

Welcome to the

2018 Annual Conference Educational Sessions

Session: 2018 IBC Essentials – Means of Egress & Fire Protection

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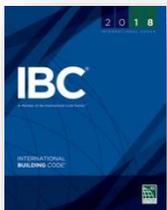
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2018 IBC Essentials Means of Egress and Fire Protection

Based on the 2018 International Building
Code[®] (IBC[®])

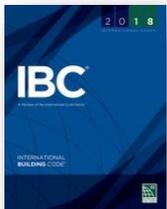
Description

- This seminar focuses on the basic concepts of the 2018 *International Building Code*[®] (IBC[®]).
- Concepts provide a basis for the correct utilization of the code.
- A clear understanding of the identified requirements allows the code user to apply the IBC in specific situations and helps to build an understanding of the intent of the code when asked to make a judgment on code compliance.



Goal

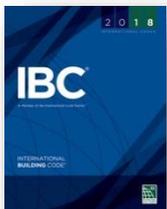
- The goal of this seminar is for participants to identify the critical concepts and code provisions pertaining to means of egress and fire protection provisions in the IBC regarding the applicable designs of commercial buildings requirements.

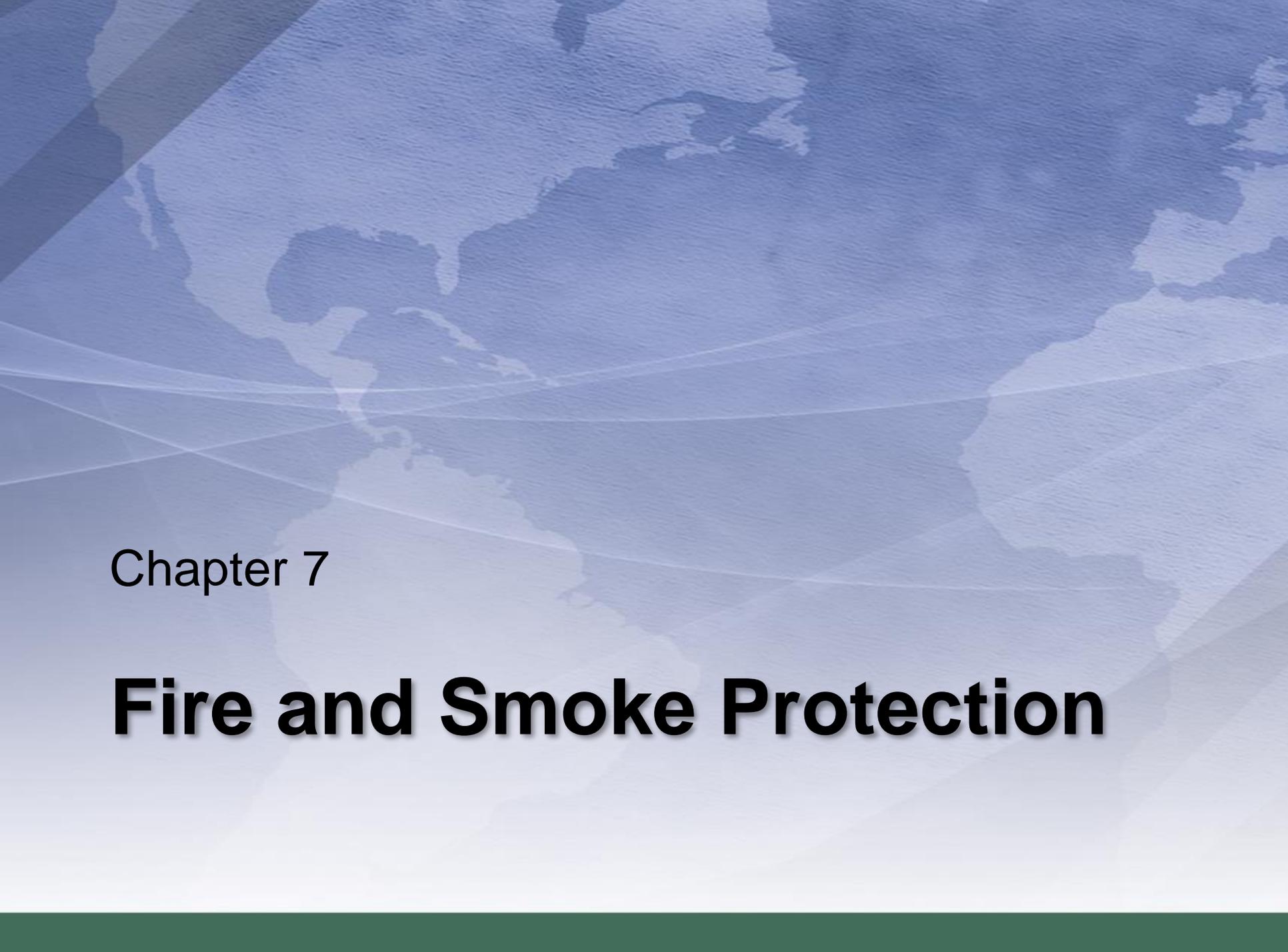


Objectives

Upon completion, participants will be better able to:

- Explain the fundamental concepts of the 2018 IBC.
- Describe the common provisions applicable to design of commercial buildings.
- Describe the use of passive and active fire protection.
- Identify how life safety and egress issues are addressed in design and construction.

