allow occupants to **safely await** assistance or rescue
 - Must be minimum **1-hour** assemblies while also providing a high degree of smoke resistance



Smoke Barriers



Exterior Walls



- Rated exterior walls provide **separation** from internal or external fires
 - Also often provide for the **protection** of outdoor exit travel
- Must be minimum **1-, 2- or 3-hour** assemblies if within fire separation distance

Table 601 - Exterior Walls

**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	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^a	2 ^a	1	0	1	0	HT	1	0
Bearing walls									
Exterior ^{e, f}	3	2	1	0	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions							See Section 602.4.6		
Interior ^d	0	0	0	0	0	0		0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 ^{1/2} ^b	1 ^{b,e}	1 ^{b,e}	0 ^e	1 ^{b,e}	0	HT	1 ^{b,e}	0

Horizontal Assemblies

- Typically used with fire-resistance-rated wall assemblies to provide **compartmentation** in multi-story buildings:
 - In most cases, the ceiling and floor work together, as well as independently, to provide the intended **separation**
 - **Required** to be minimum $\frac{1}{2}$ -, 1-, 2-, 3-, or 4-hour fire-resistance-rated assemblies

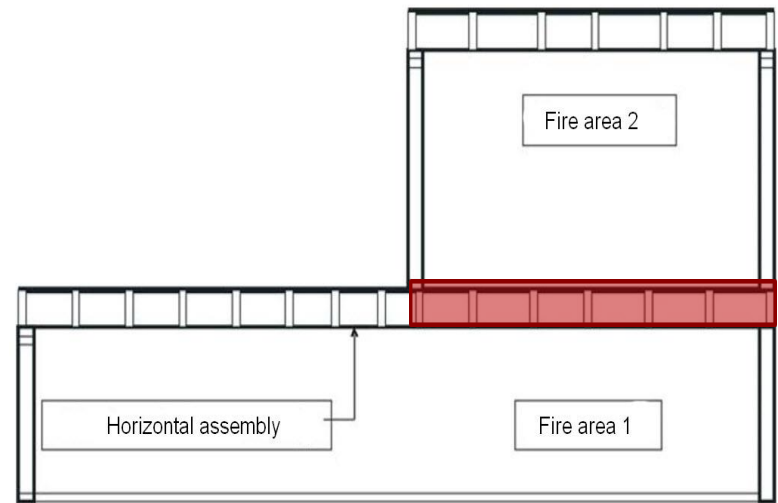


Table 707.3.10 - Horizontal Assemblies

**TABLE 707.3.10
FIRE-RESISTANCE RATING REQUIREMENTS FOR
FIRE BARRIERS, FIRE WALLS OR HORIZONTAL
ASSEMBLIES BETWEEN FIRE AREAS**

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

Smoke-resistant Separations

- In addition to the use of smoke barriers, the IBC also recognizes smoke partitions as a means to **resist** the **passage** of smoke:
 - Smoke partitions required where **smoke movement** of is a concern; however, fire is not primary consideration
 - Smoke partitions are **not** required to have a fire-resistance rating



Prescriptive Separations

- Mandated where limited degree of separation is desired (IBC Table 721.1)
 - **Not** required to be tested and listed assemblies, these separation elements adequately serve a specific need
- Applications include:
 - Gypsum board
 - Non-rated floor construction
 - Construction capable of restricting smoke migration





Module 3

Components of Fire and Smoke Separations

Vertical Elements

- A variety of different walls and partition assemblies are established in the IBC to provide varying degrees of fire and/or smoke separation:
 - In addition to vertical assemblies that are tested and listed as fire-resistance-rated, modified assemblies and prescriptive-based separation elements are selectively addressed throughout the code
 - **Table 721.1**



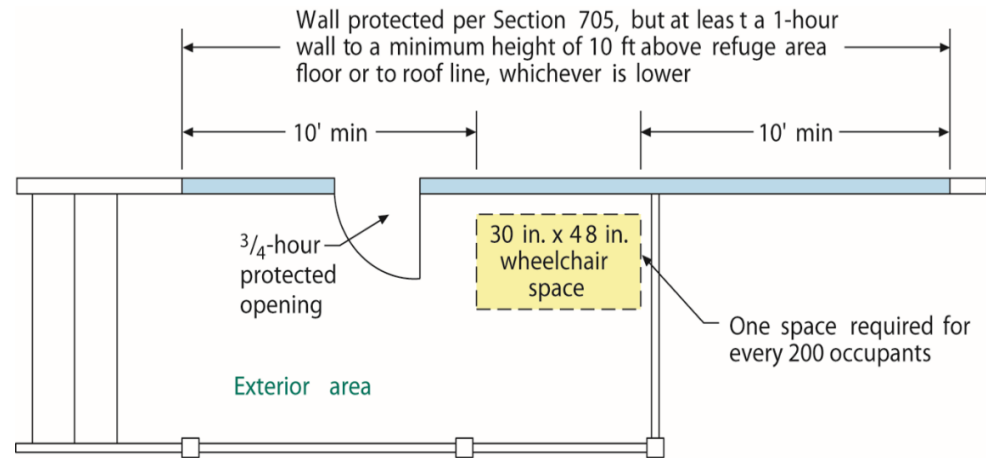
Vertical Elements



- Wall assemblies such as fire walls, fire barriers, fire partitions, smoke barriers and exterior walls must be provided with fire-resistance ratings as determined in accordance with **ASTM E119** or **UL 263**, or meet **prescriptive** specifications
 - Required fire-resistance ratings vary and are required based on the intended **purpose** of the separation

Vertical Elements

- Partial assemblies or prescriptive separation elements maybe used in limited applications:
 - Typically, where potential hazard is assumed to exist only on one side of the separation element
 - “Exposed side”

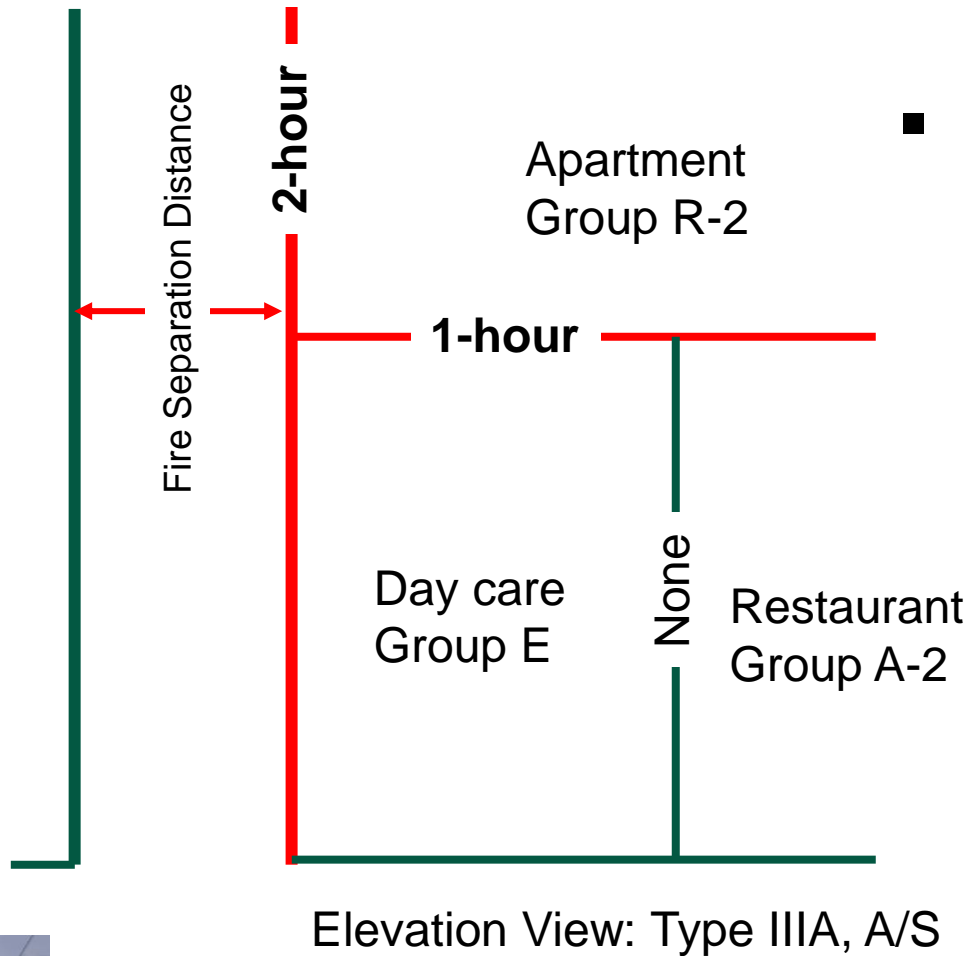


Horizontal Elements

- Fire-resistance-rated floors and floor/ceiling assemblies provide varying degrees of fire-resistance
 - Non-rated horizontal elements also provide some separation and are regulated under a variety of conditions (See 714.5 Penetrations and 717.6.3 Ducts)



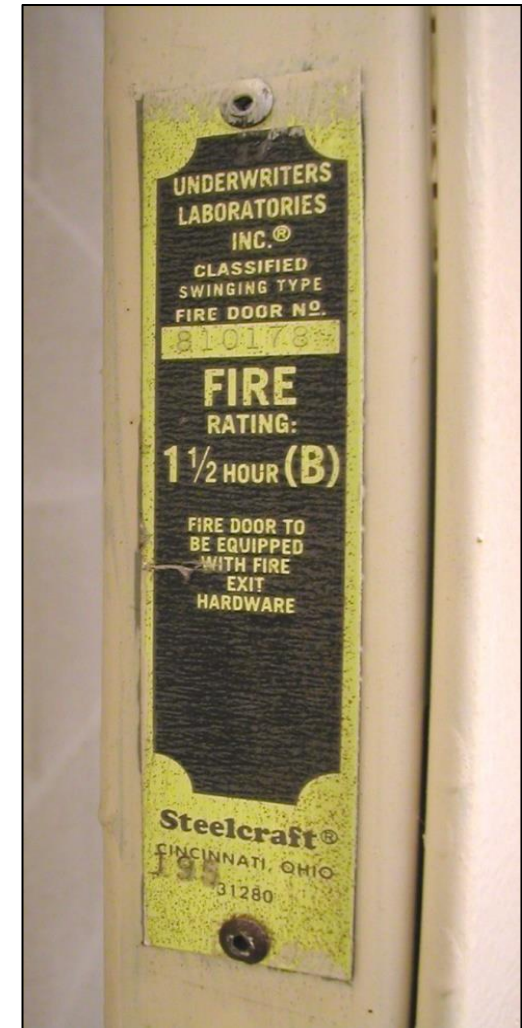
Vertical/Horizontal Combination



- Vertical and horizontal elements used to completely **separate** one area from another

Doors

- Openings require protection as part of the overall package of fire and/or smoke protection:
 - In most cases, fire-protection-rated door assemblies are mandated in fire-separation assemblies
 - **Table 716.5** provides the required ratings and markings for most conditions
 - In some cases, they are also **individually** identified based on the specific separation



Doors



- In a few cases, **prescriptive** door construction is mandated
 - Solid-wood or honeycomb-steel door of specified thickness might be the minimum required door
- Some fire separations may **not** require rated door assembly
 - The most common example is where fire-resistance-rated exterior walls are located where opening protection is not required

Windows

- Windows typically regulated same as doors
- Fire-protection-rated glazing and fire-resistance-rated glazing addressed
 - Fire-resistance-rated glazing (hourly rated) is regulated as fire-resistance-rated wall assemblies



Windows

- There are situations in the code where non-rated glazing is **permitted** in rated walls, where:
 - Security glazing is needed,
 - Smoke is the only concern, **or**,
 - Fire-resistance-rated exterior walls are permitted with unprotected openings



Penetrations

- Penetrations typically must be **protected** by firestop systems rated same as penetrated assembly
- Penetration protection prescriptive methods exist



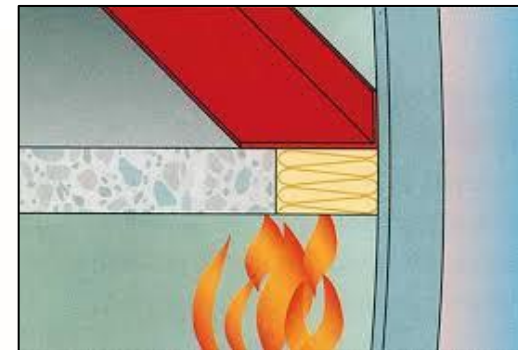
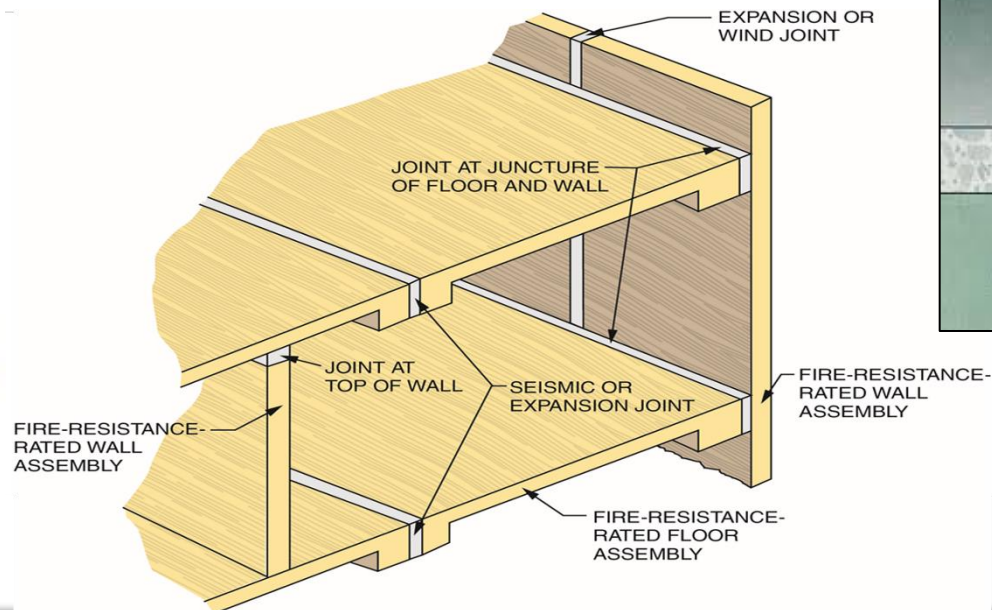
Joints

- Fire-resistant joint systems are mandated where joints occur in separation walls requiring opening protection



Joints

- Joint protection is also required at **voids** between curtain wall assemblies and:
 - Non-fire-resistance-rated horizontal assemblies
 - Fire-resistance-rated horizontal assemblies



Air Movement

- Fire dampers, smoke dampers, combination dampers, ceiling radiation dampers and corridor dampers are selectively required in ducts and air openings in separation elements



Module 4

Fire and Smoke Separation Locations



Separation Locations

- Building Size, Use and Components
- Means of Egress
- Fire Limitation Features
- Special Building Types
- Special Occupancies and Uses
- Hazardous Uses



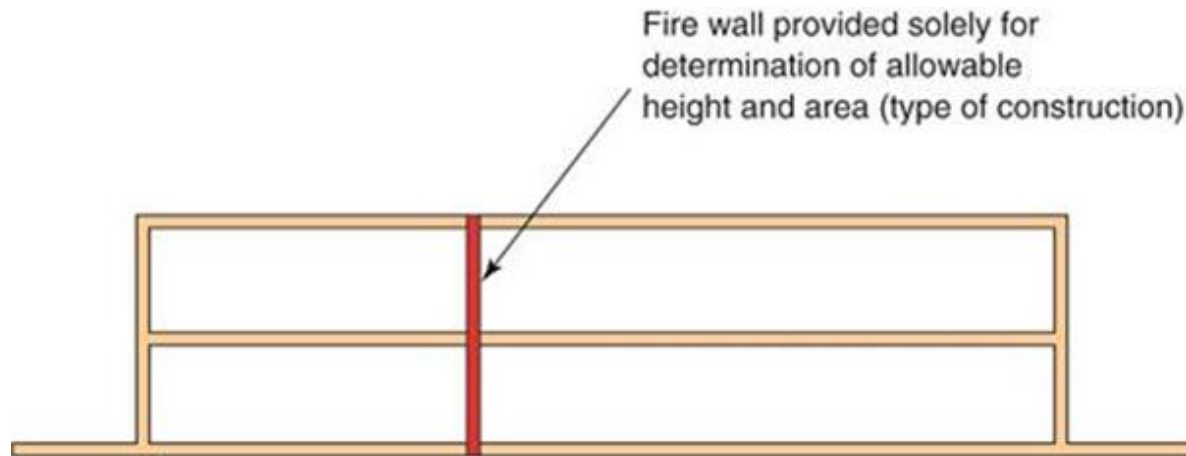
Module 5

Building Size, Use and Components

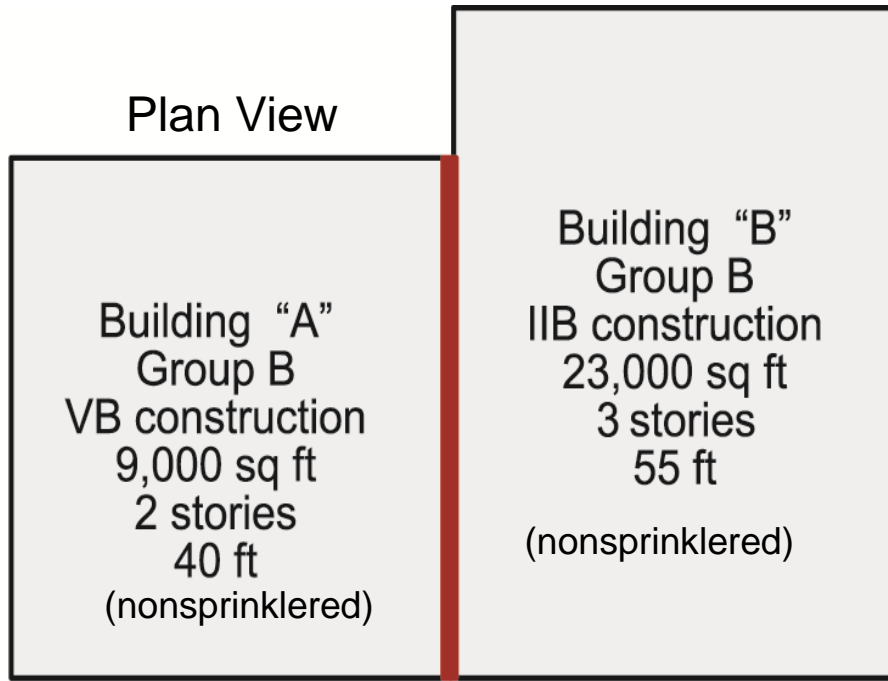


Building Height & Area - §503.1

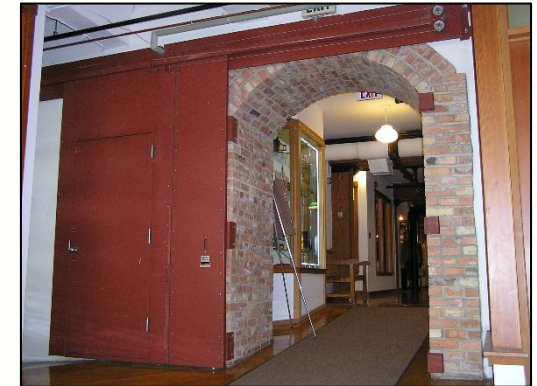
- Each portion of a building **separated** by a fire wall shall be considered a separate building
 - Fire wall use is determined by the designer as a means to reduce building size, thus increasing the available types of construction



Building Height & Area - §503.1

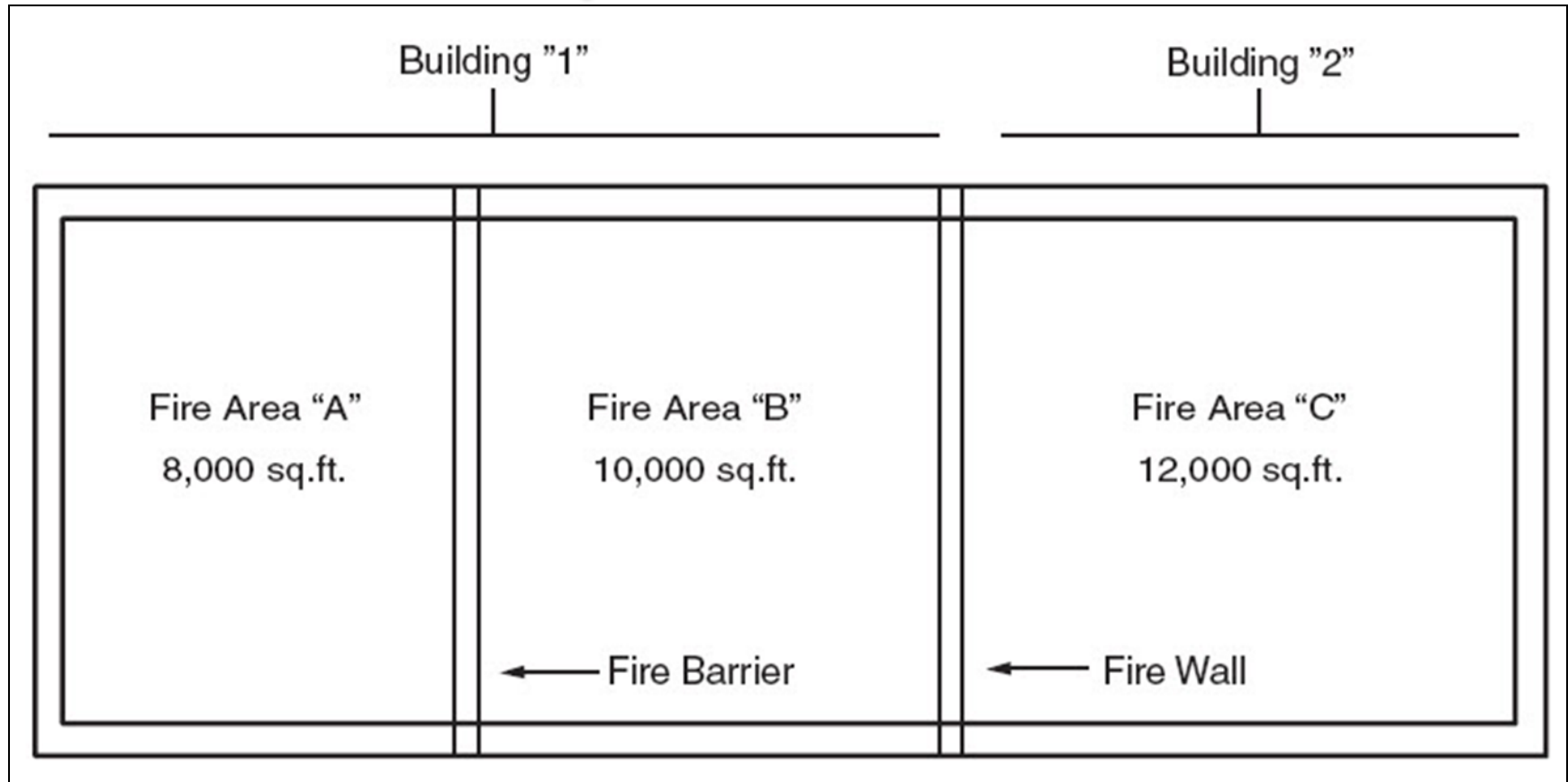


Both buildings "A" and "B" considered separate buildings for purposes of allowable height and area



Fire wall complying with Section 706

Fire Wall Application for Building Height and Area - Example



- Each building would be evaluated separately for allowable building height

Fire Wall Ratings - Table 706.4

- Rating requirements based on the buildings' construction type(s) and occupancy classification(s)

**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

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

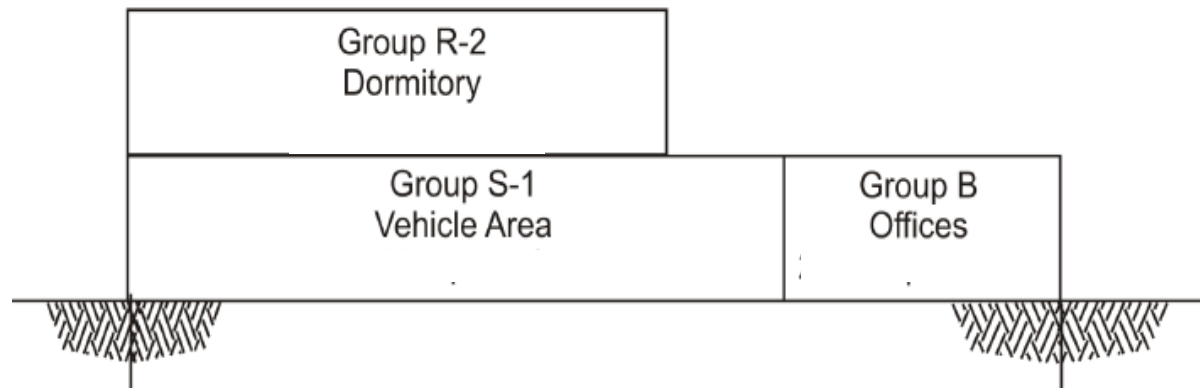
Fire Walls

- Provide variety of other alternative solutions to the designer:
 - Multiple types of construction
 - Reduction/elimination of fire protection features
 - In IFC, fire walls may be used to reduce fire flow requirements



Separated Occupancies - §508.4.4.1

- In a mixed-occupancy building, fire barriers and/or horizontal assemblies are utilized under the separated occupancies method
- **Table 508.4** establishes the minimum required fire-resistance for pairs of incompatible occupancies



Separated Occupancies - Table 508.4

TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)																				
OCCUPANCY	A, E		I-1 ^a , I-3, I-4		I-2		R ^a		F-2, S-2 ^b , U		B ^e , F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^a , I-3, I-4	—	—	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^a	—	—	—	—	—	—	N	N	1 ^c	2 ^c	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2 ^b , U	—	—	—	—	—	—	—	—	N	N	1	2	NP	NP	3	4	2	3	2	NP
B ^e , F-1, M, S-1	—	—	—	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP
H-1	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP
H-2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	1	NP	1	NP
H-3, H-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 ^d	NP	1	NP
H-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP



Incidental Uses - §509.4.1

- Must be **separated** from other portions of the building by fire barrier and/or horizontal assembly (Table 509)
 - In some cases, an **alternative method** of protection is permitted by the table:
 - Fire sprinklers
 - Fire sprinklers and rated construction



Incidental Uses - Table 509

TABLE 509
INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons for flooded lead-acid, nickel cadmium or VRLA, or more than 1,000 pounds for lithium-ion and lithium metal polymer used for facility standby power, emergency power or uninterruptable power supplies	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

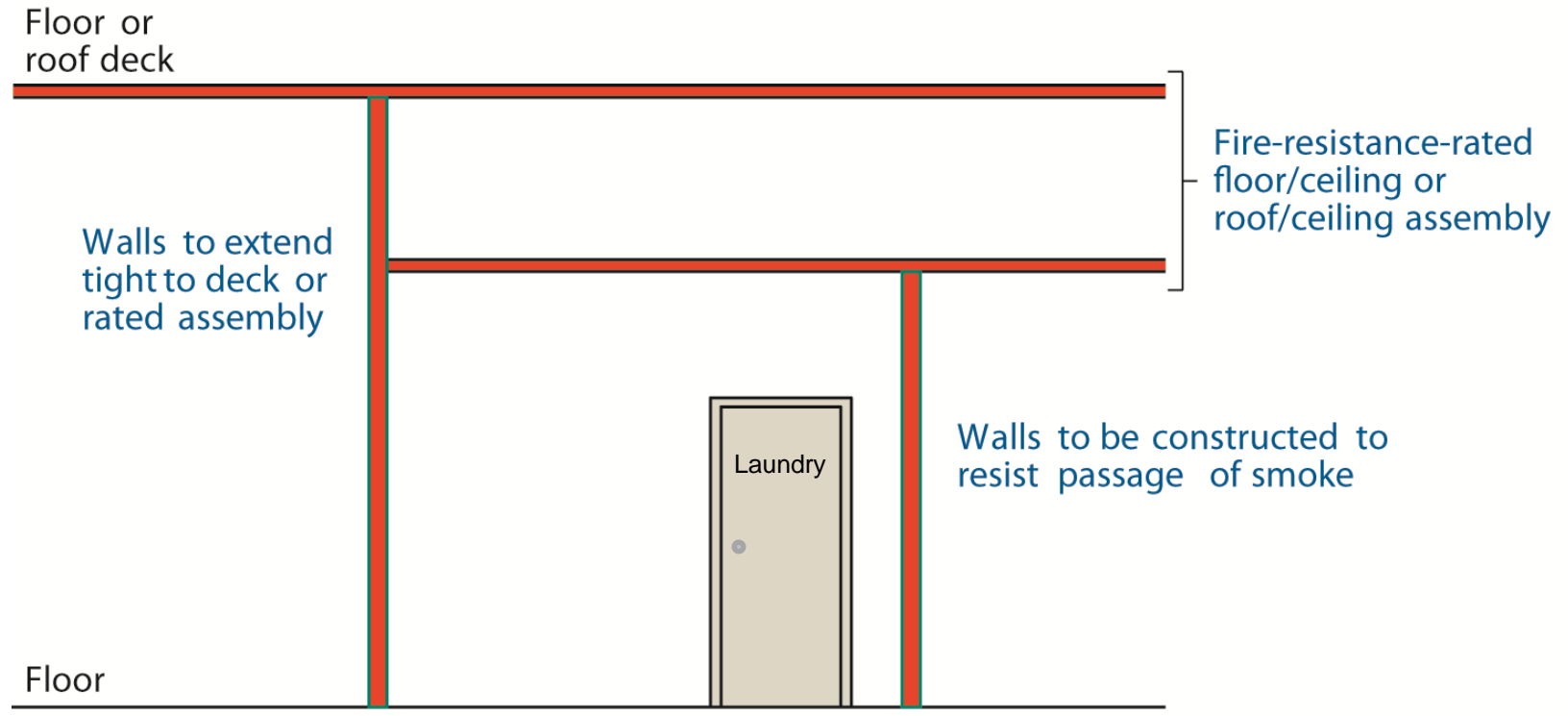
Incidental Uses - §509.4.2

- Where Table 509 permits sprinkler protection **without** a fire barrier, incidental uses must be **separated** by construction capable of resisting the passage of smoke
 - Doors/air openings regulated for smoke resistance

Where's the door?



Incidental Uses - §509.4.2

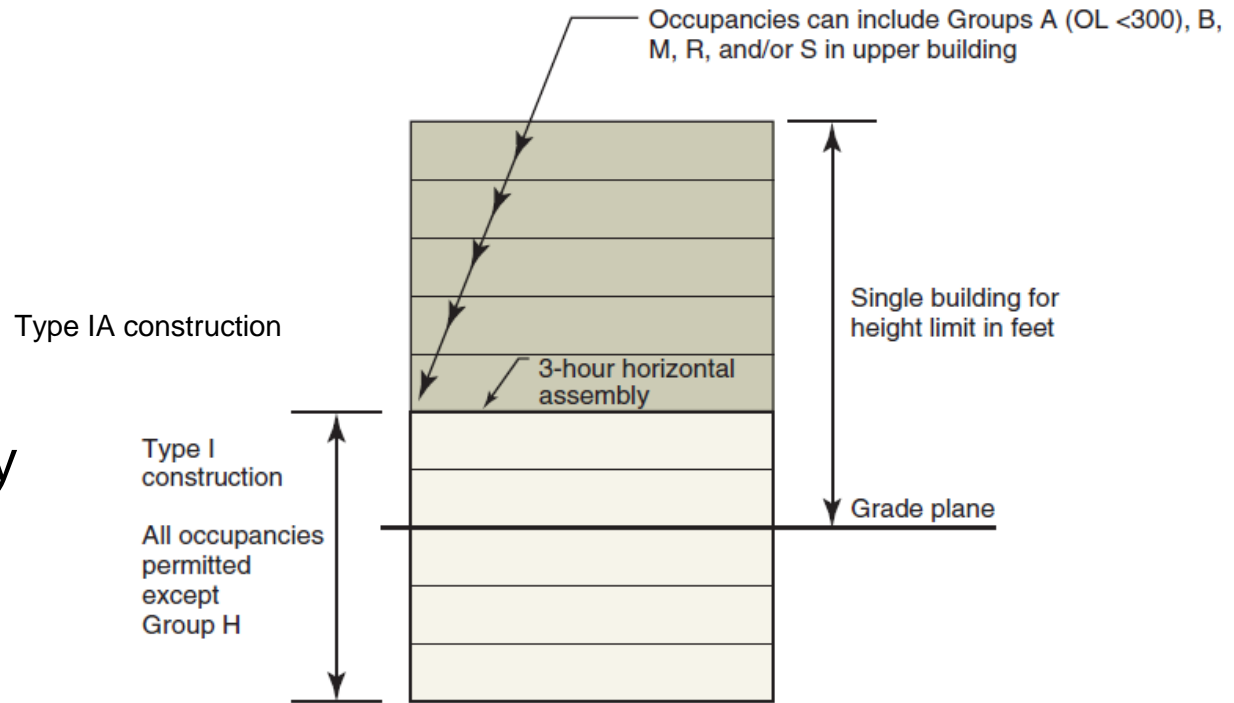


Note: doors shall:

- be self-closing or automatic-closing by smoke
- have no air transfer openings
- have no excessive undercuts

Horizontal Separation - §510.2

- Structures built under this section are considered to be **distinct buildings above and below the 3-hour fire-resistance-rated horizontal assembly**



Portions above and below 3-hour horizontal assembly to be considered separate buildings for:

- Allowable area
- Number of stories
- Fire wall continuity

Elevation View

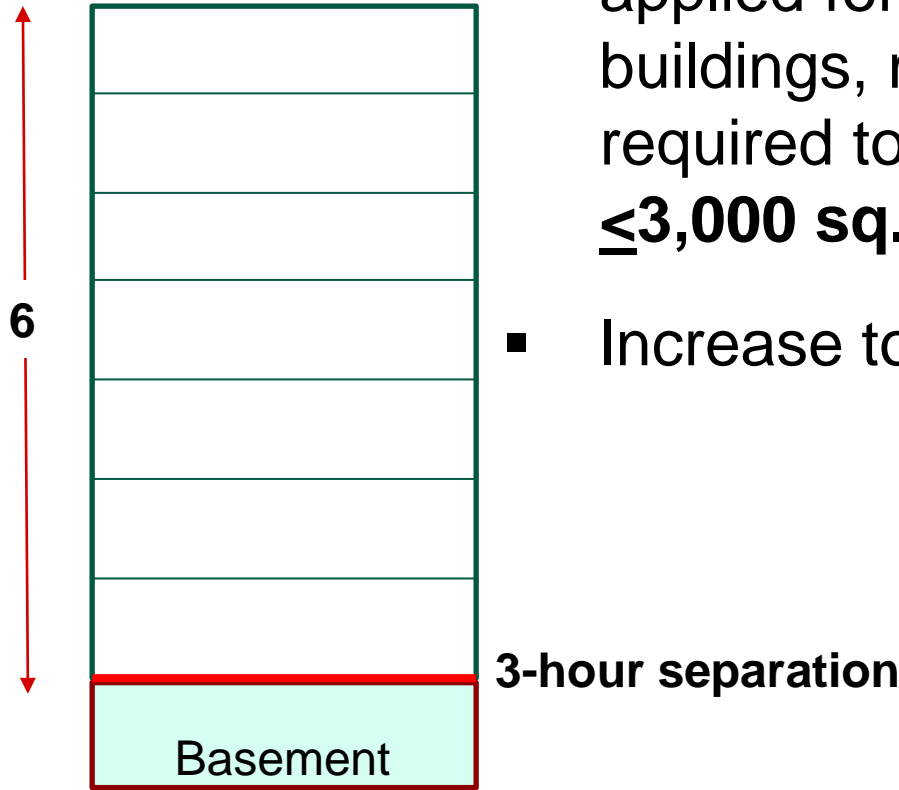
Horizontal Building Separation Section 510.2, #1

- Where **separate** and **distinct** buildings are created one above the other, the buildings shall be separated with a minimum **3-hour** horizontal assembly.
(Podium/platform construction)
- When **separated** and compliant with several other conditions, buildings can be regulated **independently** for allowable area and number of stories, and fire wall continuity

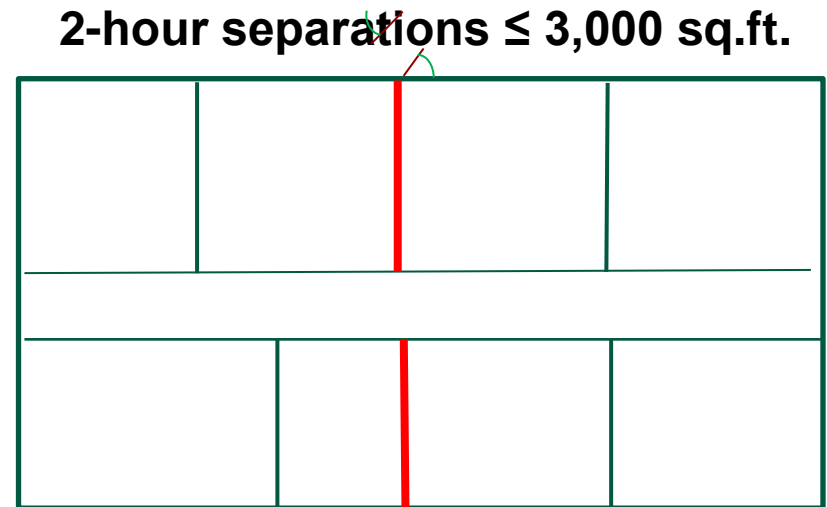


Type IIIA Group R-1 and R-2 Buildings - §510.5

- Where special height increases are applied for Type IIIA Group R-1 and R-2 buildings, minimum **2-hour** fire walls required to subdivide into floor areas **≤3,000 sq.ft.** in area
- Increase to **6** stories and **75'**



Elevation View



Plan View

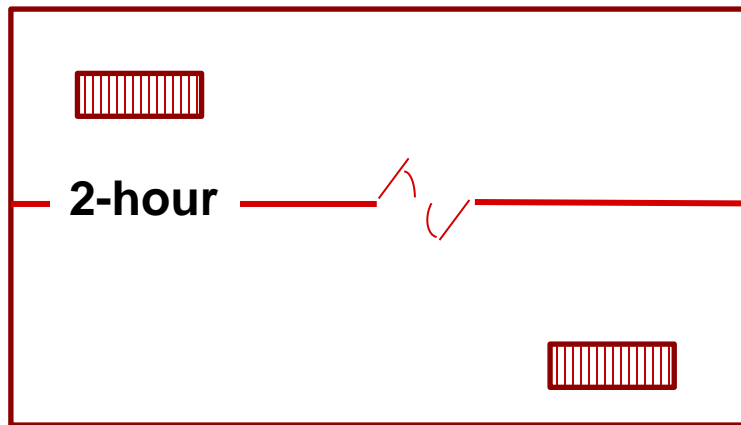
Type IIA Group R-1 and R-2 Buildings - §510.6

- Where special height increases are applied for Type IIA Group R-1 and R-2 buildings, minimum **2-hour** fire walls are required to segregate the exits
- Allows **9** stories and **100'**

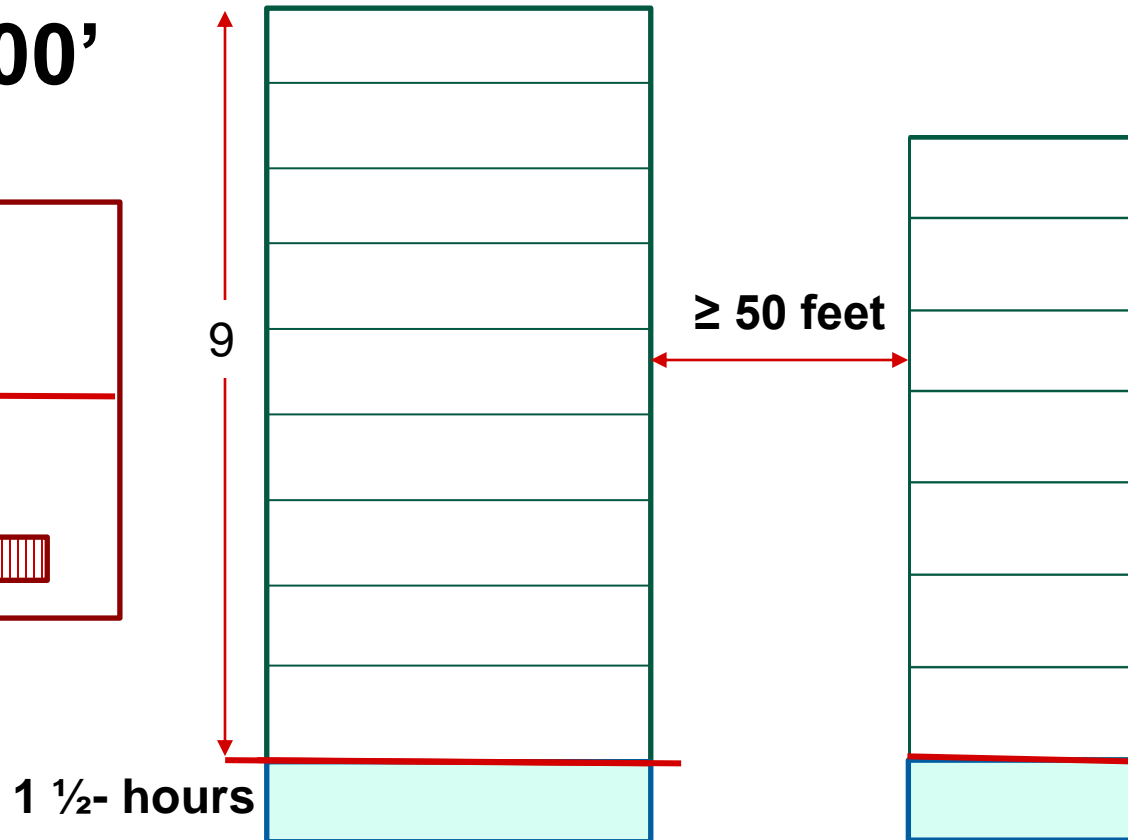


Type IIA Group R-1 and R-2 Buildings - §510.6

- 9 stories and 100'