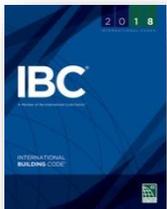
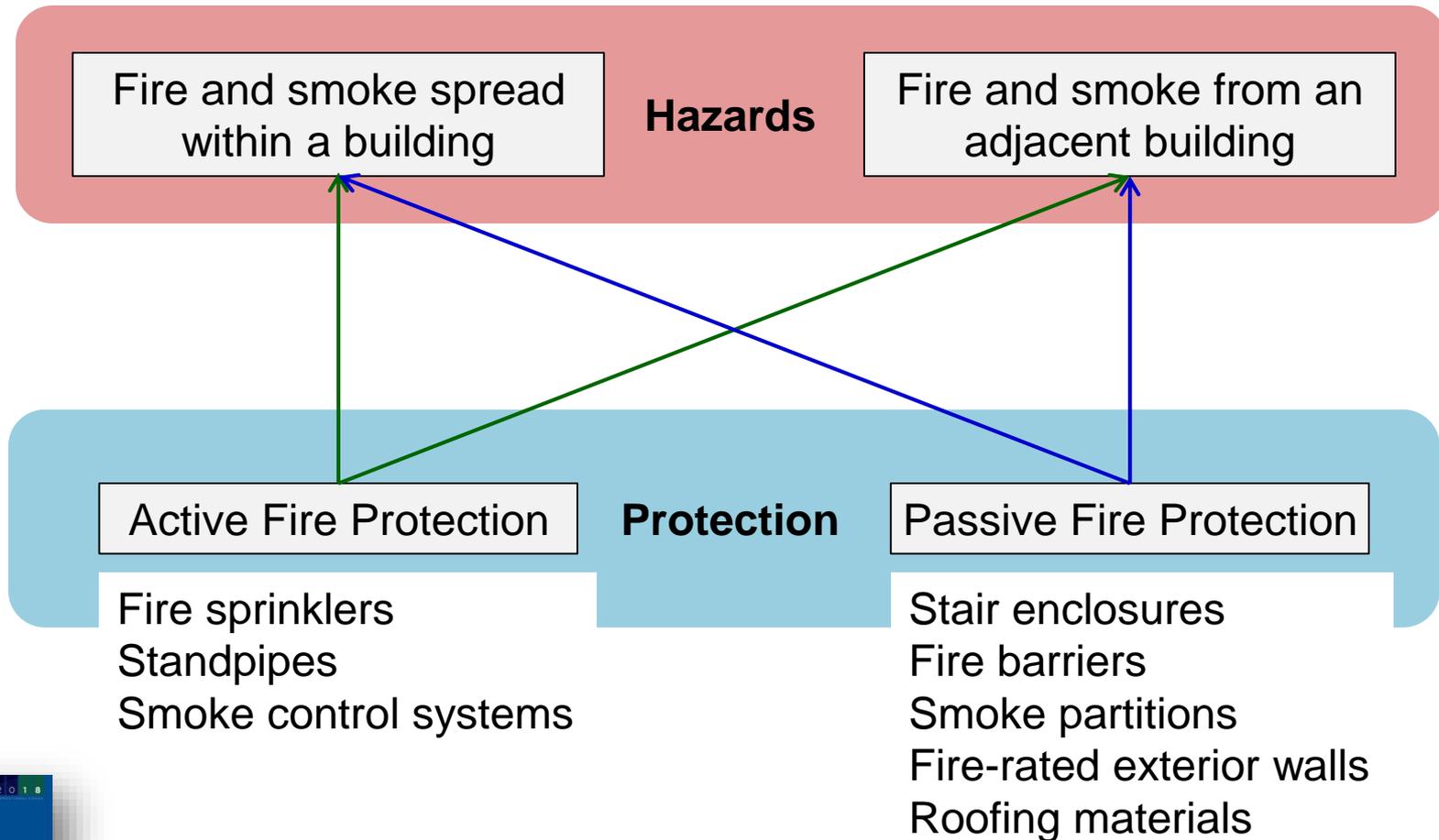