Plan View



Elevation View

Open Parking Beneath Groups A, I, B, M and R - §510.7.1

- Where special height and area allowances are permitted for open parking garages below Group A, I, B, M and R occupancies, means of egress for the upper occupancy shall be **separated** from the parking by minimum **2-hour** fire barriers



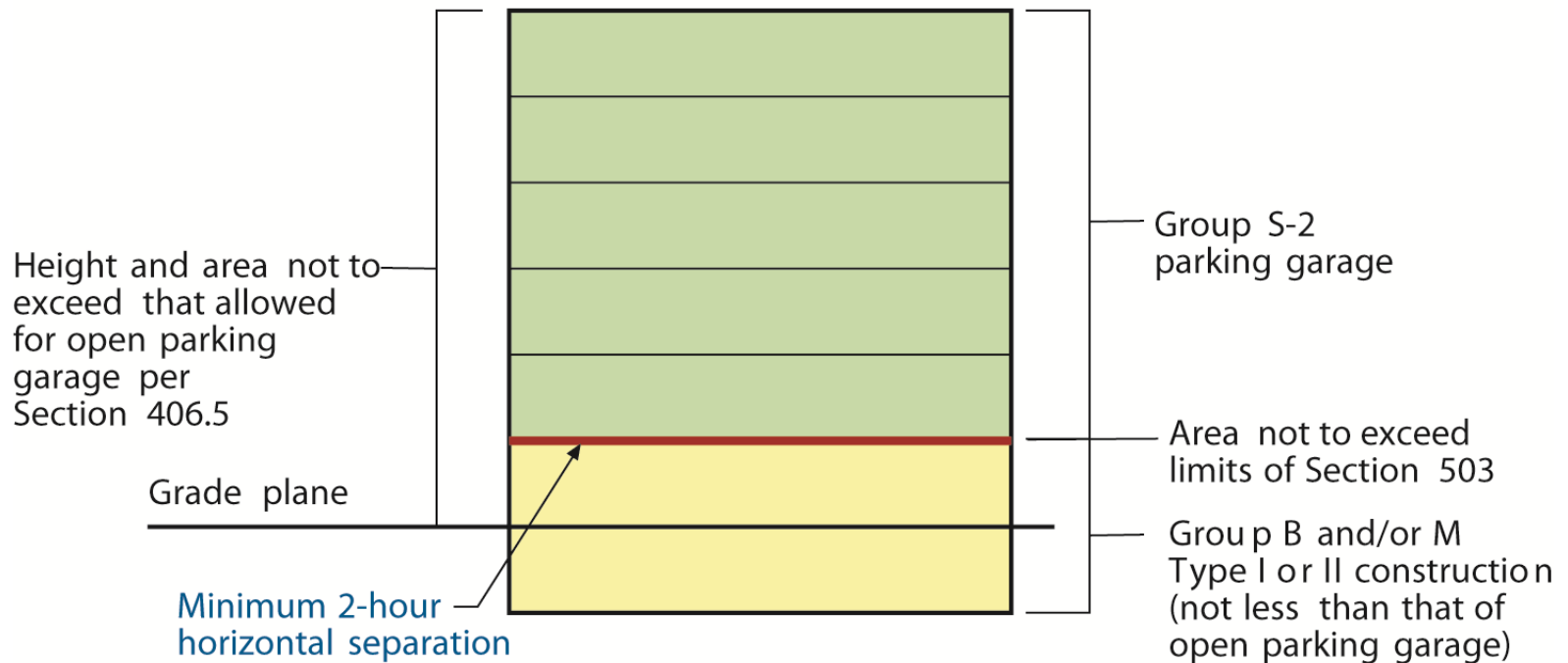
Group B or M with Group S-2 Open Parking Garage - §510.8, #1 and #7

- Where a Group B or M occupancy is located above an open parking garage and considered as separate buildings for type of construction purposes, in addition to other requirements, the buildings must be **separated** by a minimum **2-hour** horizontal assembly.



Group B or M with Group S-2 Open Parking Garage - §510.8, #1 - #7

Exits from open parking garage to discharge directly to public way and separated from basement or first story by minimum 2-hour fire barriers and/or horizontal assemblies

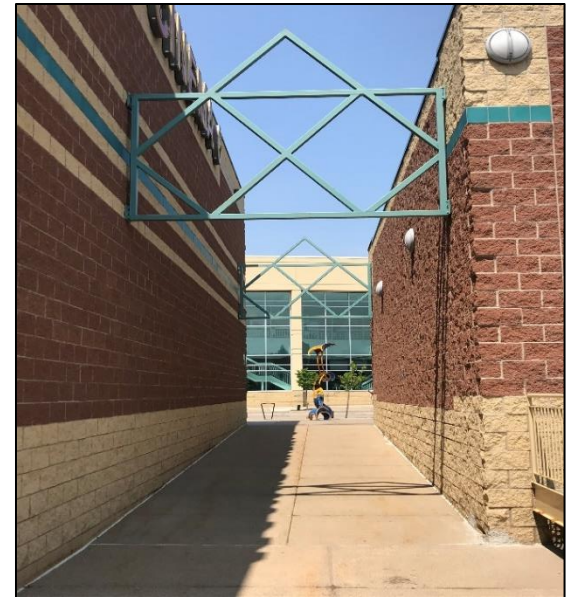


Allowable area determined independently for open parking garage and B/M occupancy

Elevation View

Buildings on Same Lot - §503.1.2

- Where two or more buildings are located on the same lot, they shall be regulated as **separate buildings**, or as portions of a single building
 - If regulated as separate buildings, the opposing exterior walls must be evaluated based on fire separation distance

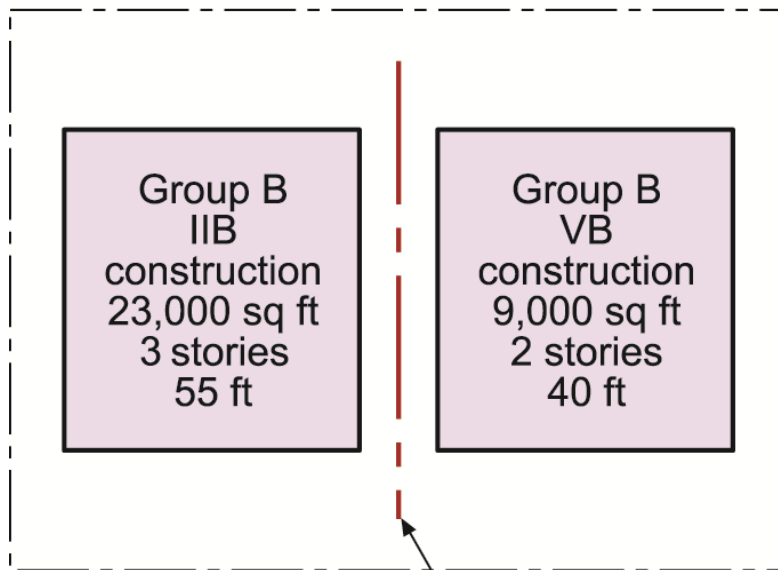


Buildings on Same Lot - §503.1.2

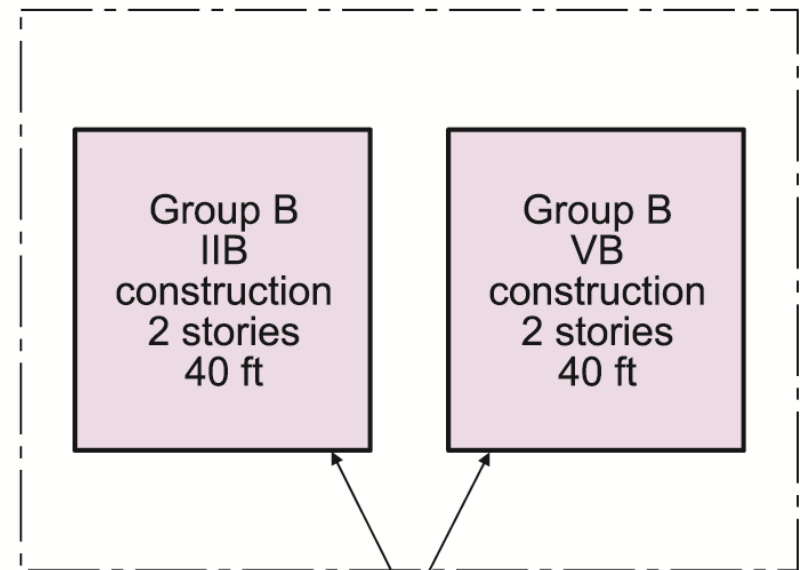
Plan View

A: separate buildings

B: single building



Assumed
imaginary line



- Assuming non-sprinklered buildings, aggregate area is limited to **9,000 sq.ft.** and allowable height is limited to **2 stories** as both buildings must be regulated as **Type VB** construction

Exterior Walls - §705.5

- For separation purposes, exterior walls near lot lines, or other buildings on the same lot, are required to be **fire-resistance-rated on both sides** as set forth in **Table 602**
 - The primary concern is **radiant heat transfer** from one building to another



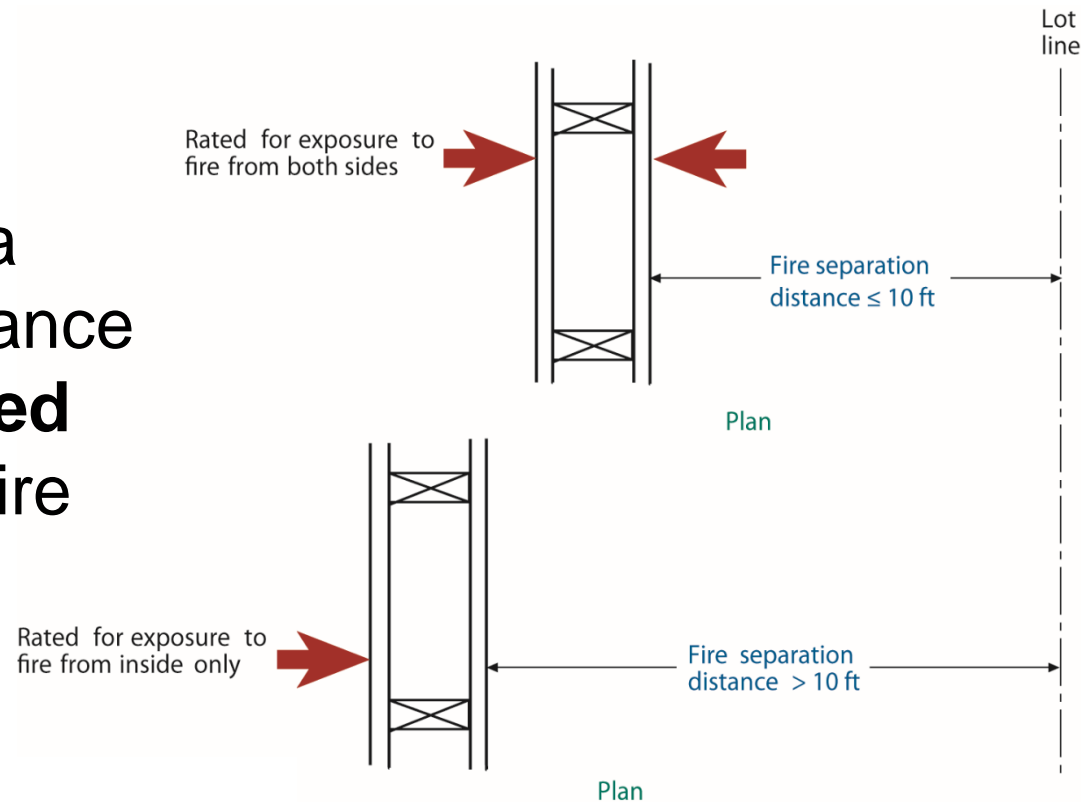
Exterior Walls - Table 602

TABLE 602
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, S-2, U ^h
$X < 5^b$	All	3	2	1
$5 \leq X < 10$	IA	3	2	1
	Others	2	1	1
$10 \leq X < 30$	IA, IB	2	1	1 ^c
	IIB, VB	1	0	0
	Others	1	1	1 ^c
$X \geq 30$	All	0	0	0

Exterior Walls - §705.5

- The required fire-resistance rating of exterior walls with a fire-separation distance of **>10'** shall be **rated** for exposure from fire from the **inside**



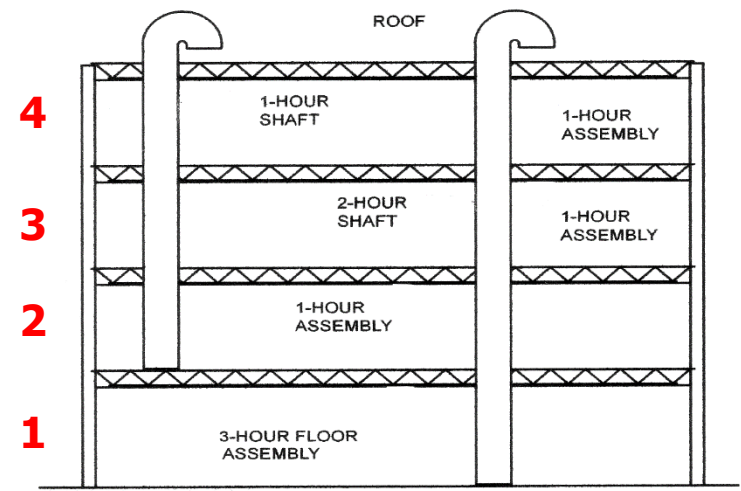
Shaft Enclosures - §713

- Shaft enclosures are a permissible method of protecting openings and penetrations through floor/ceiling and roof/ceiling assemblies
 - Shaft enclosures shall be constructed as fire barriers and/or horizontal assemblies



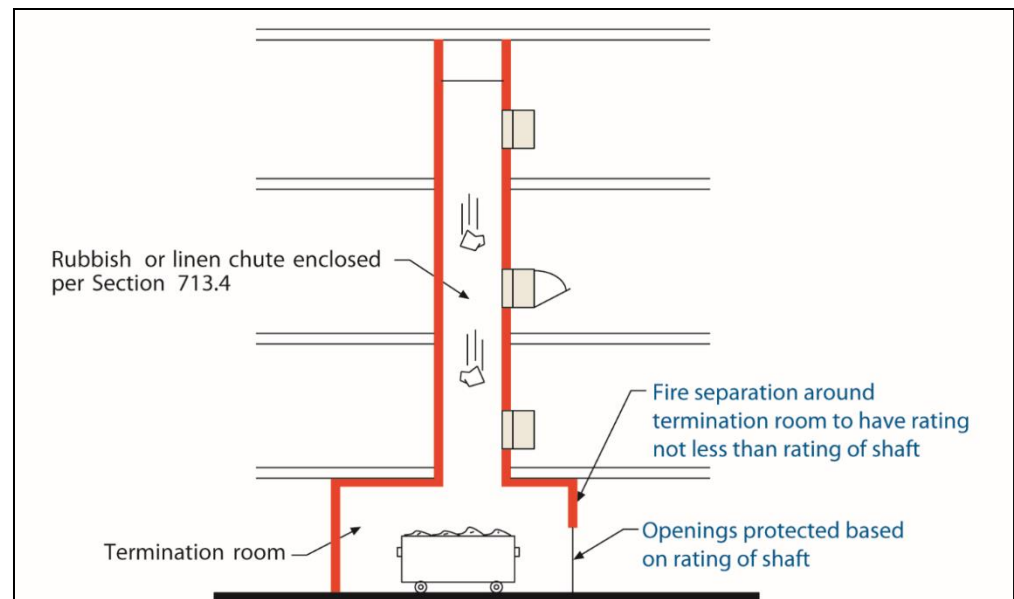
Shaft Enclosure Fire Ratings - §713.4

- Shaft enclosures shall have a minimum fire-resistance rating of:
 - **2 hours** where connecting ≥ 4 stories
 - **1 hour** where connecting ≤ 3 stories
 - **2 hours** where penetrating a floor assembly of ≥ 2 hours



Chute Access and Discharge Rooms - §713.13.3 and 713.13.4

- Waste and linen chutes access openings must be located in rooms or **compartments** enclosed by **≥1-hour** fire barriers and/or horizontal assemblies



Chute Access and Discharge Rooms - 713.13.3 and 713.13.4

- Discharge rooms shall be **separated** from the remainder of the building by fire barriers and/or horizontal assemblies having a rating equal to the shaft enclosure



Hoistway Opening Protection - §3006.3, #1 and #2

- Where elevator lobbies are required, they shall be constructed with fire partitions
 - Where the building is fully sprinklered, smoke partitions may be used to separate the elevator lobby at each floor



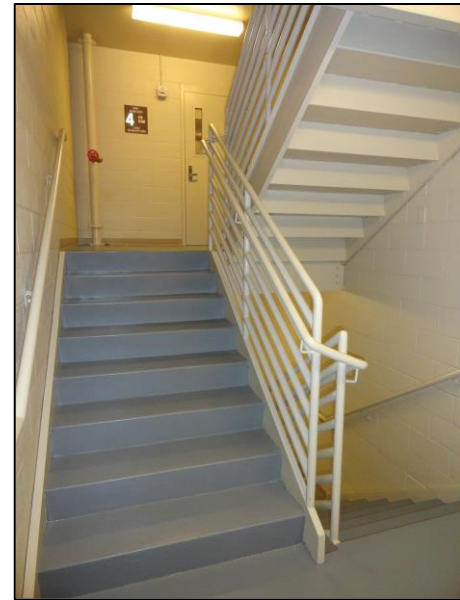


Module 6

Means of Egress

Exit Access Stairways - §1019.3

- Exit access stairways to be **enclosed** by shaft enclosures (fire barriers) with minimum fire-resistance ratings of:
 - **2-hour** serving ≥ 4 stories
 - **1-hour** serving **2 or 3** stories
- There are **8 exceptions** to this requirement



Exit Access Stairways - 1019.3

Exceptions:

1. Exit access stairways and ramps that serve or atmospherically communicate between only two stories.
2. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting **≤4** stories serving and contained **within** an individual dwelling unit or sleeping unit or live/work unit.
3. Exit access stairways serving and contained **within** a Group R-3 congregate residence or a Group R-4 facility are **not** required to be enclosed.
4. Exit access stairways and ramps in sprinkled buildings where the area of the vertical opening between stories does **not exceed** twice the horizontal projected area of the stairway or ramp and the opening is protected by a draft curtain and closely spaced sprinklers. In other than Group B and M occupancies, this provision is limited to openings that **do not connect >4 stories.**



Exit Access Stairways - 1019.3

Exceptions:

5. Exit access stairways and ramps **within an atrium** complying with the provisions of Section 404.
6. Exit access stairways and ramps in open parking garages that serve **only** the parking garage.
7. Exit access stairways and ramps serving smoke-protected or open-air assembly seating complying with the exit access travel distance requirements of Section 1029.7.
8. Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.



Exit Access Ramps - §1019.3



- Exit access ramps are required to be **enclosed** with shaft enclosures (fire barriers) under the same conditions as for exit access stairways
 - Due to the limited use of ramps connecting ≥ 3 stories, the application of this provision is very limited

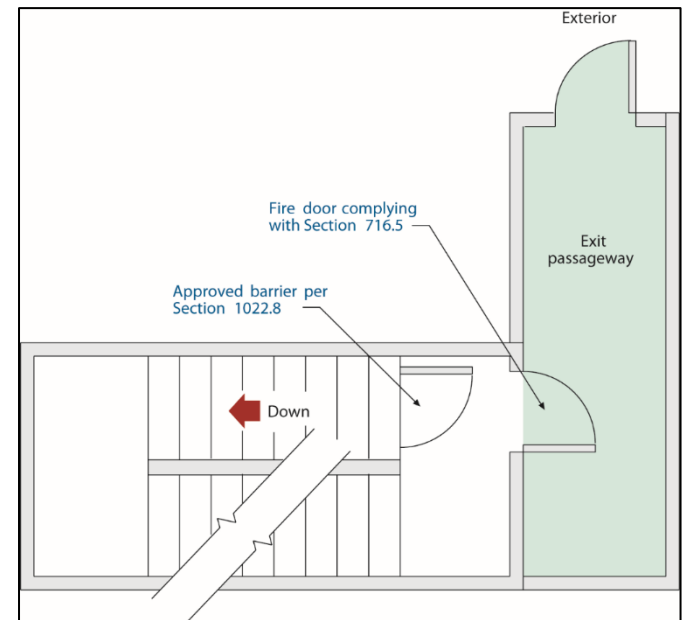
Interior Exit Stairways and Ramps - §1023.2

- Enclosures for interior exit stairways and ramps shall be fire barriers and/or horizontal assemblies, with a minimum rating of:
 - **2 hours** where connecting ≥ 4 stories
 - **1 hour** where connecting ≤ 3 stories
- The enclosure shall have a fire-resistance rating not less than the floor assembly penetrated, but need **not exceed 2 hours**



Extension of Interior Exit Stairways and Ramps - §1023.3.1

- A **horizontal extension** of an interior exit stairway or ramp, where required, shall be by an exit passageway constructed with fire barriers and/or horizontal assemblies



Extension of Interior Exit Stairways and Ramps - §1023.3.1

- The exit passageway shall have a minimum fire-resistance rating **equal or greater** to that of the connected interior exit stairway or ramp

Door assembly with 1-hour protection rating in 1-hour passageway; 1½-hour protected opening in 2-hour construction



Minimum 1-hour fire-resistant construction: 2 hours where extending a 2-hour interior exit stairway

*Maximum transmitted temperature $\leq 450^{\circ}\text{F}$ above ambient at end of 30 minutes of fire test.
(Temperature rise not regulated in sprinklered building.)