Chapter 7

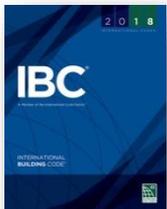
Fire and Smoke Protection

Spread of Fire and Smoke

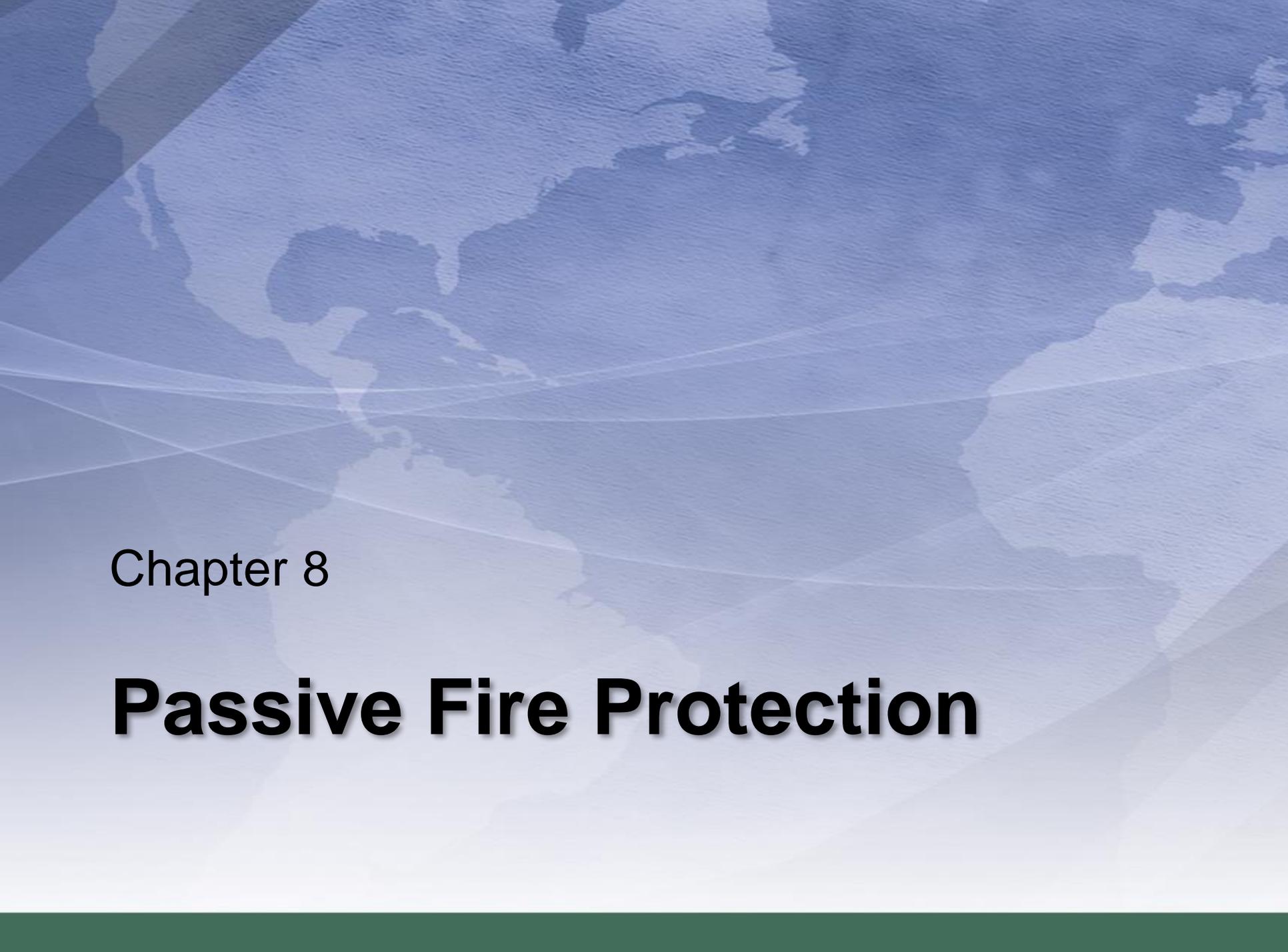




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2018 IBC Essentials

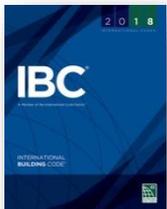


Chapter 8

Passive Fire Protection

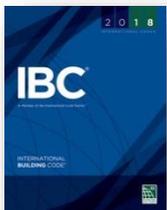
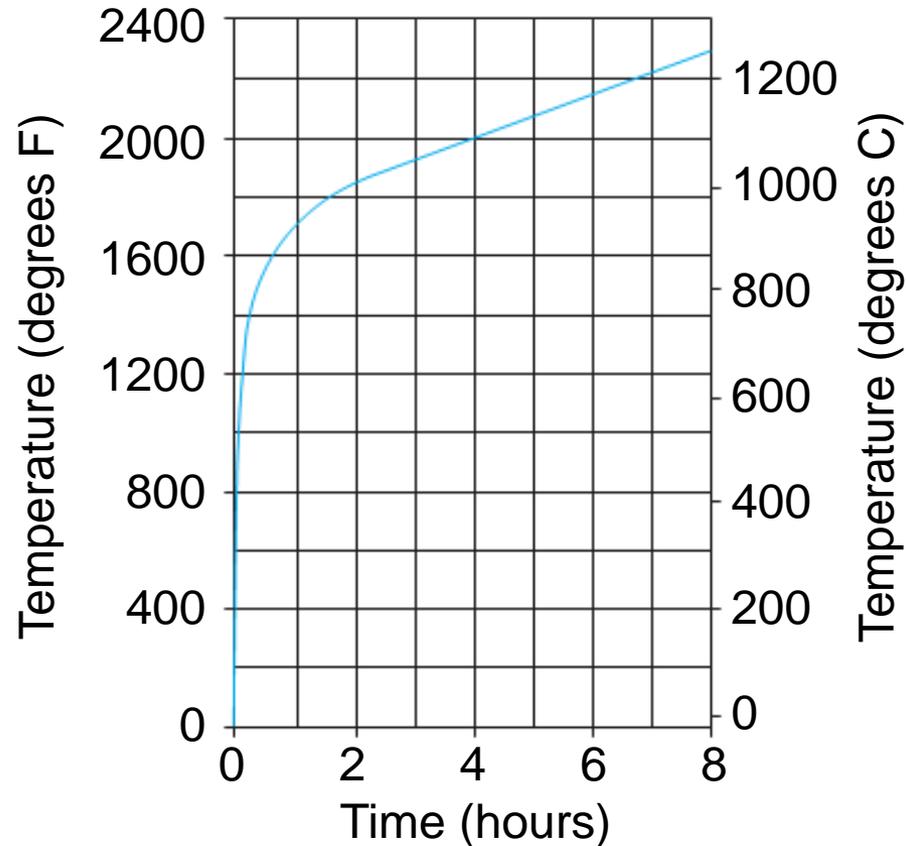
Determining Fire-resistance

- Fire testing of assemblies and materials
- Prescriptive design – Section 721
- Fire-resistance rating can be calculated based on specific materials



Fire Testing

- Provides relative comparison between different construction methods and materials
- Based on standard Time-Temperature Curve
 - UL 263
 - ASTM E119

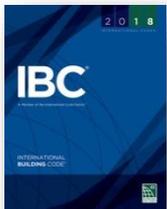


Fire-resistance Ratings – Table 721.1(2)

Material	Item Number	Construction	Minimum Finished Thickness Face-to-Face (inches)			
			4 hour	3 hour	2 hour	1 hour
13. Noncombustible studs—interior partition with gypsum wallboard each side	13-1.1	0.018" (No. 25 carbon sheet steel gage) channel-shaped studs 24" on center with one full-length layer of 5/8" Type X gypsum wallboard applied vertically attached with 1" long No. 6 drywall screws to each stud. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud. The wallboard may be applied horizontally when attached to 3 5/8" studs and the horizontal joints are staggered with those on the opposite side. Screws for the horizontal application shall be 8" on center at vertical edges and 12" on center at intermediate studs.	—	—	—	2 7/8

Protection of the Structure

- Primary structural frame members include:
 - Columns
 - Beams, girders and trusses directly attached to columns
 - Floor and roof construction connected directly to columns
 - Bracing members that are designed to support gravity loads
- Secondary members are structural members:
 - Not connected directly to columns
 - Floor and roof construction not connected to columns
 - Bracing members not supporting gravity loads



Protection of Structural Frame

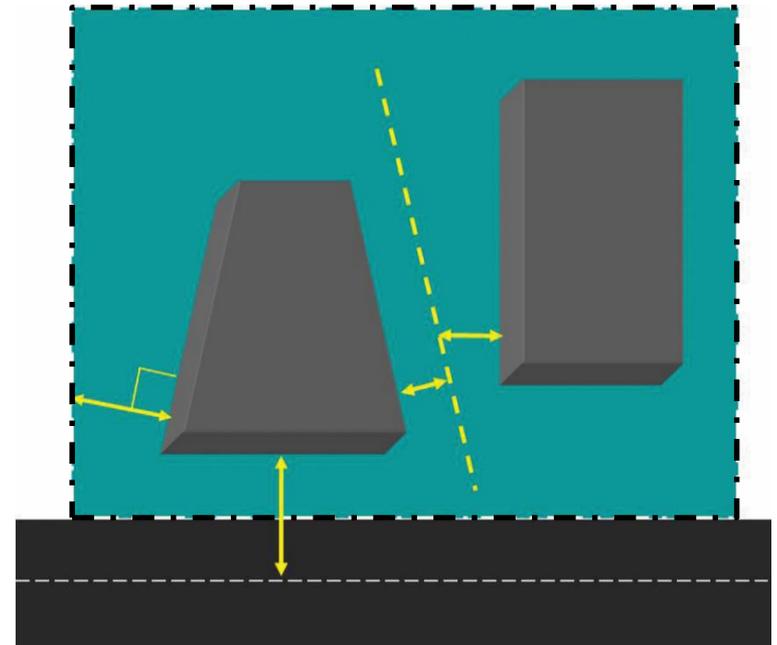
- Masonry and concrete walls encase the steel and provide protection
- When required to provide a fire-resistance rating, exposed steel must be protected

Spray-applied fireproofing



Exterior Walls

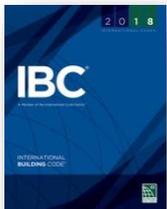
- Fire separation distance
- Table 601 – based on type of construction
- Table 602 – based on distance to property line
- Distances measured at right angles to the building wall



Fire Walls



- A fire wall allows for the structure on each side of the wall is considered a separate building for purposes of determining area and height limitations as well as type of construction.
- Extends from foundation to >30 inches above the roof (some exceptions)
- Must have structural stability
 - Structure on either side can collapse but the fire wall must remain in place for duration of the fire rating



Fire Wall and Opening Ratings

- Openings in fire walls limited to:
 - Individual size <156 square feet
 - Aggregate of 25 percent of the fire wall

Group	Fire-resistance Rating (hours)	Opening Rating (hours)
A, B, E, H-4, I, R-1, R-2, U	3 ^a	3
F-1, H-3 ^b , H-5, M, S-1	3	3 ^c
H-1, H-2	4 ^b	3
F-2, S-2, R-3, R-4	2	1½

a. In Type II and V construction, walls shall be permitted to have a 2-hour fire-resistance rating with 1½-hour openings.