Smokeproof Enclosures and Pressurized Stairways and Ramps - §1023.11.1

- Where required for **high-rise** buildings or **underground** buildings, smokeproof enclosures and pressurized stairways may be extended by an exit passageway
- Fire barriers and/or horizontal assemblies must have a minimum **2-hour** fire-resistance rating



Exit Passageways - §1024.3

- Exit passageways, where provided, shall be **enclosed** by fire barriers and/or horizontal assemblies with a minimum **1-hour** fire-resistance rating
 - The rating cannot be less than that required for any connected interior exit stairway or ramp



Horizontal Exits - §1026.2

- Horizontal exits, where provided, shall be constructed with fire walls, or by fire barriers with a minimum **2-hour** fire-resistance rating
 - The separation shall **extend** vertically through the entire building unless floor assemblies have a minimum **2-hour** fire-resistance rating

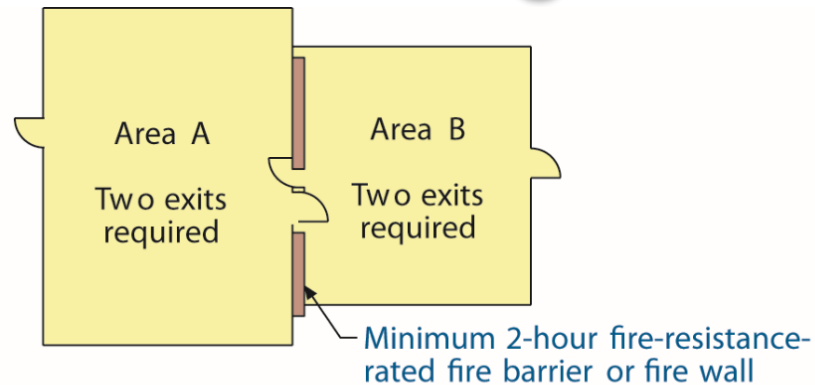


Horizontal Exits - 1026.2

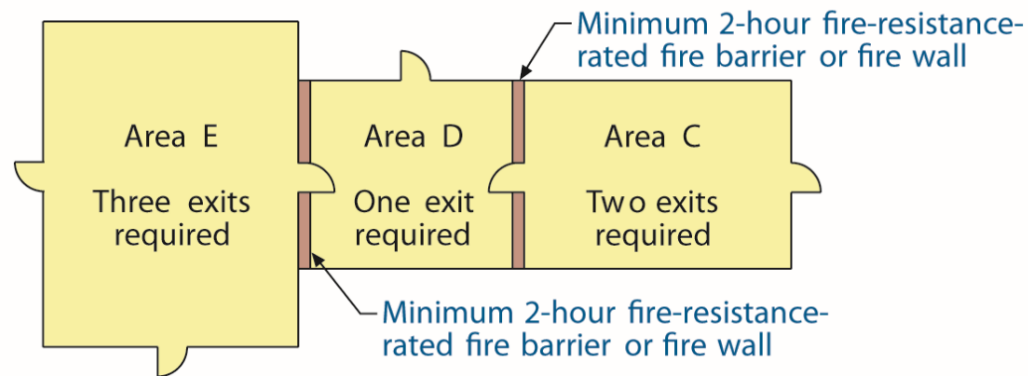
- A horizontal exit creates refuge areas such that smoke protectives are also required



Horizontal Exits - §1026.3



Complying fire wall or fire barrier may be utilized as horizontal exit from both sides, provided door size and swing are adequately addressed.



When two or more exits are required, not more than one-half the total number of exits and one half of the exit width may be horizontal exits.

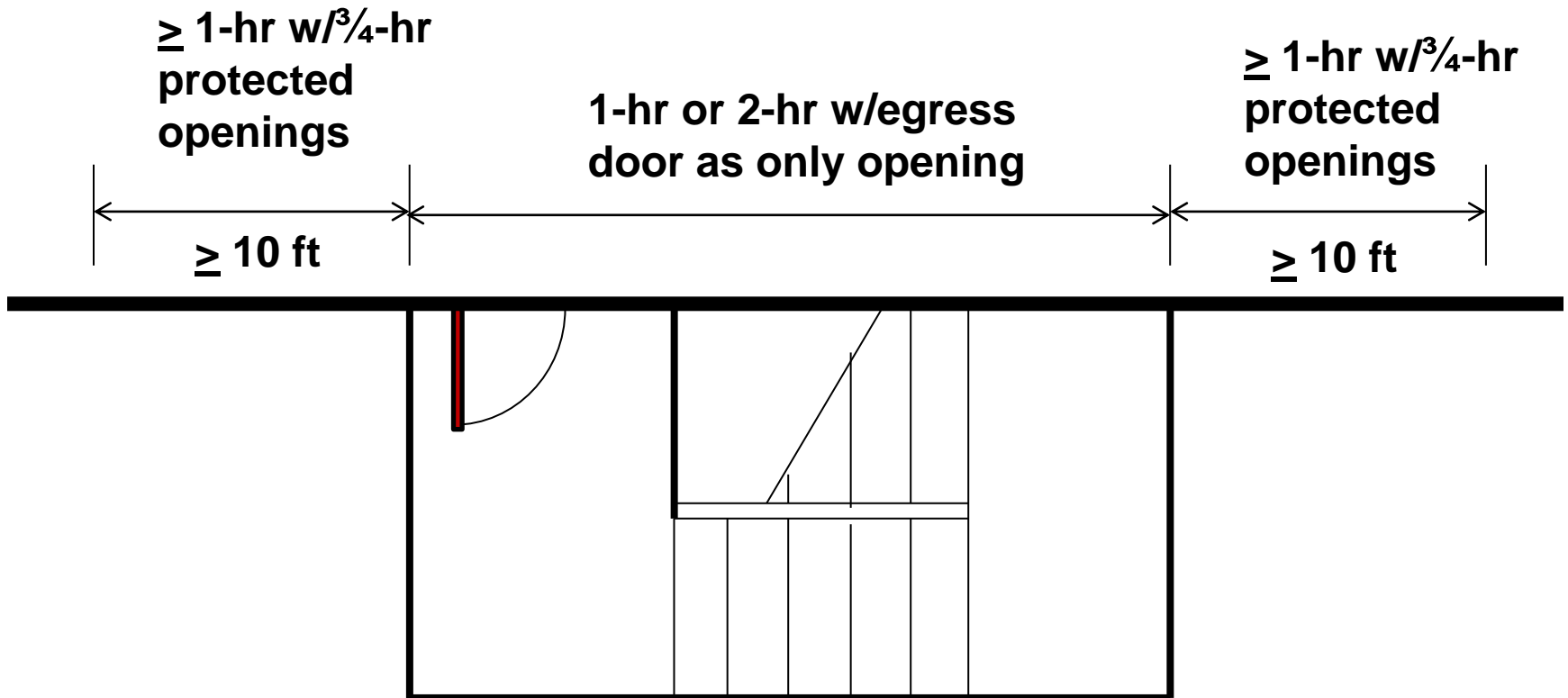
Horizontal exit shall not serve as the only exit from an area.

Exterior Stairways and Ramps - §1027.6

- Exterior stairways and ramps shall be **separated** from the interior of the building consistent with the protection required for interior exit stairways and ramps
 - Fire barrier construction is required for those exterior walls adjacent to the exterior stairway or ramp

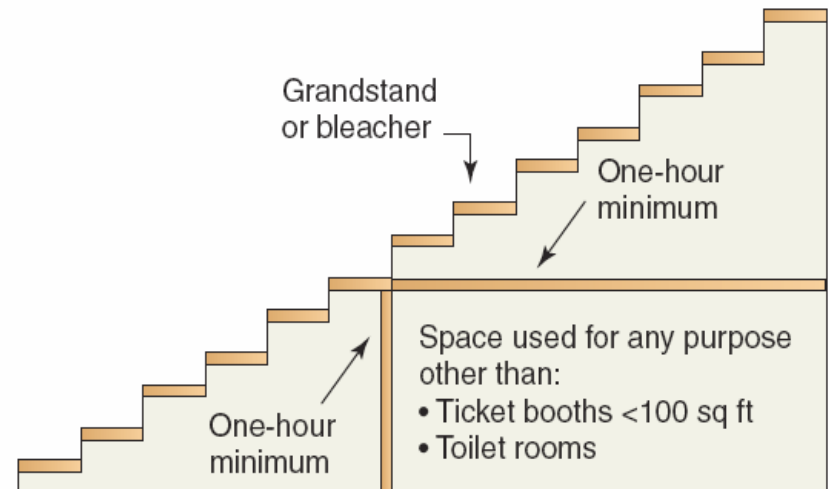


Exterior Stairways and Ramps - §1027.6



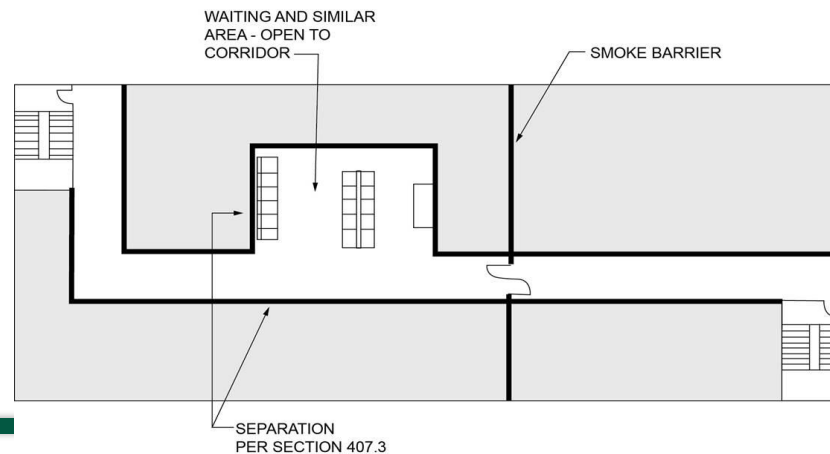
Spaces under Grandstands and Bleachers - §1029.1.1.1

- Usable spaces must be **separated** from grandstands and bleachers above by minimum **1-hour** fire barriers and/or horizontal assemblies
 - **Not** required for toilet rooms and small ticket booths



Corridors - §1020.1

- Corridors shall be fire-resistance rated in accordance with **Table 1020.1**
- Corridor walls are required to be constructed as fire partitions
 - Where interrupted by a lobby, foyer or reception area, the fire partition protection shall **extend** behind such spaces



Corridor Construction - Table 1020.1

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^c
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	0.5
I-2 ^a , I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1 ^b

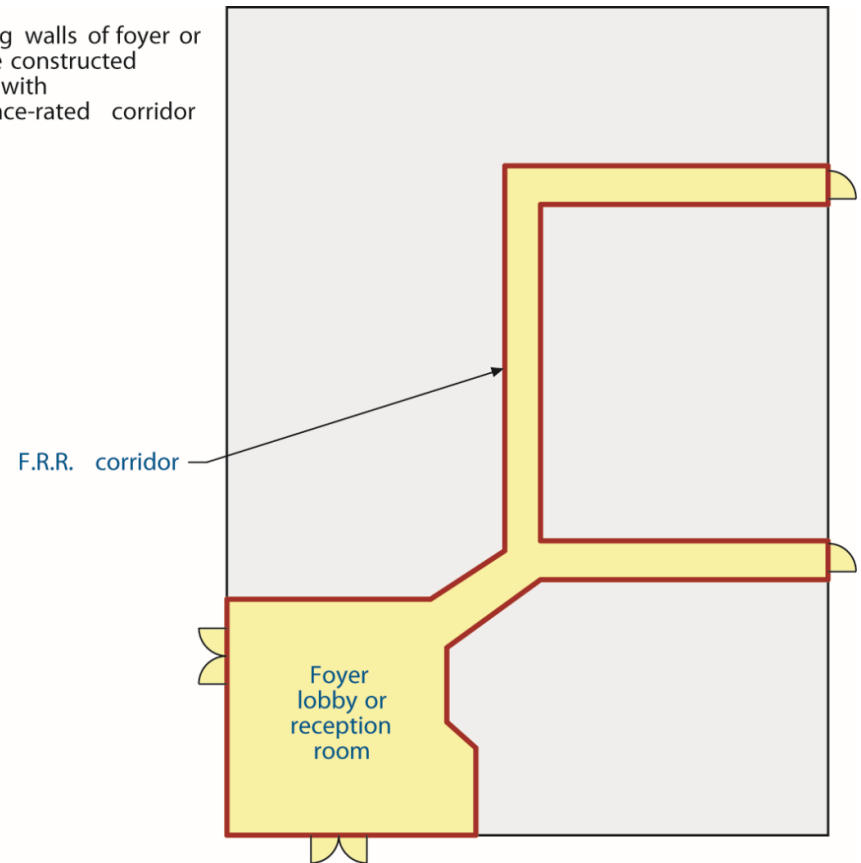
Corridor Continuity - §1020.6

- Fire resistance continuous from point of entry to an exit and **not interrupted** by intervening rooms ...

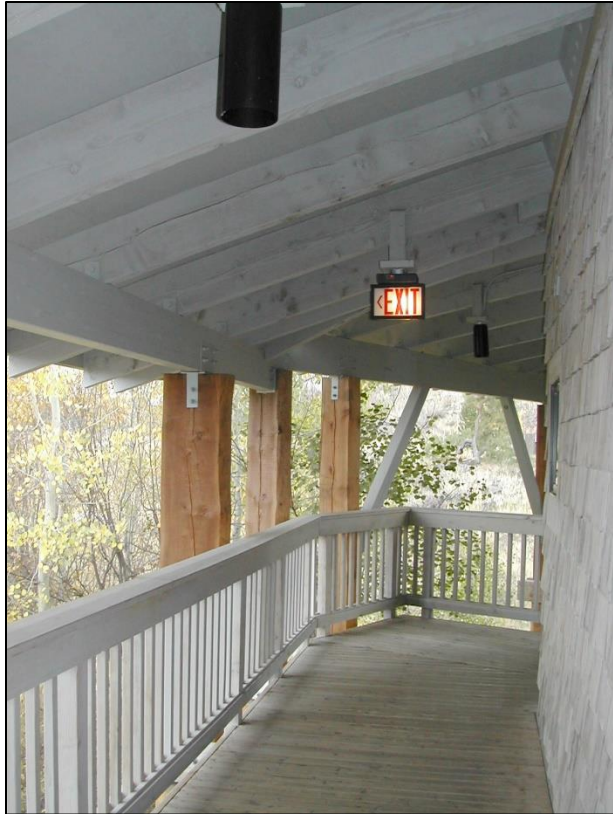
Exception:

- Where interrupted by a lobby, foyer or reception area, the fire partition protection shall extend behind such spaces

Surrounding walls of foyer or lobby to be constructed consistent with fire-resistance-rated corridor



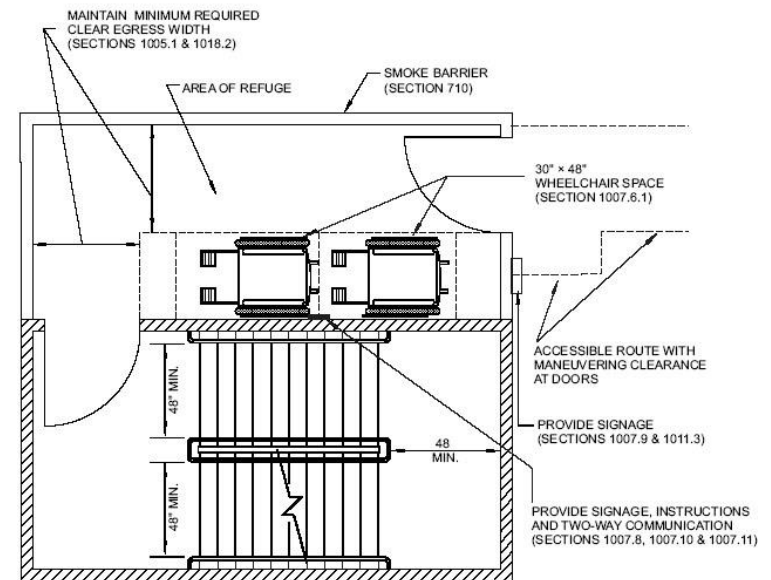
Egress Balconies - §1021.2



- Exterior egress balconies shall be **separated** from the interior of the building by fire partitions and openings as required for corridors
 - Separation is **not** required where **two** specified **conditions** are met:
 - Two available stairways, **and**,
 - Dead-ends do not pass unprotected opening

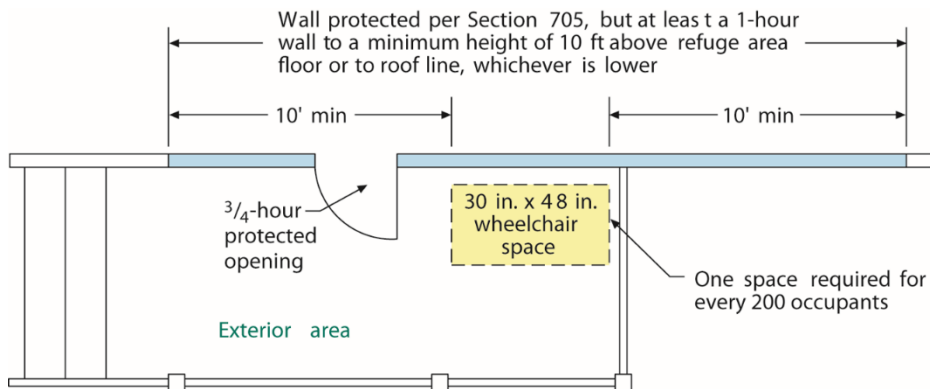
Areas of Refuge - §1009.6.4

- Each area of refuge in an accessible means of egress shall be **separated** from the remainder of the story by a smoke barrier or horizontal exit
 - Areas of refuge must be designed to minimize the intrusion of smoke



Exterior Area for Assisted Rescue - §1009.7.2

- Exterior walls separating an exterior area for assisted rescue from the interior of the building shall have a minimum fire-resistance rating of **1-hour**, rated for exposure from the interior



Egress Courts - §1028.4.2

- Exterior walls adjacent to an egress court shall have a minimum **1-hour** fire-resistance rating for at least **10'** above the walking surface where the court is less than **<10'** in width

Exceptions

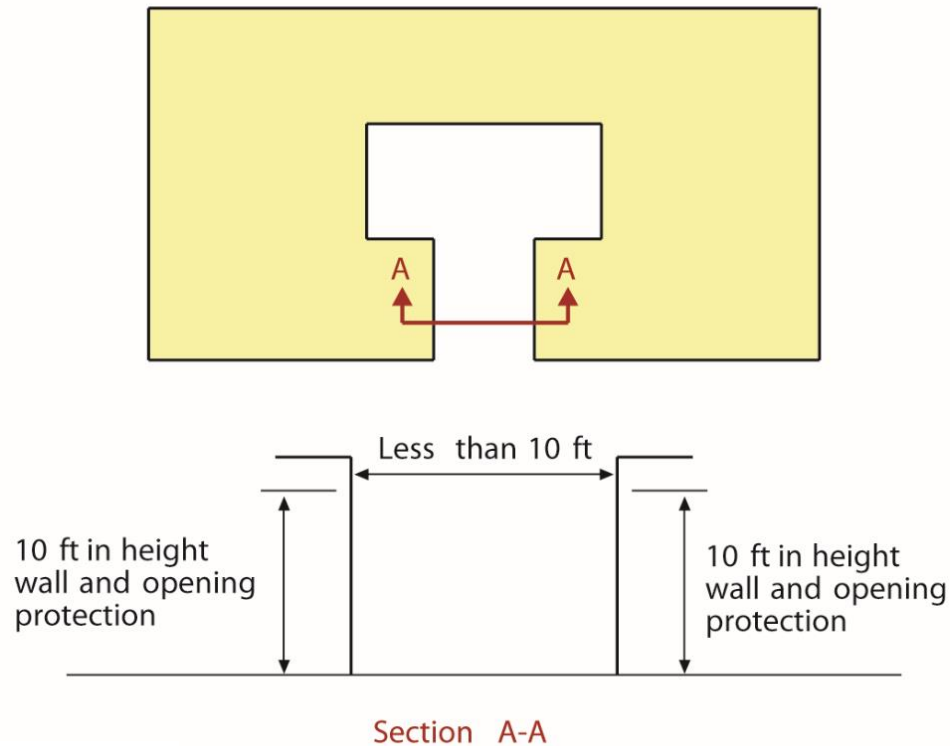
- Egress court that:
 - Serves an occupant load **<10**, and
 - Serves other than a Group R-3 occupancy