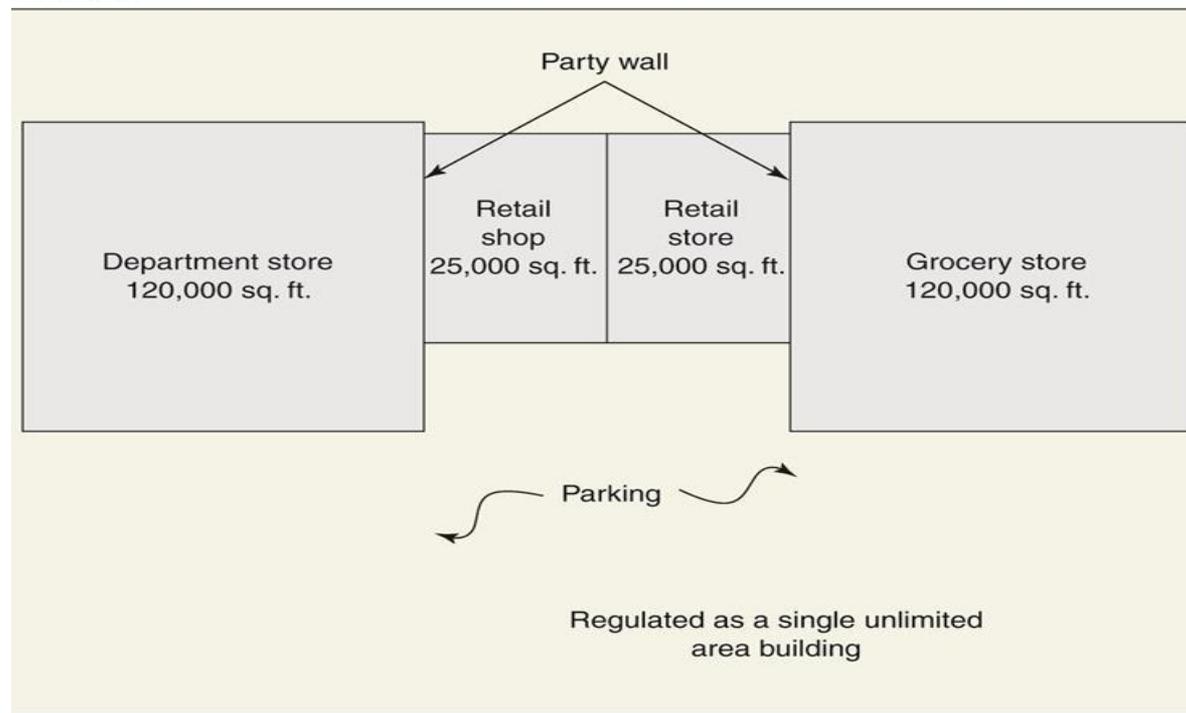
b. For Group H-1, H-2, or H-3 buildings, also see Sections 415.4 and 415.5.



Building Height & Area – 706.1.1

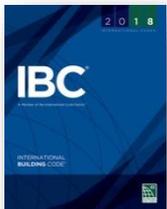
- Fire walls nor party walls, are required to be used on lot lines dividing a building for ownership purposes.

Example:



Fire Barriers

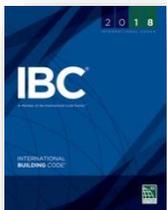
- Examples of fire barrier use:
 - Separated mixed-use occupancy
 - Exit enclosures
 - Separation of fire areas
 - Incidental accessory occupancies
 - Control areas
- Extend from the top of the floor/ceiling assembly to the underside of the floor or roof sheathing above
- Construction and structure supporting a fire barrier must have a fire-resistance rating of equal to or better than the fire barrier



Fire Barrier Opening Ratings

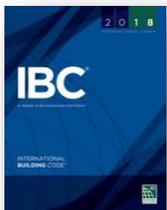
Fire-resistance Rating (hours)	Fire Door/Fire Shutter Rating (hours)
4	3
3	3
2	1½
1	¾ ^a

- a. Openings in shafts, exit enclosures, and exit passageway walls are required to have a 1-hour fire rating.



Fire Partitions

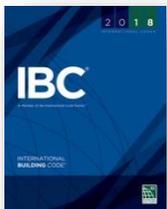
- Provide separation of:
 - Dwelling units in apartments and condominiums
 - Guest rooms in hotels
- Must extend from the floor assembly to either the floor or roof sheathing above, or a fire-resistance-rated floor/ceiling or roof/ceiling assembly



Horizontal Assemblies

- Floor/ceiling assembly
- Roof/ceiling assembly
- Openings in fire-resistance-rated horizontal assemblies must be protected with shaft enclosures
- Vertical openings through horizontal assemblies must be protected to restrict the spread of heat and smoke vertically
 - Several exceptions and protection methods are found in Section 712

Uses: Dwelling separation, exit enclosure, fire area separation, mixed use separation, control area enclosure, smoke barrier enclosure, etc.



Shafts

- Fire-resistance rating for shafts
 - 1-HR fire-resistance rated shaft connecting > 2 stories
 - 2-HR fire-resistance rated shaft connecting ≥ 4 stories
 - 16 exceptions to these requirements found in 712
- Penetrations of shaft wall must be protected with fire dampers



Ductwork
penetrating floor

Penetrations

- Pipes, tubing, conduit, and cables passing through fire assemblies are penetrations
- Through penetrations
 - Passes through entire assembly
- Membrane penetrations
 - Penetrates through one surface



- Listed penetration firestop system shall be installed per manufacturers installation instructions

Opening Protection

- Doors and windows installed in fire-resistance-rated assemblies are required to have a fire protection rating
- Fire door assemblies include the door, frame and all associated hardware



Interior Finishes

Table 803.9

- Flame spread is the propagation of flame over a surface

Group	Sprinklered ^l			Nonsprinklered		
	Exit enclosures and exit passageways ^{a,b}	Corridors	Rooms and enclosed spaces ^c	Exit enclosures and exit passageways ^{a,b}	Corridors	Rooms and enclosed spaces ^c
A-1 & A-2	B	B	C	A	A ^d	B ^e
A-3 ^f , A-4, A-5	B	B	C	A	A ^d	C
B, E, M, R-1	B	C	C	A	B	C
R-4	B	C	C	A	B	B
F	C	C	C	B	C	C
H	B	B	C ^g	A	A	B
I-1	B	C	C	A	B	B
I-2	B	B	B ^{h,i}	A	A	B
I-3	A	A ^j	C	A	A	B
I-4	B	B	B ^{h,i}	A	A	B
R-2	C	C	C	B	B	C
R-3	C	C	C	C	C	C
S	C	C	C	B	B	C
U	No restrictions			No restrictions		

Fireblocking

- Fireblocking is used to separate:
 - Concealed openings within a wall
 - Openings between a wall and floor or attic spaces
 - Floor levels
 - The top floor and the attic
- Required in wall spaces:
 - Vertically at ceiling and floor
 - Horizontally at intervals <10 feet



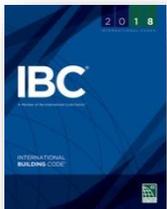
Draftstops

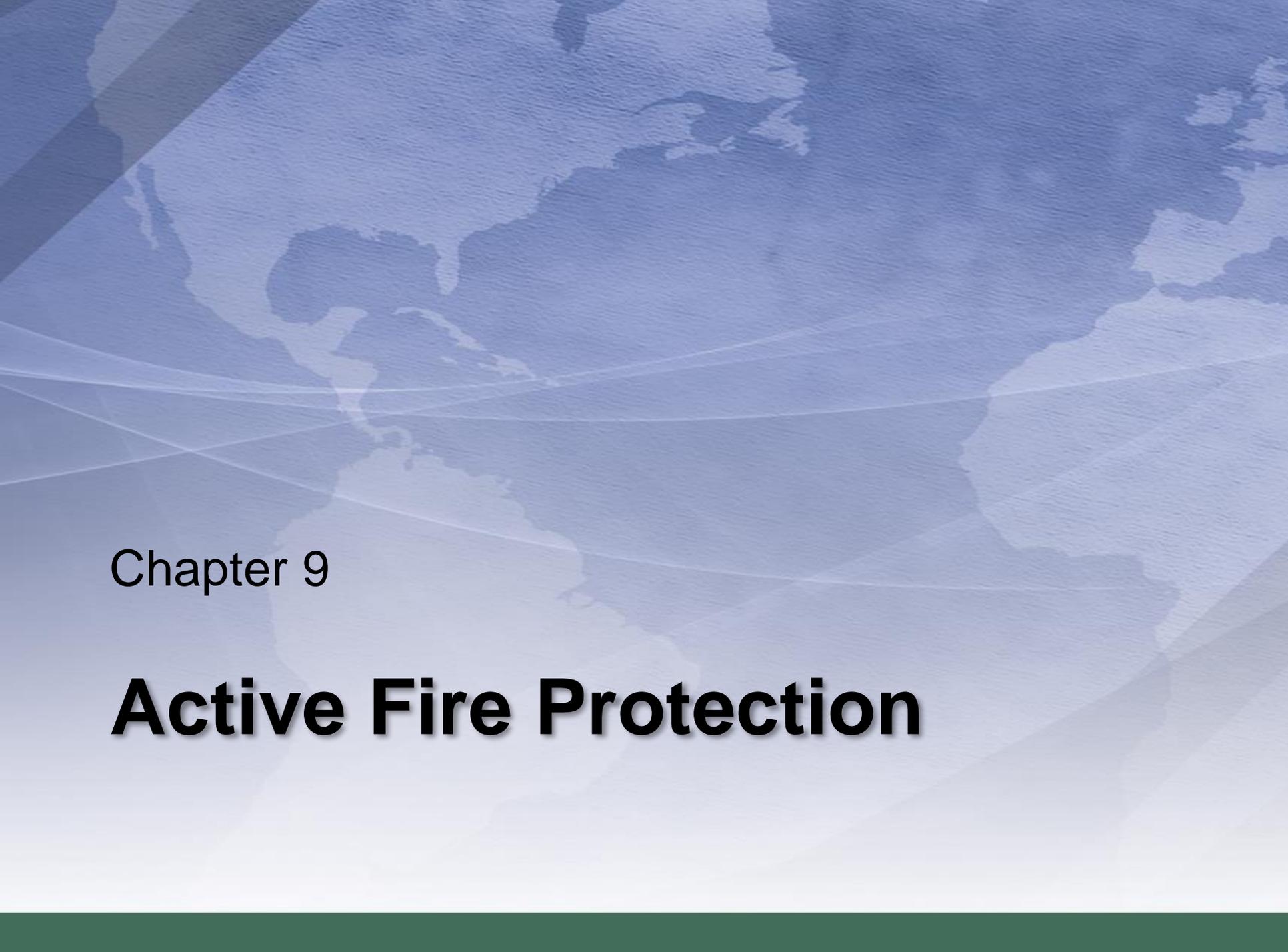
- Required in large concealed floor spaces and attics with combustible construction
- Group R requires draftstops within concealed spaces in line with dwelling unit and guest room separations
- Attics, mansards and concealed roof spaces >3,000 square feet must be subdivided into maximum 3,000 square feet areas
 - Fire sprinklers in these spaces eliminate the draftstop requirement





Need discussion or group activity here.