Egress Courts - §1028.4.2

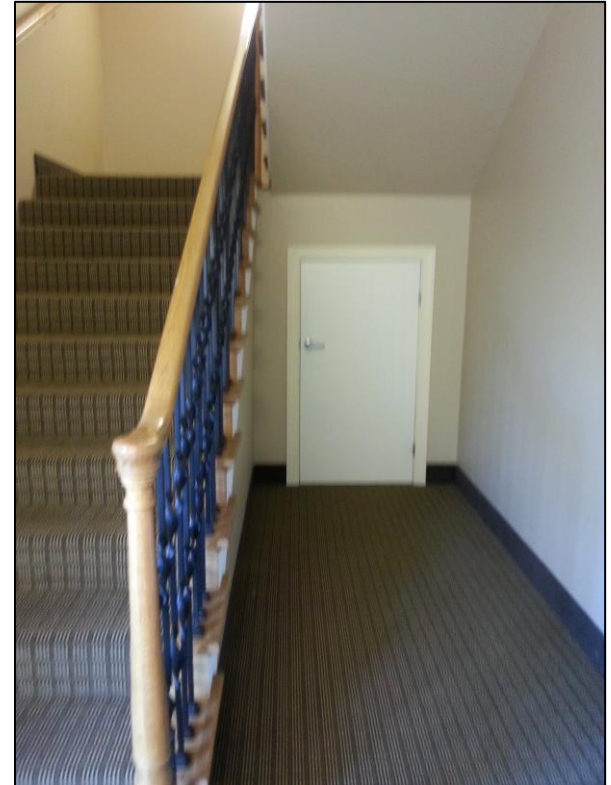
When an egress court serving an occupant load of 10 or more is less than 10 feet in width:

- The court walls shall be protected up to 10 feet by a minimum of 1-hour fire-resistance-rated construction
- Openings in the court walls shall be protected by assemblies having a minimum $\frac{3}{4}$ -hour fire-protection rating



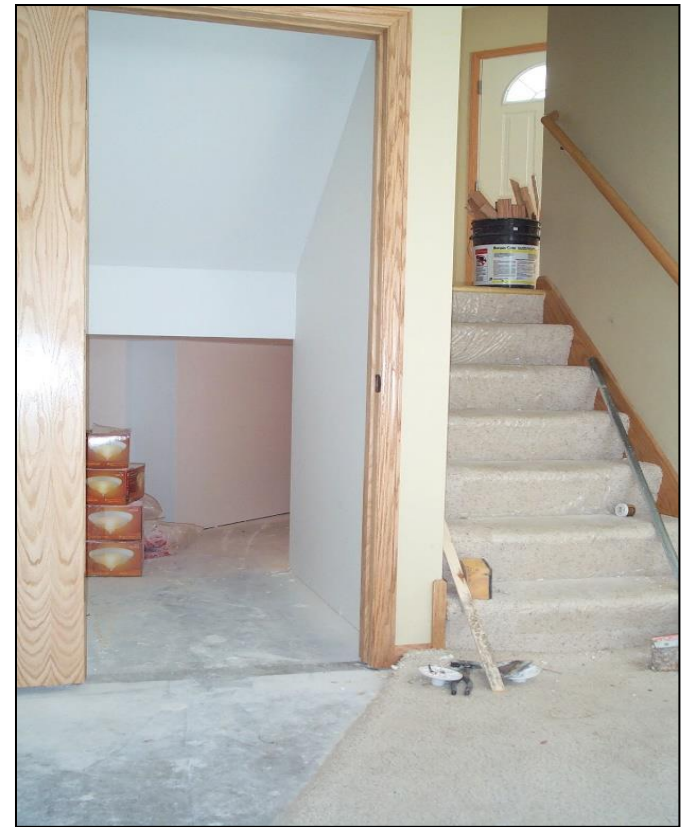
Enclosures under Interior Stairways - §1011.7.3

- Walls and soffits within enclosed usable spaces **under** enclosed and unenclosed interior stairways shall be protected by minimum **1-hour** fire-resistance-rated construction, or the rating of the enclosure, whichever is greater



Enclosures under Residential Interior Stairways - §1011.7.3, Exception

- Spaces under stairways serving an individual Group R-2 or R-3 dwelling unit are required, at a minimum, to be **protected** on the **enclosed side** of the stairway with minimum 1/2" gypsum board

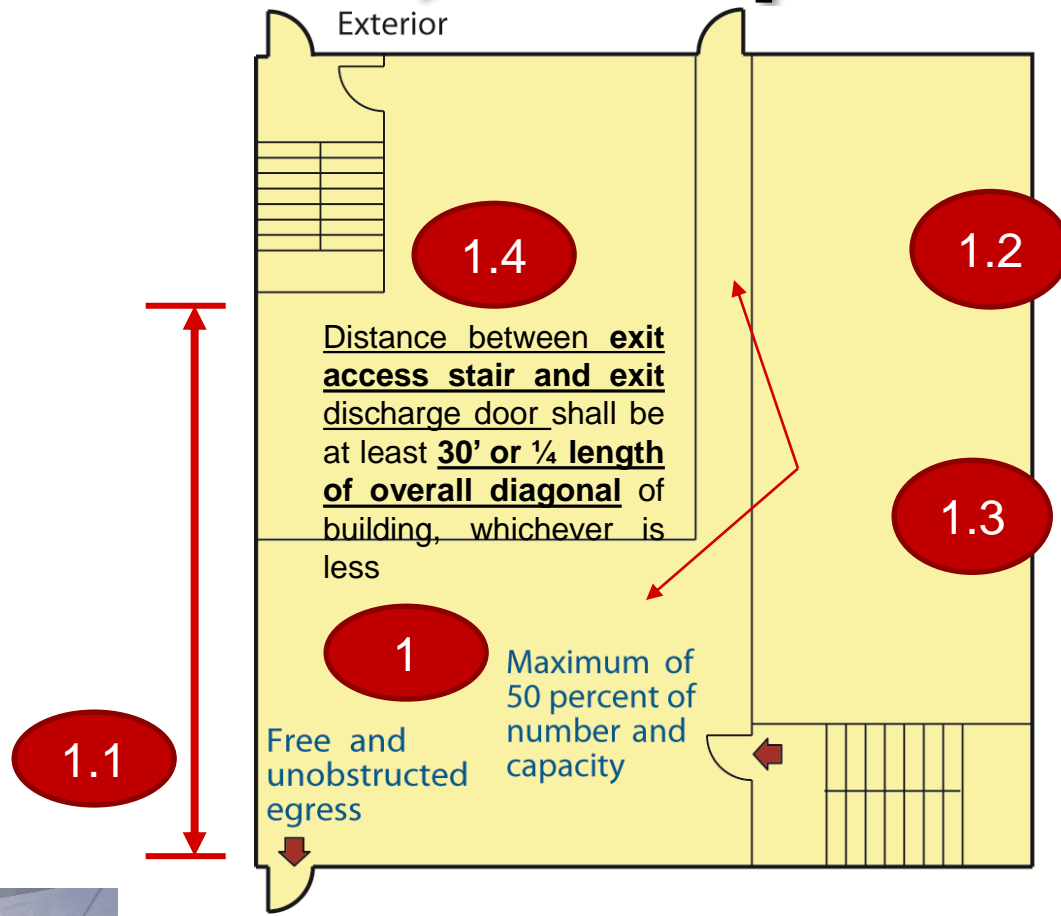


Enclosures under Exterior Stairways - §1011.7.4

- **No** enclosed usable space is permitted under an exterior exit stairway unless it is completely **enclosed** in **1-hour** fire-resistance-rated construction



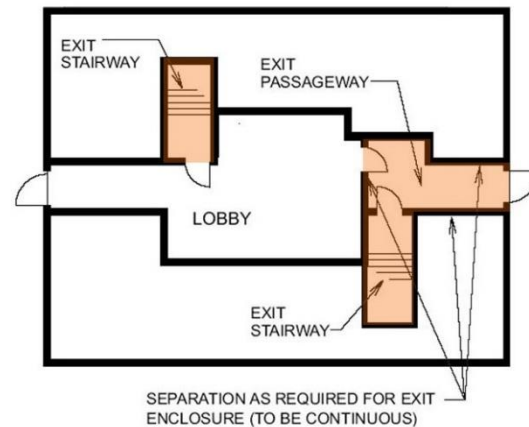
Interior Exit Discharge - 1028.1, Exception 1



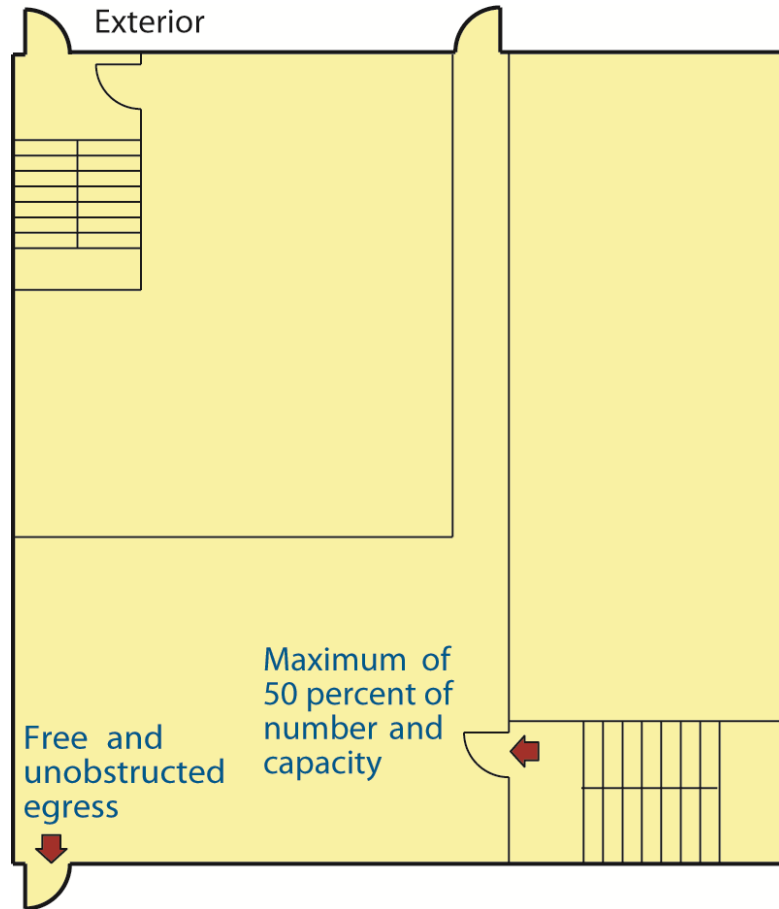
- Entire area of level shall be **separated from areas below** by construction equivalent to the stair enclosure
- Egress path from exit stairway to discharge shall be **sprinklered and all rooms and portions of the level having access to the egress path shall be sprinklered or separated** from the egress path by construction equivalent to the stair enclosure

Interior Exit Discharge - §1028.1, Exception 1.2

- Where an interior exit stairway is permitted to egress through a discharge level **lobby** or similar space, as **one condition** the discharge level must be **separated** from areas below by construction conforming to the fire-resistance rating of the enclosure



Interior Exit Discharge - §1028.1, Exception 1.2



Entire floor level is sprinklered and protected from areas below by construction equivalent to rating of interior exit stairway enclosure

Interior Exit Discharge - §1028.1, Exception 2.1

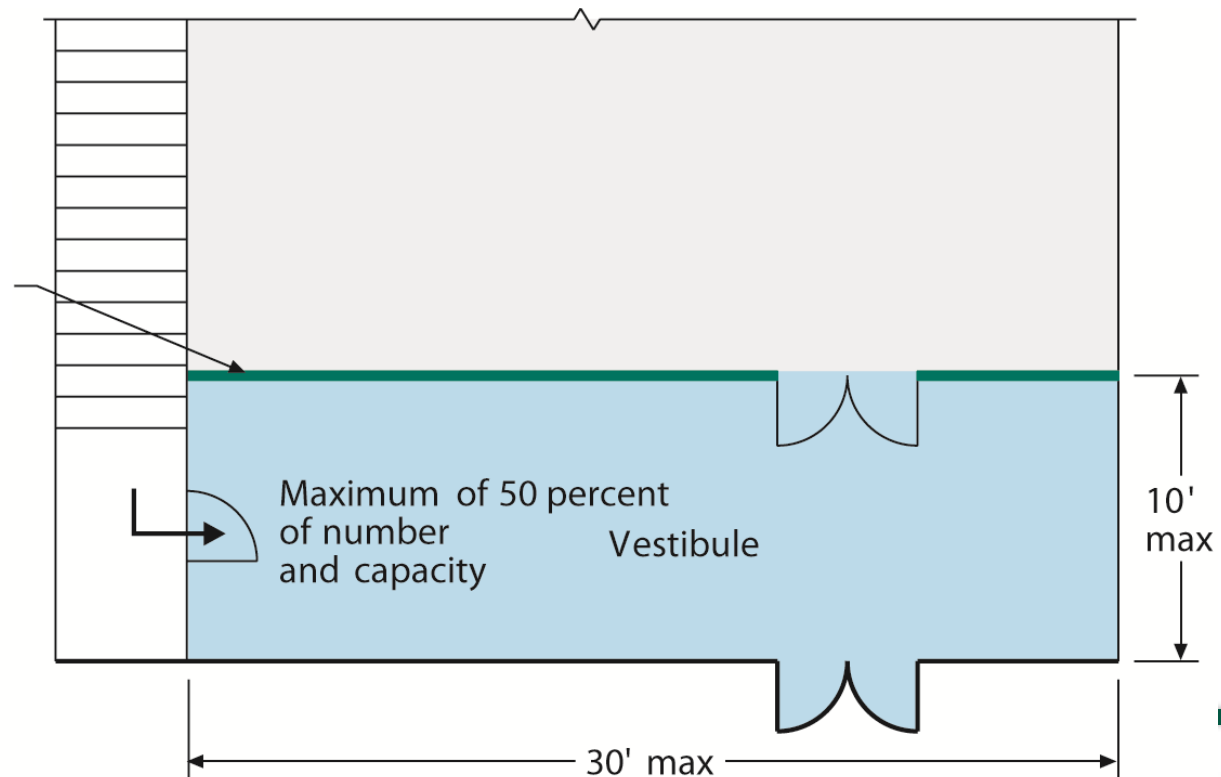
- Where an interior exit stairway is permitted to egress through a discharge level **vestibule**, as one condition the discharge level must be **separated** from areas below by construction conforming to the fire-resistance rating of the enclosure

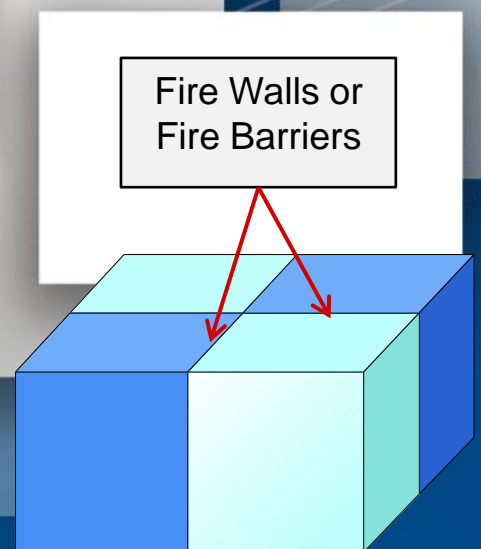


Interior Exit Discharge - §1028.1, Exception 2.3

- **Vestibule** must be **separated** from the remainder of the level of exit discharge by fire partitions

Separation from remainder of level of exit discharge to be by fire partition.





Fire Walls or
Fire Barriers

4 Fire Areas created by fire
walls or fire barriers

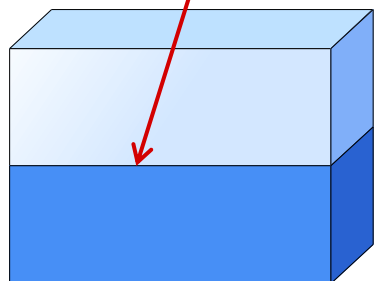
Module 7

Fire Limitation Features

Fire Areas - §901.7

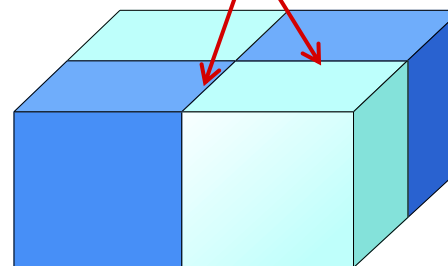
- Where buildings are divided into fire areas so as not to exceed the limits of §903 for requiring an automatic sprinkler system, the fire areas shall be **separated** by fire barriers and/or horizontal assemblies having a minimum fire-resistance rating as set forth in Table 707.3.10

Horizontal Fire-rated Assembly



2 Fire Areas created by horizontal assembly

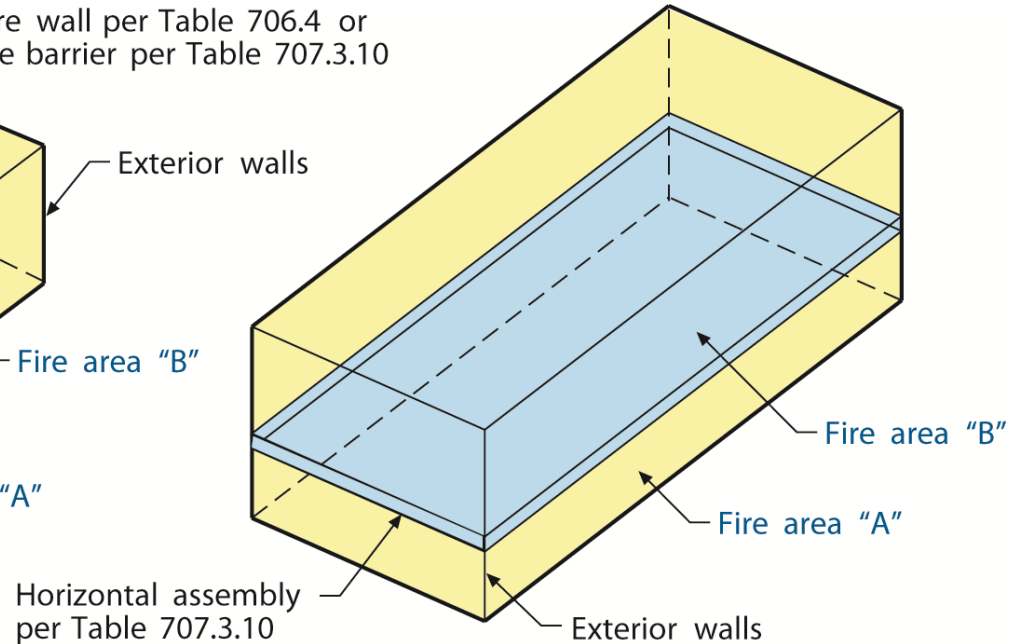
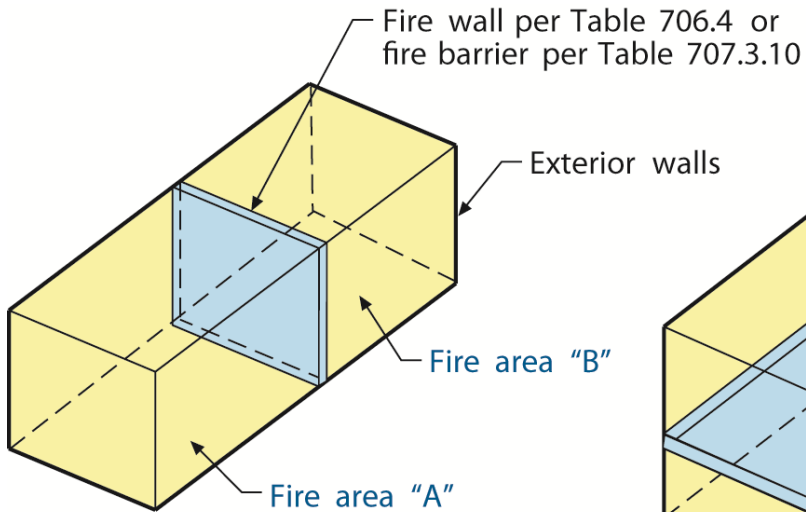
Fire Walls or Fire Barriers



4 Fire Areas created by fire walls or fire barriers

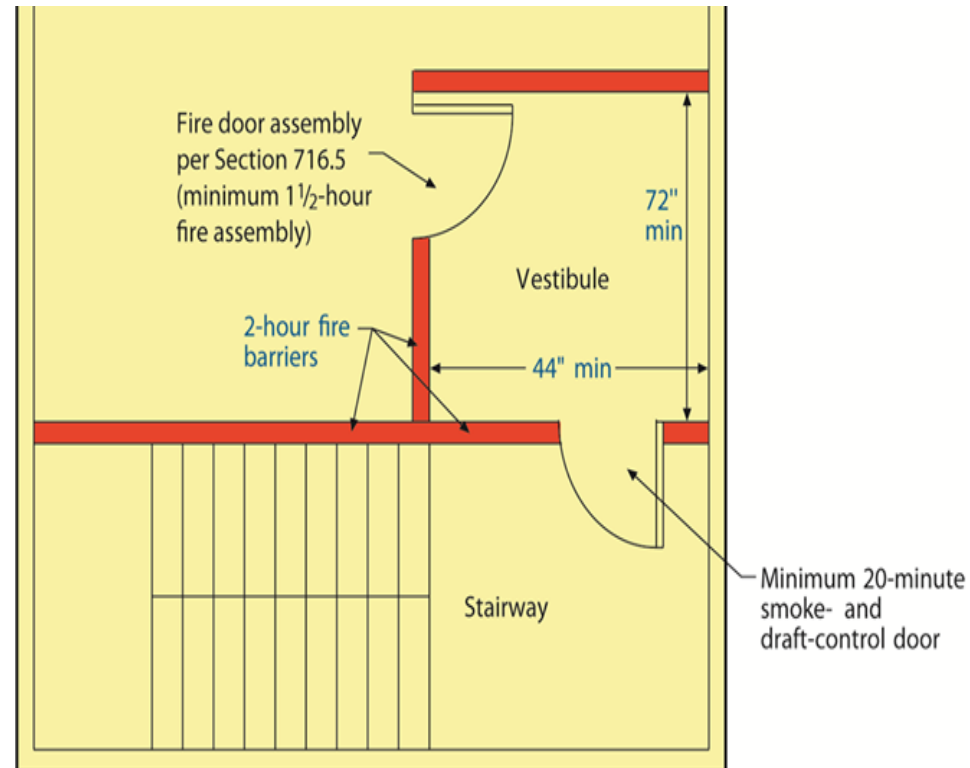
Fire Areas - §901.7

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



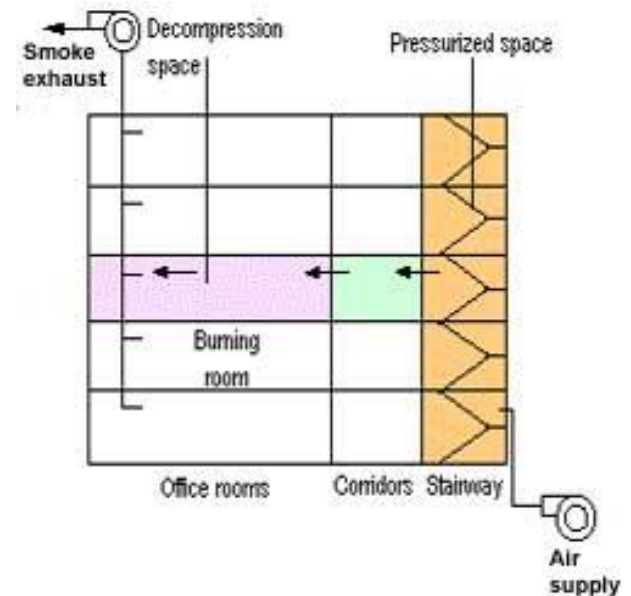
Smokeproof Enclosures - § 909.20.2

- A smokeproof enclosure shall be **separated** from the remainder of the building by minimum **2-hour** fire barriers and/or horizontal assemblies
- In addition, the vestibule must be **separated** from the stairway by minimum **2-hour** fire barriers and/or horizontal assemblies



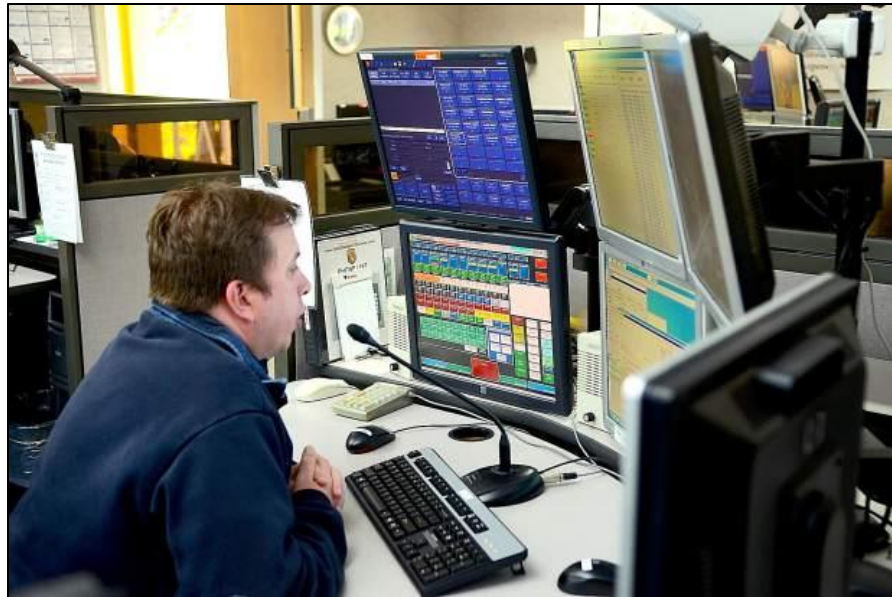
Stair Pressurization Alternative - §909.20.6.1

- Smokeproof enclosure ventilation systems shall be **isolated** from the remainder of the building by minimum **2-hour** fire barriers and/or horizontal assemblies
 - Protection shall be provided for equipment, control wiring, power wiring and ductwork



Fire Command Center - §911.1.2

- Fire command centers, where required, shall be **separated** from the remainder of the building by minimum **1-hour** fire barriers and/or horizontal assemblies

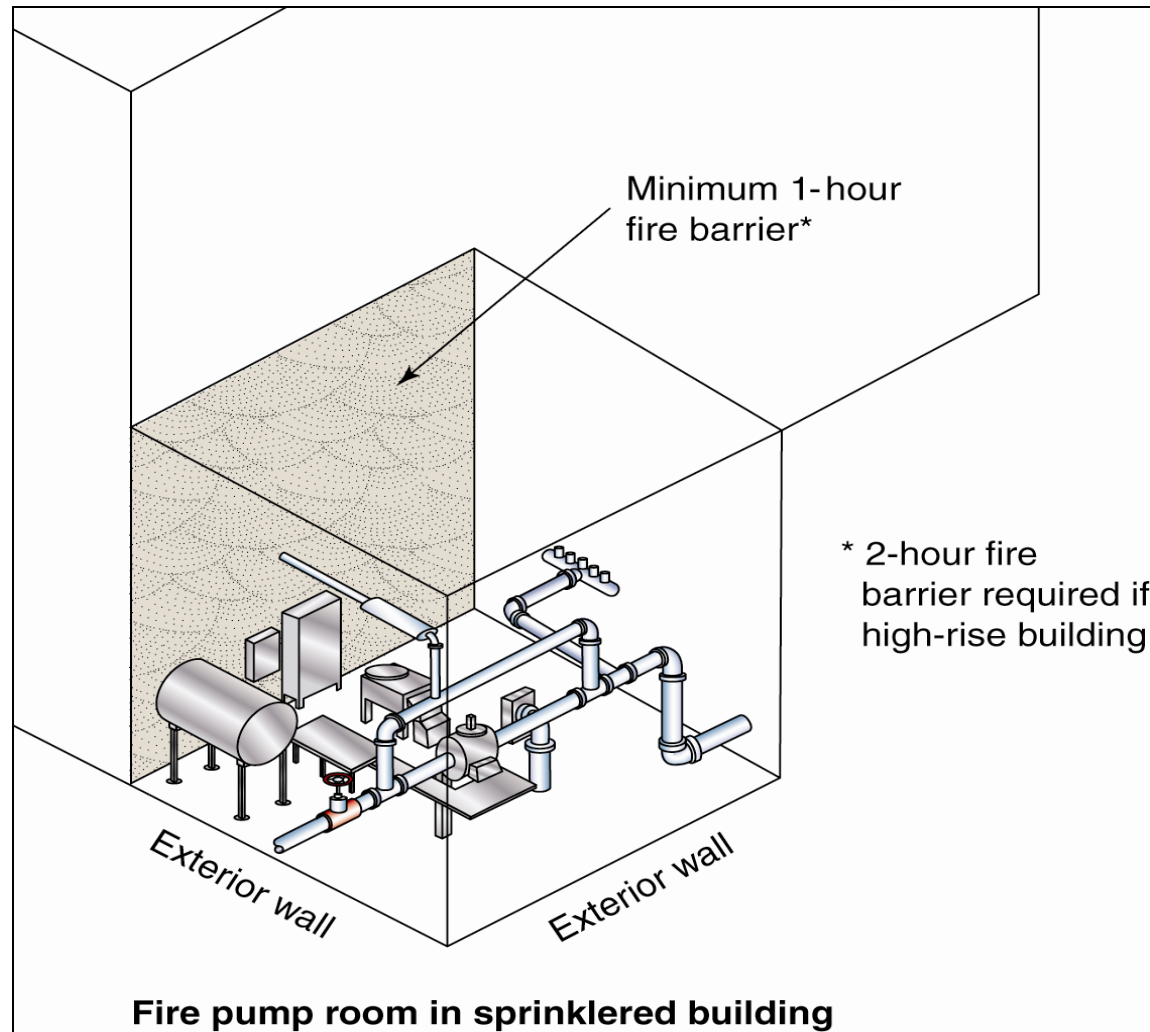


Fire Pump Rooms - §913.2.1

- Fire pumps shall be located in rooms **separated** from all other portions of the building by minimum **2-hour** fire barriers and/or horizontal assemblies
 - In other than high-rise buildings, where the building is fully sprinklered, the fire barriers and/or horizontal assemblies must have a minimum **1-hour** fire-resistance rating



Fire Pump Rooms - §913.2.1



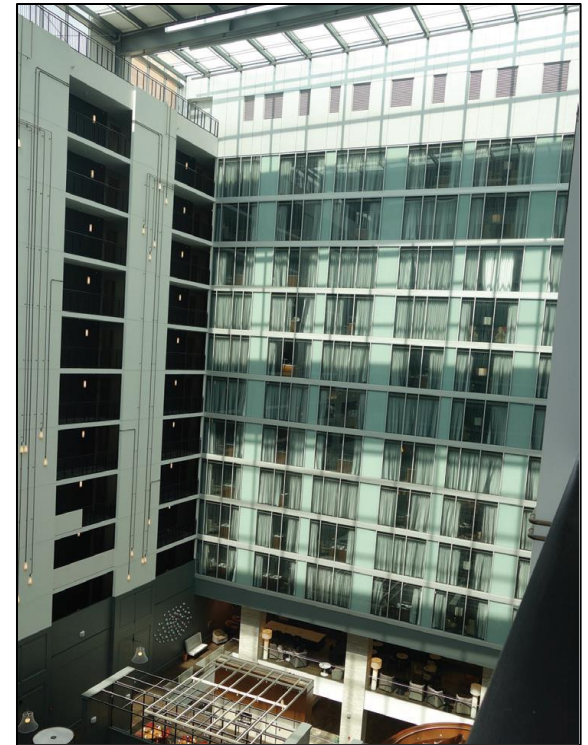
Fire Alarm Systems in Group R Occupancies - §907.2

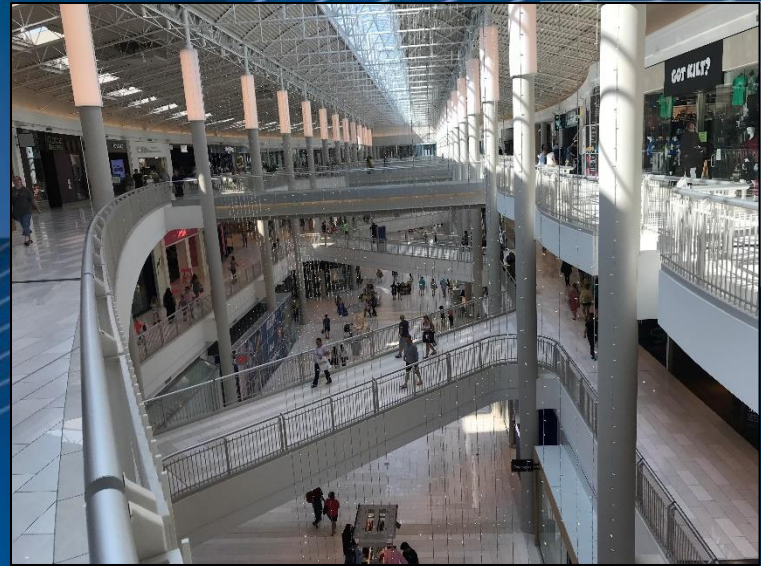
- In select Group R occupancies, an otherwise-mandated fire alarm system may not be required where the units are **separated** from each other and the public and common areas by minimum **1-hour** fire partitions
 - Other conditions must also be met:
 - Maximum **2** stories
 - Fully sprinklered building activates alarm upon water flow
 - Minimum **1** manual fire alarm box installed



Smoke Control Systems - §909.5

- Where construction elements are used as a part of a smoke control system, smoke barriers shall be provided
 - The maximum allowable leakage area is to be calculated and reviewed for compliance



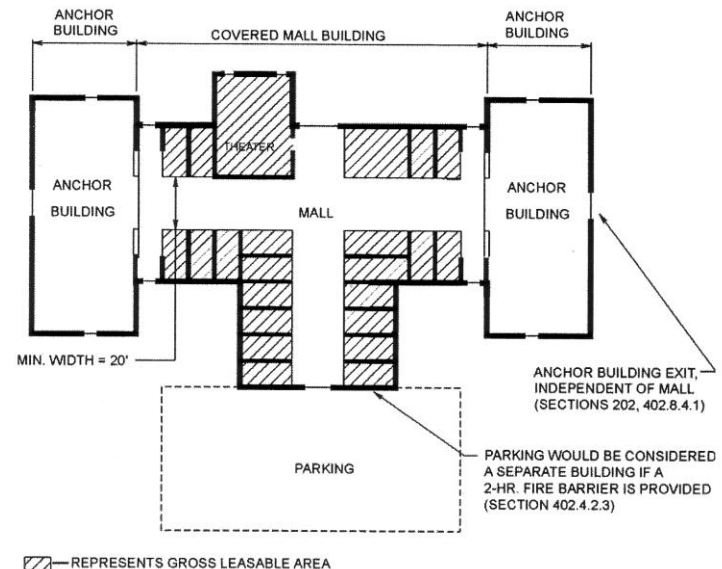


Module 8

Special Building Types

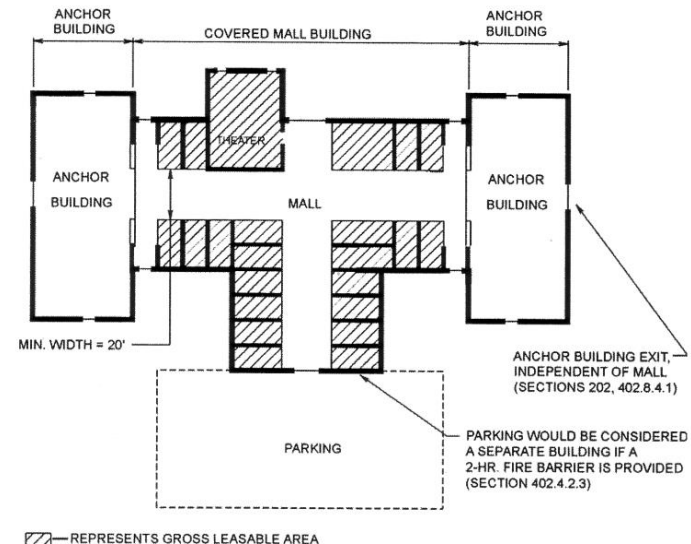
Mall/Anchor Building Separation - §402.4.2.2

- An anchor building shall be **separated** from a covered or open mall building by a fire wall
 - Where the anchor building is ≤ 3 stories, minimum **2-hour** fire barriers are permitted



Mall/Parking Garage Separation - §402.4.2.3

- An attached parking garage shall be **separated** from a covered mall building, open mall building or anchor building by a minimum **2-hour** fire barrier and/or horizontal assembly



Mall Exit Passageways - §402.8.6.1

- Where exit passageways provide a secondary means of egress from a tenant space, doorways to the exit passageway shall be **protected** by **1-hour** fire door assemblies that are self- or automatic-closing by smoke detection in accordance with §716.5.9.3



Mall Tenant Separations - §402.4.2.1

- Each tenant space within a mall building shall be **separate** from other tenant spaces by a fire partition
 - **No separation** wall is required between the tenant space and the mall

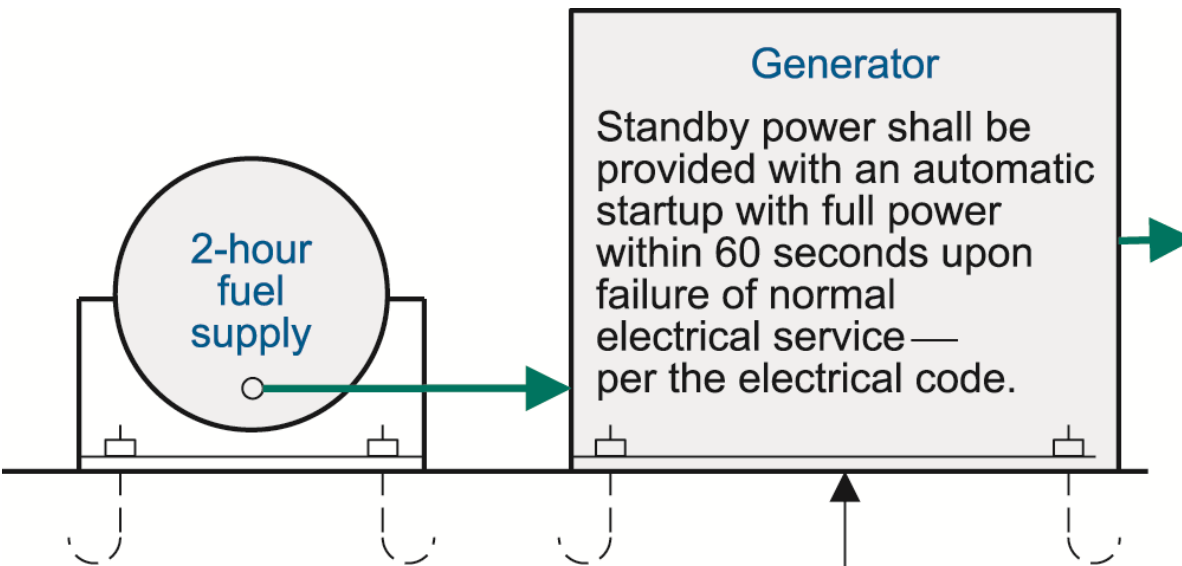


Standby Power Protection in High-rise Buildings - §403.4.8.1

- If a generator within the building is used for standby power in a high-rise building, it shall be located in a **separate** room enclosed with minimum **2-hour** fire barriers and/or horizontal assemblies



Standby Power Protection in High-rise Buildings - §403.4.8.1



Power to:

1. Fire command center
2. Electrically powered fire pumps
3. Ventilation and automatic fire detection equipment for smokeproof enclosures

Note: if generator used for standby power and located within building, minimum 2-hour fire barrier separation required.

Note: system supervision—manual start and transfer override controls at fire command center per Section 911.