Chapter 9

Active Fire Protection

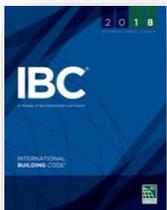
Automatic Fire Sprinklers

- Sprinklers react to heat
- Sprinklers apply water directly to the fire area
- Sprinklers normally operate independently



Automatic Fire Sprinklers – Where Required

- Required based on:
 - Occupancy classification
 - Use or materials handled
 - Number of occupants
 - Size of fire areas
 - Floor level in the building
- Section 903.2 will require sprinklers to be installed in one of the following:
 - Fire area
 - Floor level, plus all floors to the level of exit discharge
 - Entire building



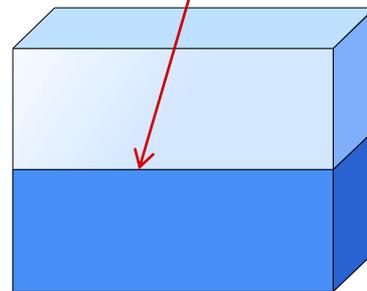
Fire Areas

- Any floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building



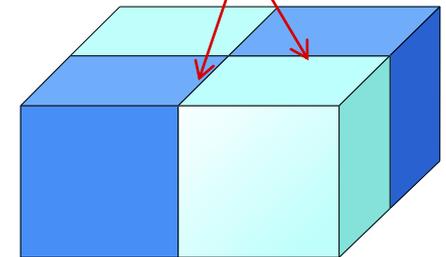
Every building is at least 1 Fire Area

Horizontal Fire-rated Assembly

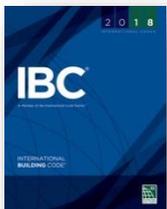


2 Fire Areas created by horizontal assembly

Fire Walls or Fire Barriers



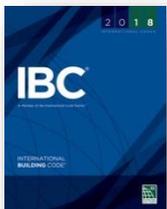
4 Fire Areas created by fire walls or fire barriers



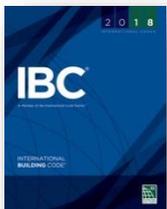
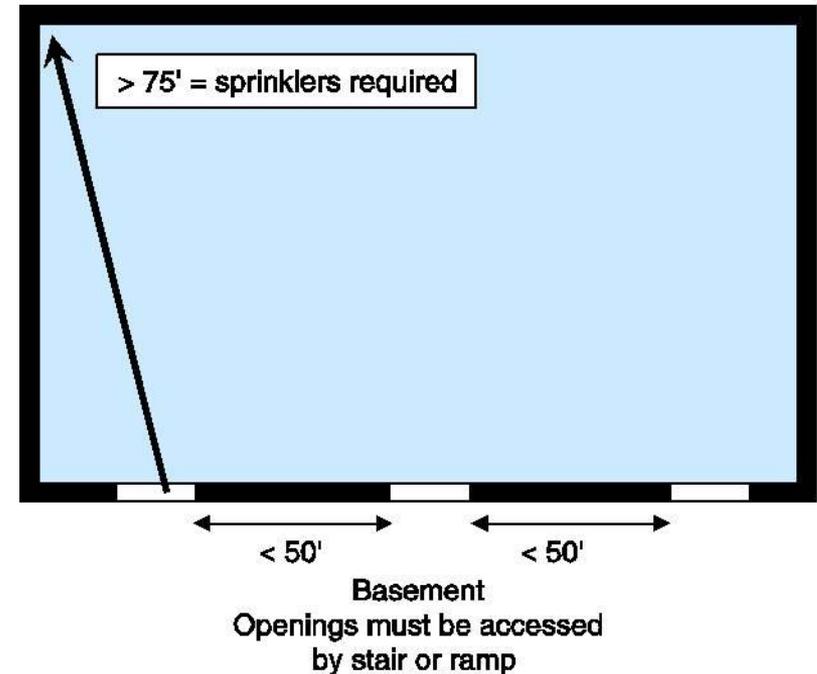
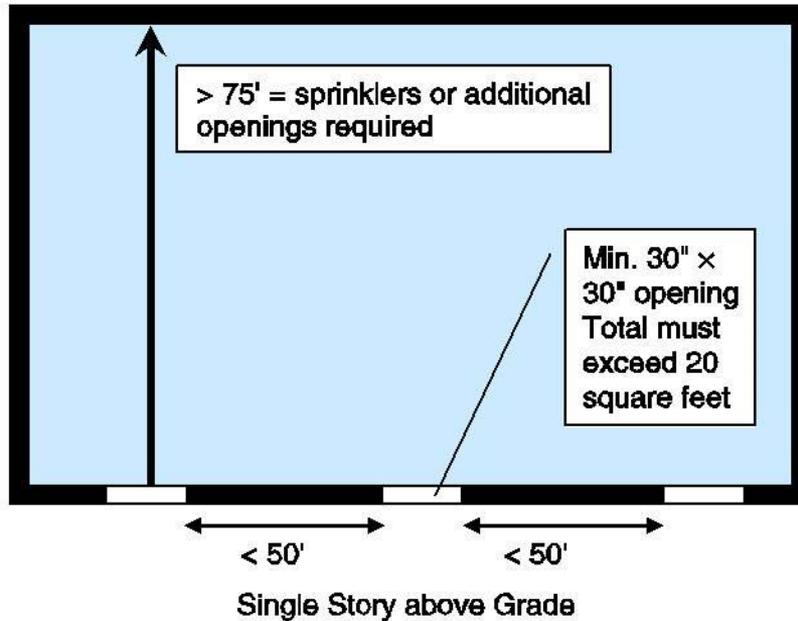
Fire Areas

- Fire Areas are created with fire-resistance-rated construction of 1-hour or greater
- When separating a single occupancy into smaller fire areas to eliminate fire sprinklers, Table 707.3.10 specifies the minimum rating

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

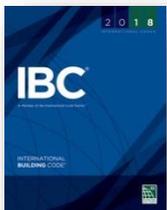


Automatic Fire Sprinklers – Floors without Openings



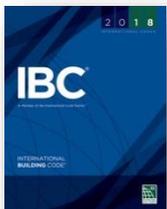
Automatic Fire Sprinklers – Modifications of Code Requirements