Atrium Sprinkler Protection - §404.3, Exception 1

- The sprinkler required for a building containing an atrium is **not required** for those areas adjacent and above the atrium space provided that portion is **separated** from the atrium by minimum **2-hour** fire barriers and/or horizontal assemblies

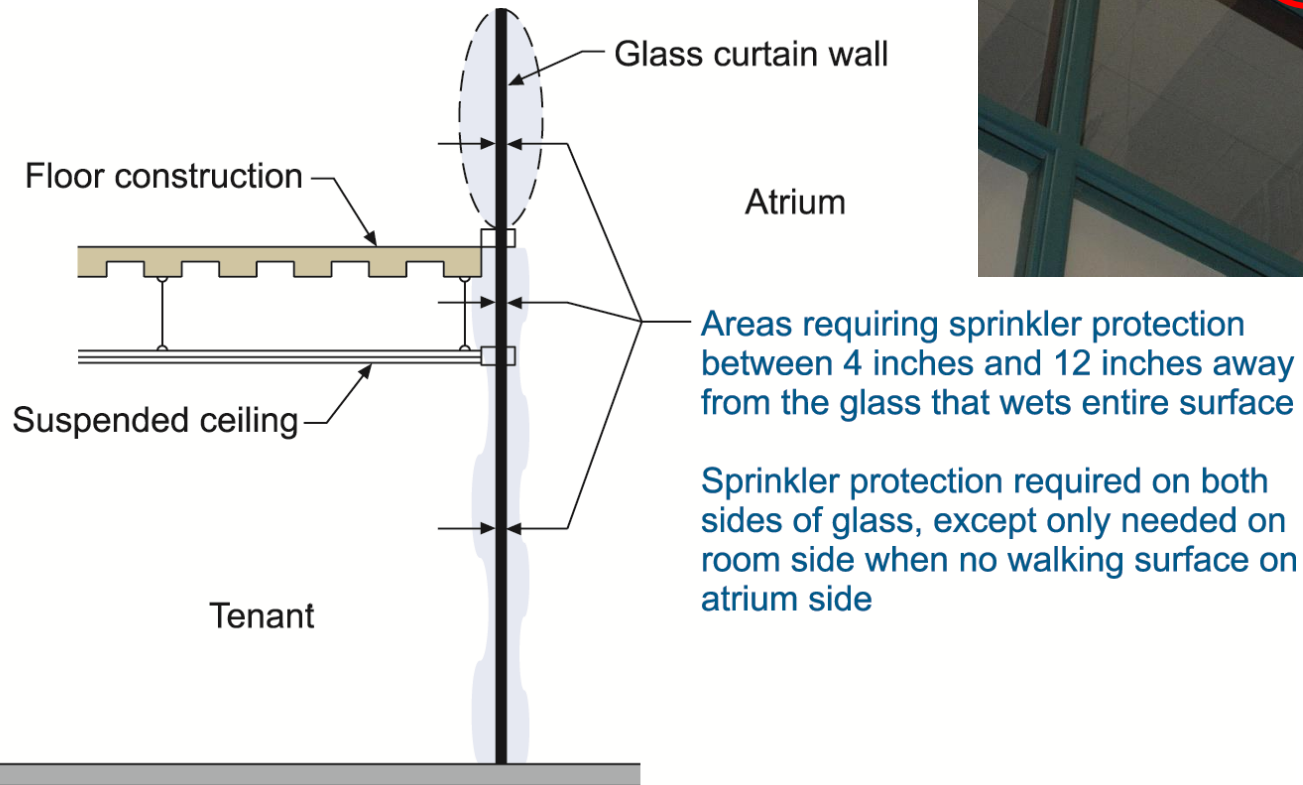


Atrium Separation - §404.6

- Atrium spaces shall be **separated** from adjacent spaces by a minimum **1-hour** fire barrier and/or horizontal assembly
 - The **1-hour** separation is **not required** under one of **3 exceptions**, including where glazing is protected by an automatic sprinkler system

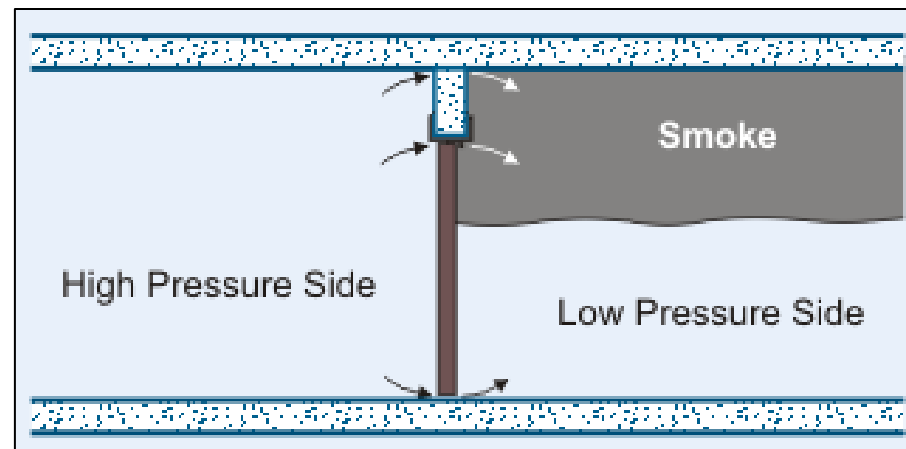


Atrium Separation - §404.6, Exception 1



Underground Building Compartmentation - §405.4

- A building with a floor level more than **60'** below the lowest discharge level must be divided into at least **two compartments**, created through the use of smoke barriers



Underground Building Compartmentation - §405.4

- Elevators that serve more than one compartment shall be provided with an elevator lobby **separated** from each compartment by a smoke barrier



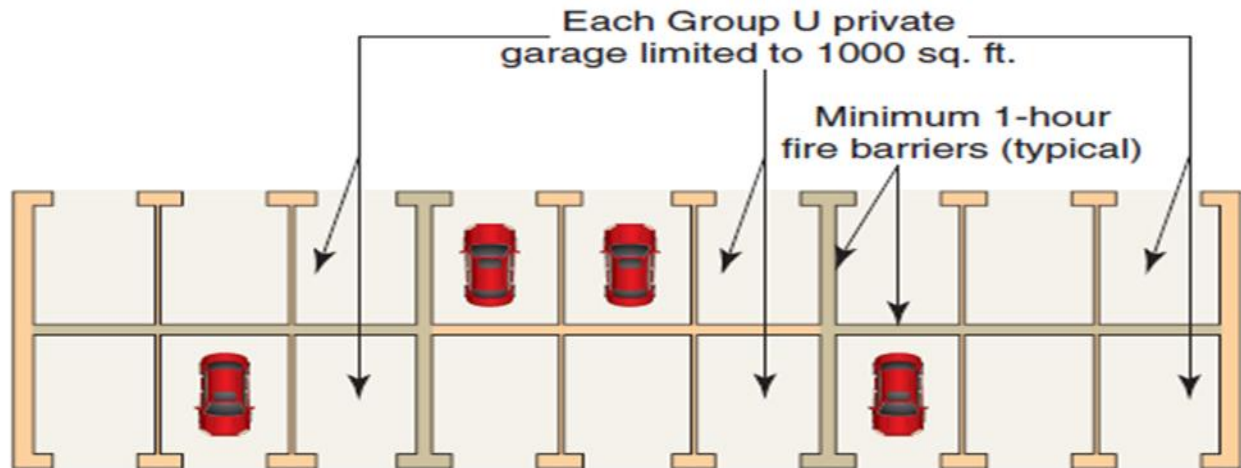


Module 9

Special Occupancies and Uses

Private Garage Buildings - §406.3.1

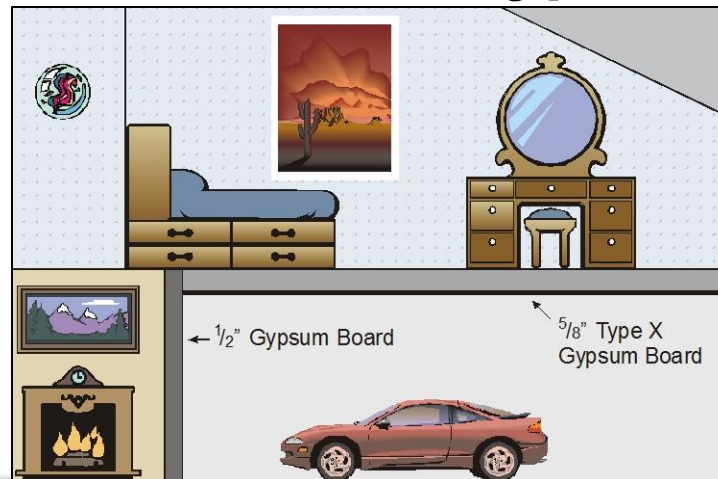
- Multiple **1,000 sq.ft.** private garages are permitted within the same structure where each private garage is **separated** by minimum **1-hour** fire barriers, horizontal assemblies, or both



Example: If non-sprinklered building of Type VB construction, total allowable area limited to 5500 sq. ft. plus any applicable frontage increase

Garage Dwelling Separations - §406.3.4.1

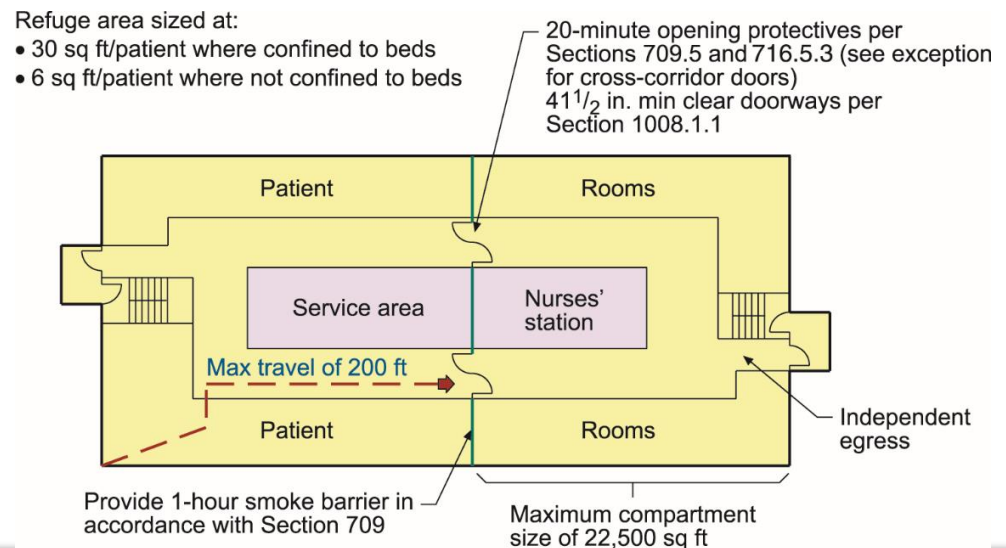
- A private garage shall be **separated** from the dwelling unit by minimum 1/2" gypsum board on the garage side
- Garages with habitable rooms above shall be **separated** by not less than **5/8" Type X** gypsum board



Group I-2 Smoke Compartments - 407.5

- Every story in a **Group I-2** occupancy* where persons receive care or those having an occupant load of **≥ 50** shall be divided into at least **2** smoke compartments by smoke barriers

***24-hour** care for **≥ 5** who are incapable of self-preservation



Group I-2 Corridors - §407.3

- Corridor walls in a Group I-2 occupancy shall be constructed as smoke partitions
- Waiting areas and similar spaces constructed as required for corridors are permitted to be open to the corridor

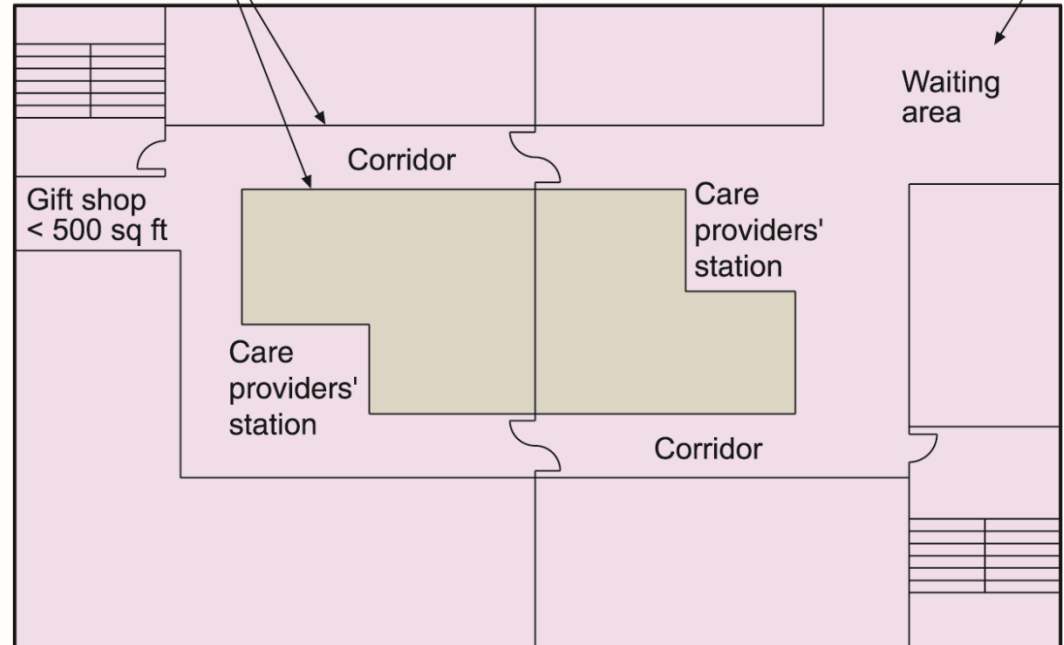


Group I-2 Corridors - §407.3



Smoke partitions per Section 710

Waiting area permitted to be open to corridor where complying with Section 407.2.1

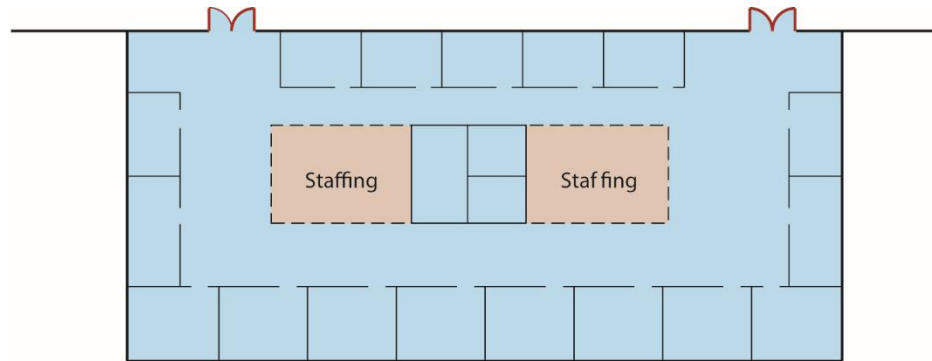


Corridor doors:

- Need no fire-protection rating
- Need not be self-closing or automatic-closing
- Shall limit smoke
- Shall have positive latching

Group I-2 Care Suites - §407.4.4.2

- Care suites shall be **separated** from other portions of the building by smoke partitions



Suite having patient sleeping rooms

- 5,000 sq ft max
- Two exit-access doors if > 1,000 sq ft
- Travel to exit access door limited to 100 ft

Suite having no patient sleeping rooms

- 10,000 sq ft max
- Two exit-access doors if > 2,500 sq ft

- The presence of sprinklers, higher level of staff awareness and limited suite areas permit care suites to be treated differently than standard patient sleeping rooms

Group I-3 Smoke Compartments - §408.6

- Every story in a **Group I-3*** occupancy used by residents for sleeping or those stories having an occupant load of ≥ 50 shall be divided into at least **2** smoke compartments by smoke barriers



*Prisons, jails, correctional facilities where persons are under restraint or security

Group I-3 Subdivision of Resident Housing Areas - 408.8

- In **Conditions 3 and 4***, each sleeping area shall be **separated** from adjacent common spaces by a smoke-tight partition where distance of travel from sleeping area to corridor **>50'**
 - Sleeping areas and any contiguous day room, group activity space or other common spaces where residents are housed



3 - Free movement in smoke zone

4 - Free movement is restricted but occupants can be released remotely

Group I-3 Interior Exit Stairways - §408.3.8

- One interior exit stairway in each building is permitted to have glazing installed in doors and walls at each landing providing access to the stairway:
 - The total glazing is limited to **5,000 sq.in.** per floor level
 - Sprinkler protection is required to wet the glazing **completely**



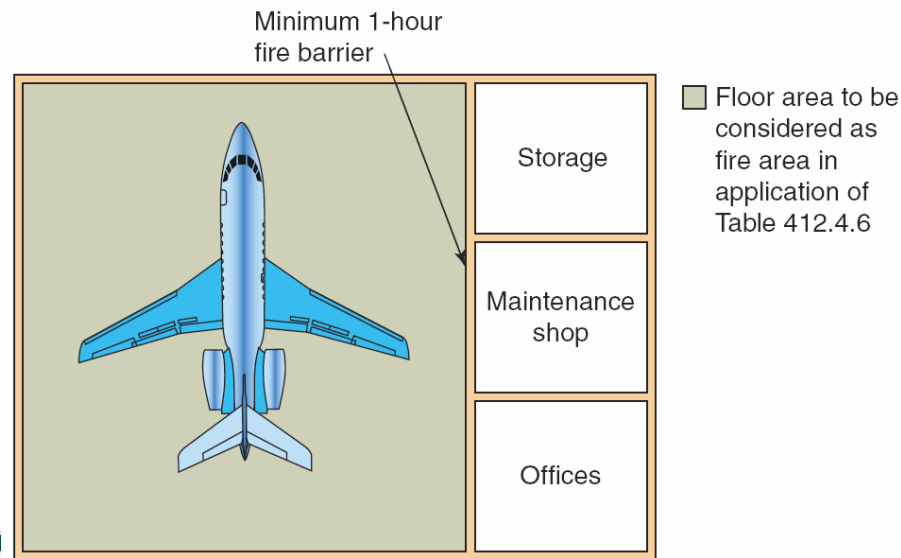
Aircraft Hangar Fire Areas - §412.4.6.2

- When determining the fire suppression requirements for aircraft hangars, established fire areas shall be **separated** by minimum **2-hour** fire walls



Aircraft Hangar Fire Areas - §412.4.6.2

- Support areas, such as offices, shops and storage rooms, which are **separated** from the aircraft servicing area by minimum **1-hour** fire barriers are not required to be included in the determination of fire area size



Aircraft Hangar Heating Equipment - §412.4.4

- Heating equipment in an aircraft hangar shall be placed in another room **separated** by minimum **2-hour** fire barriers and/or horizontal assemblies



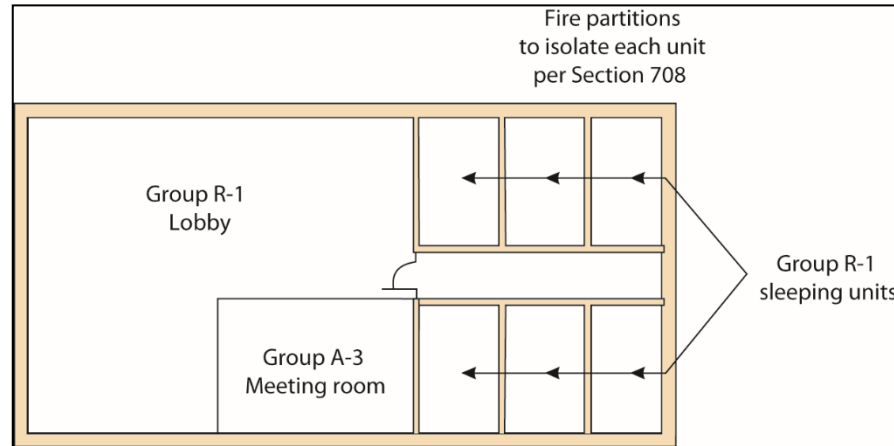
Residential Aircraft Hangar Separation - 412.4.1

- An aircraft hangar attached to a dwelling must be **separated** by a minimum **1-hour** fire barrier
- Access doors:
 - $\frac{3}{4}$ **hour** listed
 - **4"** high noncombustible sill
 - **Self-closing**
- Windows or other vent openings are **prohibited**



Residential Unit Wall Separations - §420.2

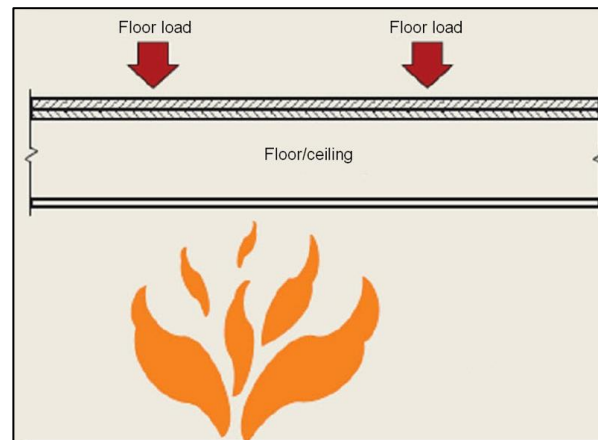
- In Group I-1*, R-1, R-2 and R-3 occupancies, walls separating dwelling and sleeping units in the same building, as well as **separating** such units from other occupancies in the building, shall be constructed as fire partitions



* Congregate care for **>16** residents on **24-hour** basis: assisted living, group homes, alcohol and drug centers

Residential Unit Floor Separations - §420.3

- In Group I-1, R-1, R-2 and R-3 occupancies, floor assemblies **separating** dwelling and sleeping units in the same building, as well as separating such units from other occupancies in the building, shall be constructed as horizontal assemblies



Ambulatory Care Facilities Separation - §422.2

- Ambulatory care facilities where there are ≥ 4 individuals incapable of self-preservation shall be **separated** from adjacent spaces, corridors and tenants by fire partitions



Ambulatory Care Facilities Smoke Compartments - §422.3

- Where the aggregate area of one or more ambulatory care facilities **>10,000 sq.ft.**, smoke barriers are required to create smoke compartments
 - No individual compartment is permitted to exceed **22,500 sq.ft.**



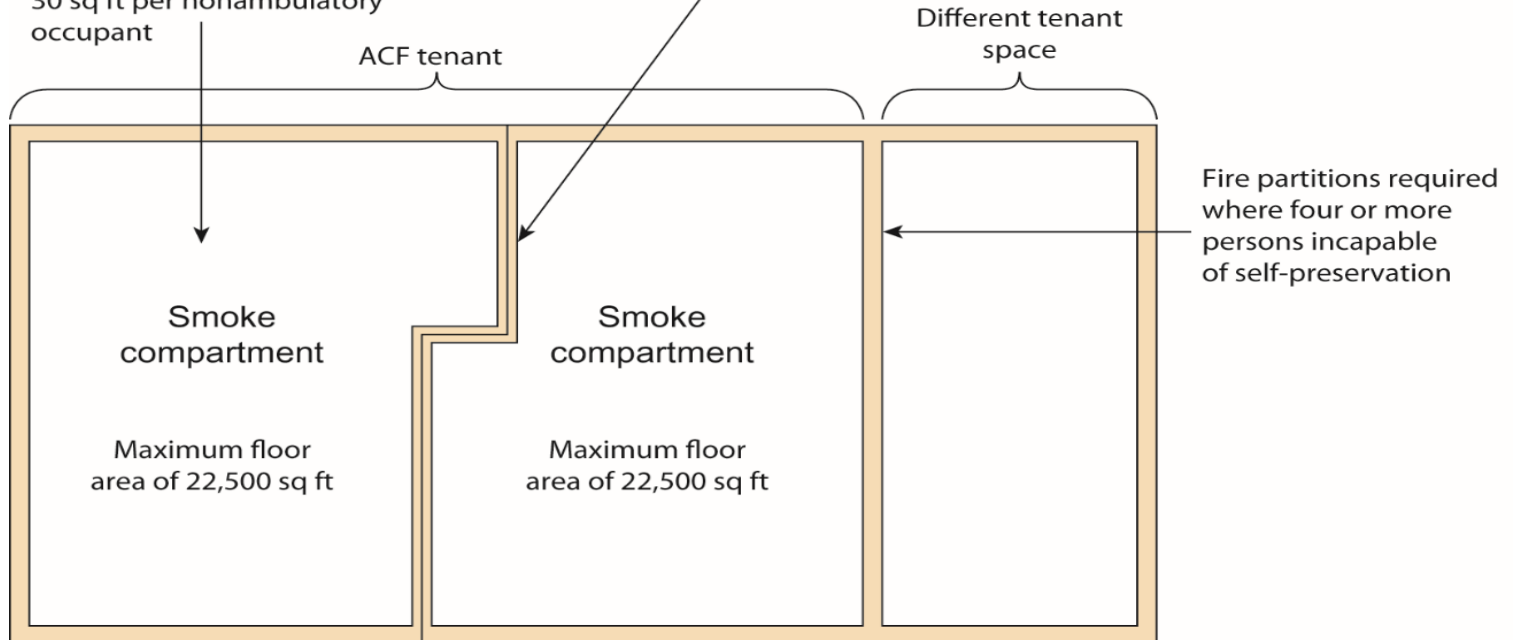
Incomplete
smoke
barrier

Ambulatory Care Facilities - §422

Where smoke barrier is required:

- Travel to smoke barrier door limited to 200 ft
- Refuge areas required based on 30 sq ft per nonambulatory occupant

Smoke barrier per Section 709 required on story where facility exceeds 10,000 sq ft



- Facility to be sprinklered where (Section 903.2.2):
 - Four or more persons are incapable of self-preservation, or
 - Any persons incapable of self-preservation are located at other than level of exit discharge
- Manual fire alarm system required (Section 907.2.2.1)
 - Alarm boxes not required where building is fully sprinklered and notification appliances activate upon sprinkler water flow

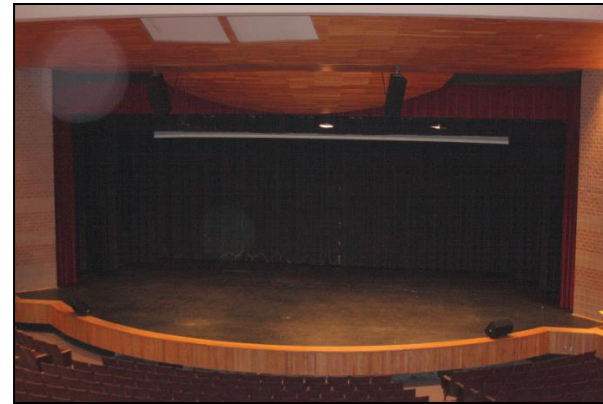


Module 10

Special Building Features

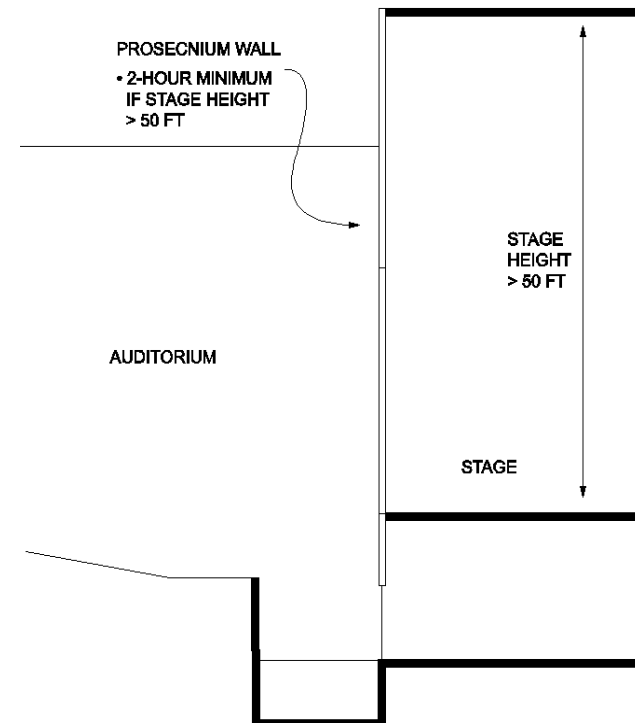
Stage Proscenium Wall - §410.3.4

- Where the stage height **>50'**, all portions of the stage shall be **separated** from the seating area by a proscenium wall with a minimum **2-hour** rating, extending from the foundation to the roof (fundamentally a fire barrier)



Stage Proscenium Wall - §410.3.4

- Proscenium opening to be **protected** by a fire curtain or other acceptable method



Stage Support Areas Separation - §410.5.1

- The stage shall be **separated** from support areas, such as dressing rooms, workshops and storerooms, by fire barriers and/or horizontal assemblies:
 - Minimum **2-hour** separation required for stage heights **>50'**
 - Minimum **1-hour** separation required for stage heights of **≤50'**

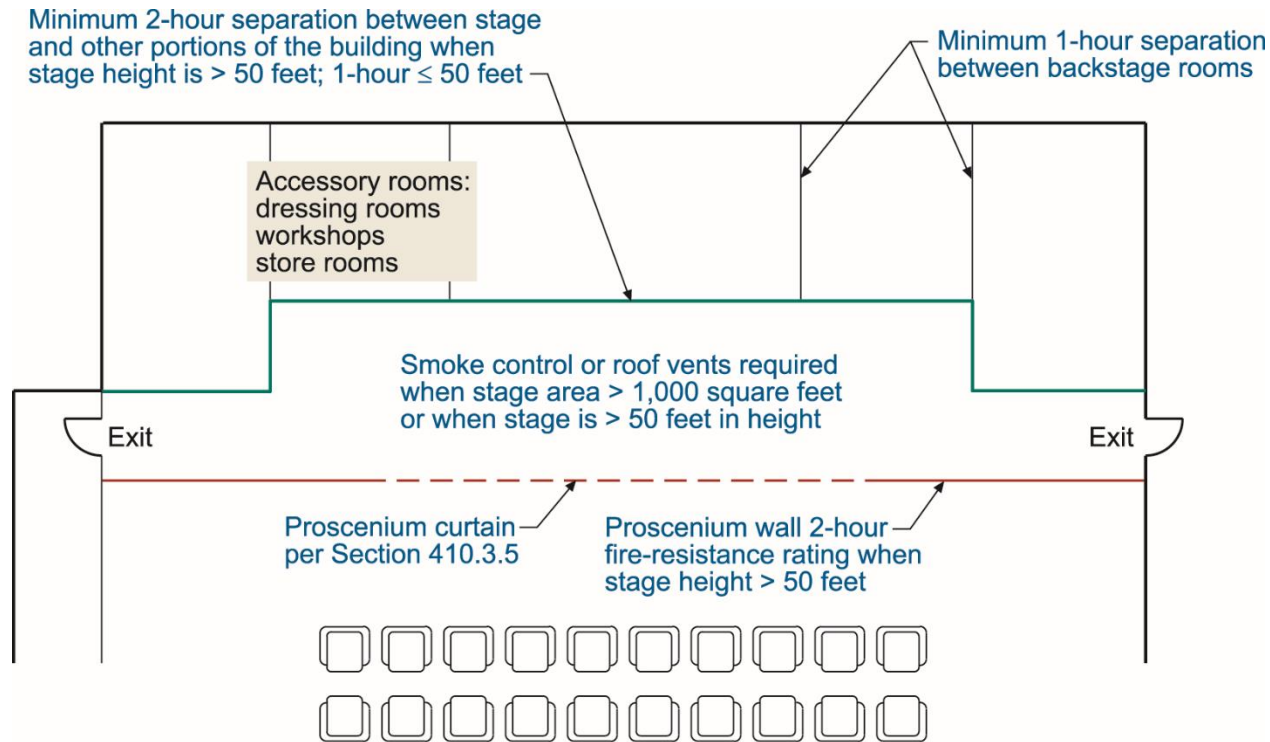


Stage Support Areas Separation - §410.5.2

- Support areas, such as dressing rooms, workshops and storerooms, shall be **separated** from each other by fire barriers and/or horizontal assemblies
 - Minimum **1-hour** separation required



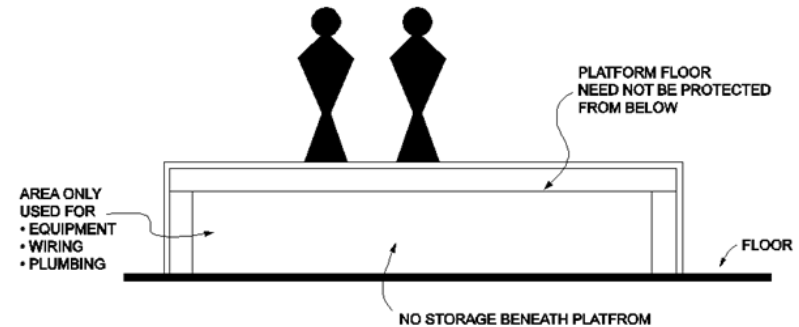
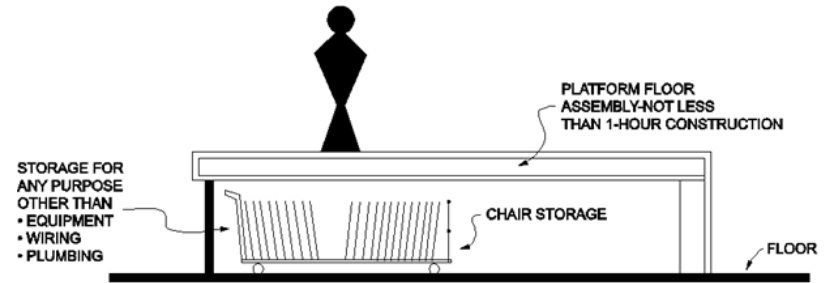
Stages - §410.3



Finished floor of all stages may be wood
Stage required to be constructed as required for the building

Platform Construction - §410.4

- Where space beneath a permanent platform is used for storage, or any other purpose other than equipment, plumbing or wiring, the floor assembly shall be at least **1-hour** construction



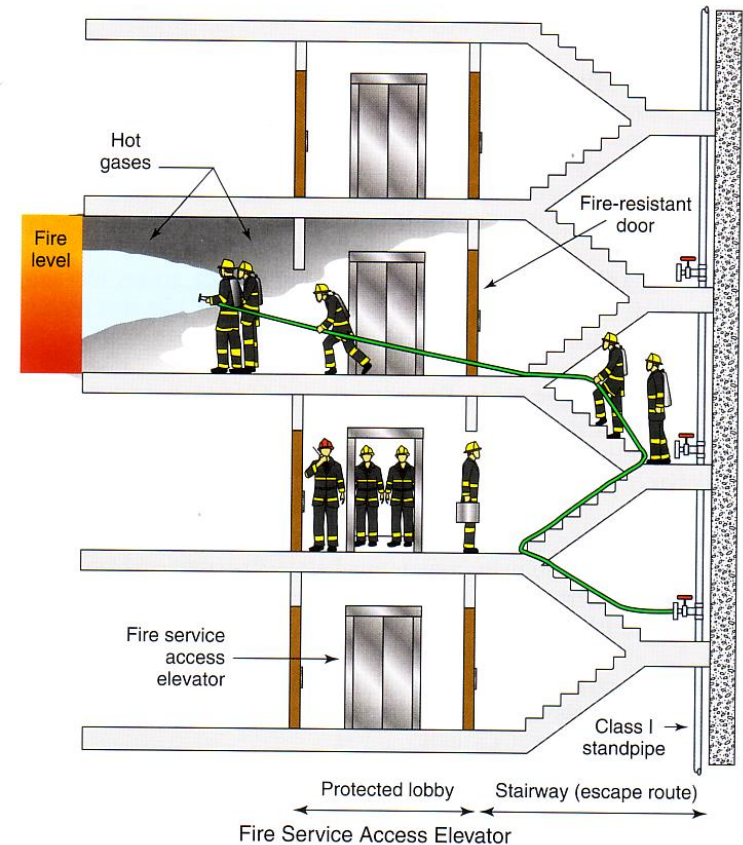
Elevator Machine Rooms - §3005.4

- Elevator machine rooms and spaces shall be **enclosed** with fire barriers and/or horizontal assemblies
 - The fire-resistance rating shall be not less than the required rating of the hoistway enclosure served by the machinery



Fire Service Access Elevator Lobby - §3007.6.2

- In high-rise buildings provided with fire service access elevators, the elevator shall be provided with a lobby **enclosed** by a smoke barrier
 - Elevator lobbies are not required at the level of exit discharge



Occupant Evacuation Elevator Lobby - §3008.6.2

- In high-rise buildings **provided** with occupant evacuation elevators, the elevator shall be provided with a lobby enclosed by a smoke barrier
 - Elevator lobbies are not required at the level of exit discharge



Pedestrian Walkways - §3104.5

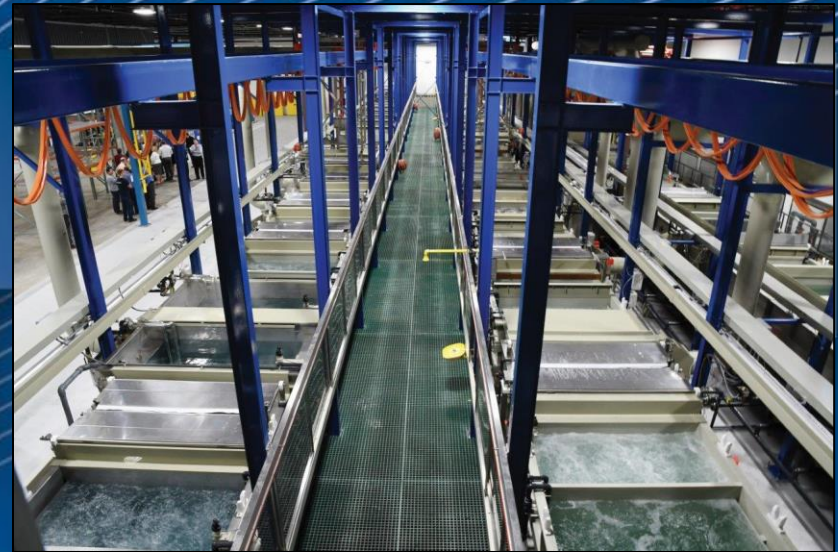
- Pedestrian walkways shall be **separated** from the interior of the attached buildings by minimum **2-hour** fire barriers and/or horizontal assemblies
 - An **alternate** separation method addresses the walkway/building connections, including the use of a tempered, wired or laminated glass wall



Tunnels - §3104.10

- **Separation** between a tunneled walkway and the building to which it is connected shall be not less than **2-hour** fire-resistant construction





Module 11

Hazardous Uses

Combustible Storage - §413

- Attic, under-floor and concealed spaces used for storage of combustible materials must be **protected** on the storage side as required for **1-hour** fire-resistance-rated construction
 - **Not** required for sprinklered spaces or in Group R-3 and U occupancies

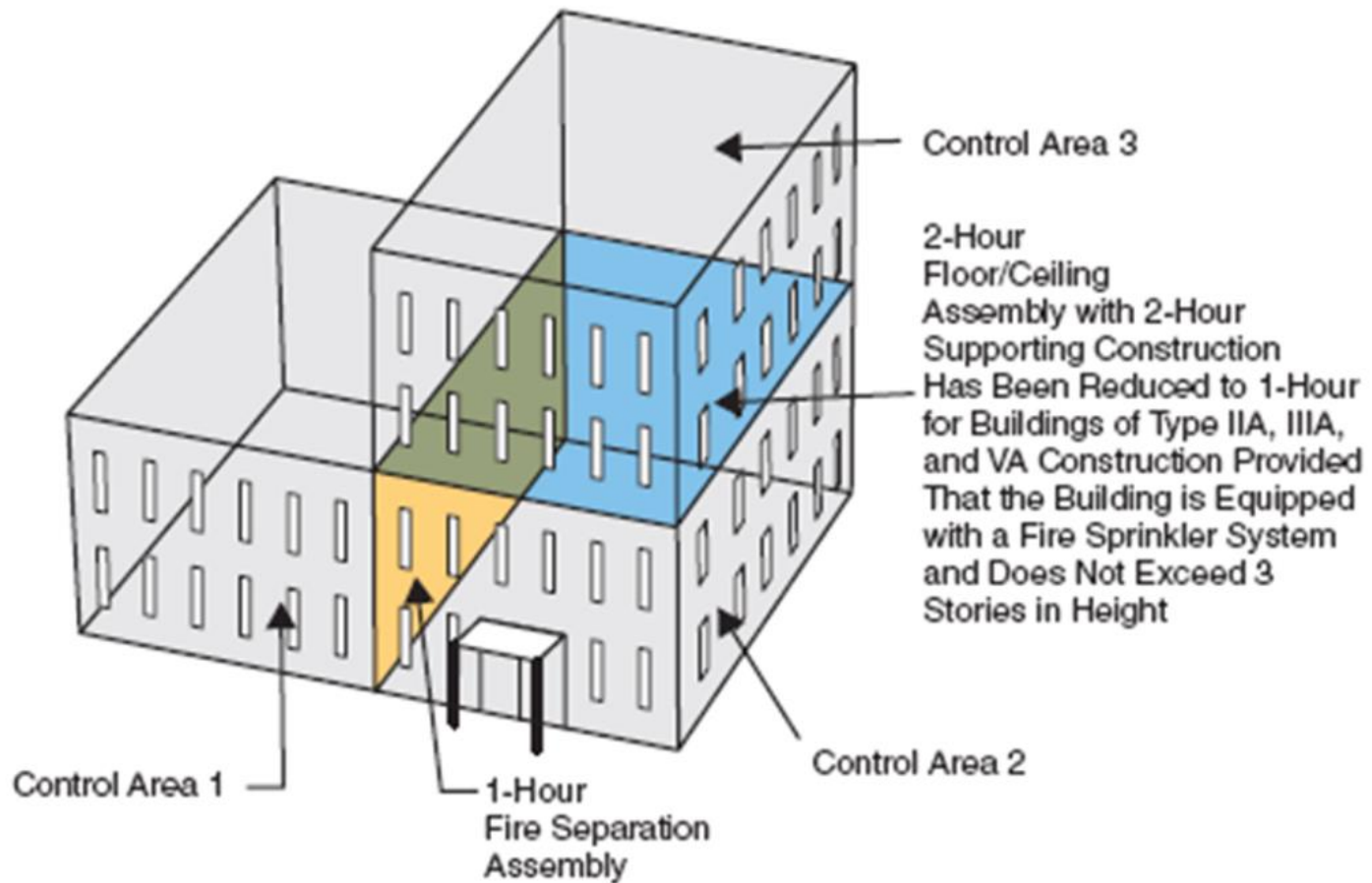


Control Areas - §414.2.4

- Where control areas are provided for the use or storage of hazardous materials, they shall be **separated** by fire barriers in accordance with **Table 414.2.2**
- The floor assemblies separating control areas shall be minimum **2-hour** horizontal assemblies
 - **Exception** permits **1-hour** assemblies under specified conditions



Control Areas - §414.2.4



Control Areas - Table 414.2.2

[F] TABLE 414.2.2 DESIGN AND NUMBER OF CONTROL AREAS				
FLOOR LEVEL		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA ^a	NUMBER OF CONTROL AREAS PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS ^b
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed



Grinding Rooms - §426.1.2

- Rooms used for grinding or other operations that produce combustible dusts shall be **enclosed** with fire barriers and/or horizontal assemblies
- The required fire-resistance rating is based on the floor area of the room:
 - **2 hours** where $\leq 3,000$ sq.ft.
 - **4 hours** where $> 3,000$ sq.ft.



Group H-3 and H-4 Gas Rooms - §415.10.2

- Where Group H-3 or H-4 rooms are provided, they shall be **separated** from other areas by minimum **1-hour** fire barriers and/or horizontal assemblies



Highly Toxic Solids and Liquids - §415.10.4

- Where highly toxic solids and liquids are not stored in approved hazardous materials storage cabinets, they shall be **isolated** from other hazardous material storage by minimum **1-hour** fire barriers and/or horizontal assemblies



Group H-5 Fabrication Areas - §415.11.1.2

- Fabrication areas in Group H-5 occupancies shall be **separated** from each other, from corridors and from other parts of the building by minimum **1-hour** fire barriers and/or horizontal assemblies



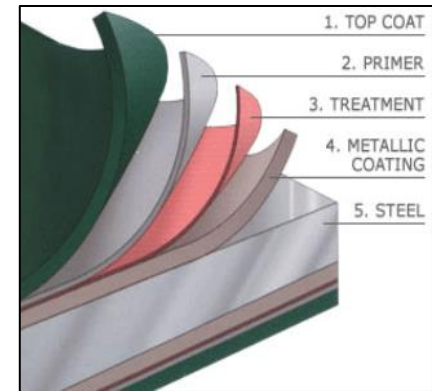
Flammable Finish Spray Rooms - §416.2

- In buildings used for the application of flammable finishes, spray rooms shall be **enclosed** with minimum **1-hour** fire barriers and/or horizontal assemblies



Manufacturing of Organic Coatings - §418

- In buildings used for the manufacture of organic coatings, a variety of fire **separations** are required using fire barriers and/or horizontal assemblies:
 - Storage areas for flammable and combustible liquid tanks: **2 hours**
 - Nitrocellulose storage rooms: **2 hours**
 - Storage rooms for finished products that are flammable or combustible liquids: **2 hours**
- The manufacture of organic coatings encompasses operations that produce decorative and protective coatings for architectural uses, industrial products and other specialized purposes



Questions?



Thank you for your attendance.



Roger Axel, CBO
raxelcodeguy@gmail.com
952-217-2307





Final Reflection

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

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