- When fire sprinklers are installed in a building, the IBC gives credit, and allows modifications, for the added protection the system provides
- Standards used in the design of sprinkler system
 - NFPA 13
 - NFPA 13R
 - NFPA 13D



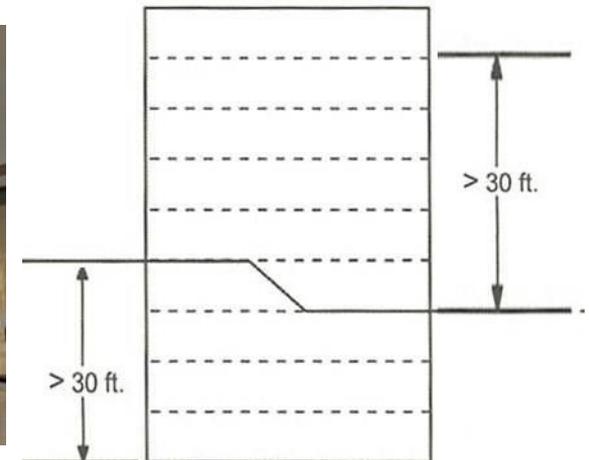
Standpipes

- Standpipe Classes
 - Class I – 2½ inch connection for FD
 - Class II – 1½ inch connection with hose
 - Class III – combination of both I & II
- Standpipe Types
 - Wet standpipe
 - Dry standpipe
- Standpipe system must comply with NFPA 14



Standpipes – Where Required

- In buildings with a floor level:
 - >30 feet above the LLFDVA
 - >30 feet below the HLFDDVA
- Covered malls
- Stages



Fire Alarm Systems

- Alarm activation
 - Manual
 - Automatic
- Required based on
 - Occupancy classification
 - Occupant load
 - Floor level
 - Operations conducted
 - Materials handled
- Fire alarms must comply with NFPA 72

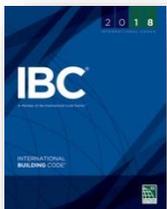


Fire Alarm Systems

- Occupant notification
 - Audible
 - 15 dBA above ambient
 - 5 dBA above max 60 second sound level
 - Maximum 110 dBA
 - Visual
 - Public and common areas
 - Emergency voice/alarm communication system
 - Provide voice instructions

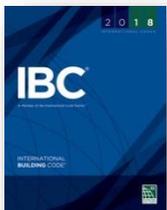


Courtesy of Cooper Notification, Inc.



Smoke Alarms

- Smoke alarms include the detector, control equipment, and alarm-sounding device in a single unit
- Multiple smoke alarms are interconnected so when one device senses smoke, all of the devices sound an alarm
- Smoke alarms are required in:
 - R-1 – sleeping areas, egress path and each floor
 - R-2, R-3, R-4, I-1 – sleeping rooms, common area outside of sleeping rooms and each floor



Smoke Control Methods

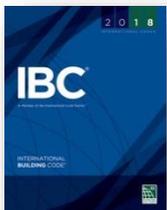
- Smoke barriers
 - Restrict the passage of smoke
 - 1-HR fire-resistance rated
- Smoke-protected assembly seating
- Smoke control system
 - Mall or atrium with 3 levels
 - Underground buildings



Cross corridor doors as part of smoke barrier held in place with magnetic hold-open device released by smoke detectors or fire alarm

Carbon Monoxide Alarms

- Group E, I-1, I-2, I-4 and R occupancies must be provided with CO alarms when:
 - The building contains a fuel-burning appliance
 - The building includes an attached garage
- Listed in accordance with UL 2034 AND UL 217
- CO alarms must be installed in the following locations:
 - Outside of each separate dwelling-unit sleeping area in the immediate vicinity of the bedrooms
 - On every level of a dwelling unit that can be occupied, including basements but excluding attics and crawl spaces





Fire Safety

1. T F A 3-HR fire-resistance rated fire wall is required to separate two Group M occupancies.

True

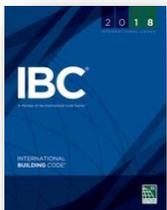
IBC Table 706.4; Workbook Table 8-6

2. A door in a 2-HR fire-resistance rated fire barrier must have a minimum fire-resistance rating of

_____ .

1½-HR

IBC Table 716.5; Workbook Table 8-7





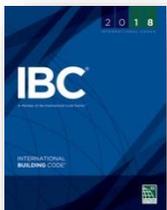
Fire Safety

3. The flame spread rating of interior finishes placed into the corridor of a sprinklered Group A-2 restaurant must be at least Class _____ .

B
IBC Table 803.9

4. T F Fire area, rather than building area, is used to determine the size of occupancies when fire sprinklers are required.

True
IBC §903.2

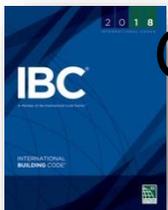




Fire Safety

5. Fire sprinklers may be required based on which of the following criteria?
- A. Occupancy classification
 - B. Use or materials handled
 - C. Number of occupants
 - D. Size of fire areas
 - E. Floor level in the building
 - F. Any of the above
 - G. None of the above

F
IBC §903.2





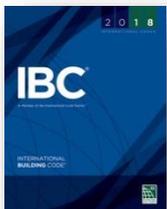
Fire Safety

6. T F A Group I-1 Assisted Living Facility with an attached garage must be equipped with both smoke alarms and carbon monoxide alarms?

True

IBC §907.2.11.2 – smoke alarms

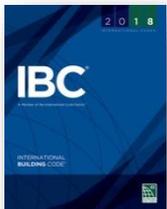
IBC §908.7 – CO alarms

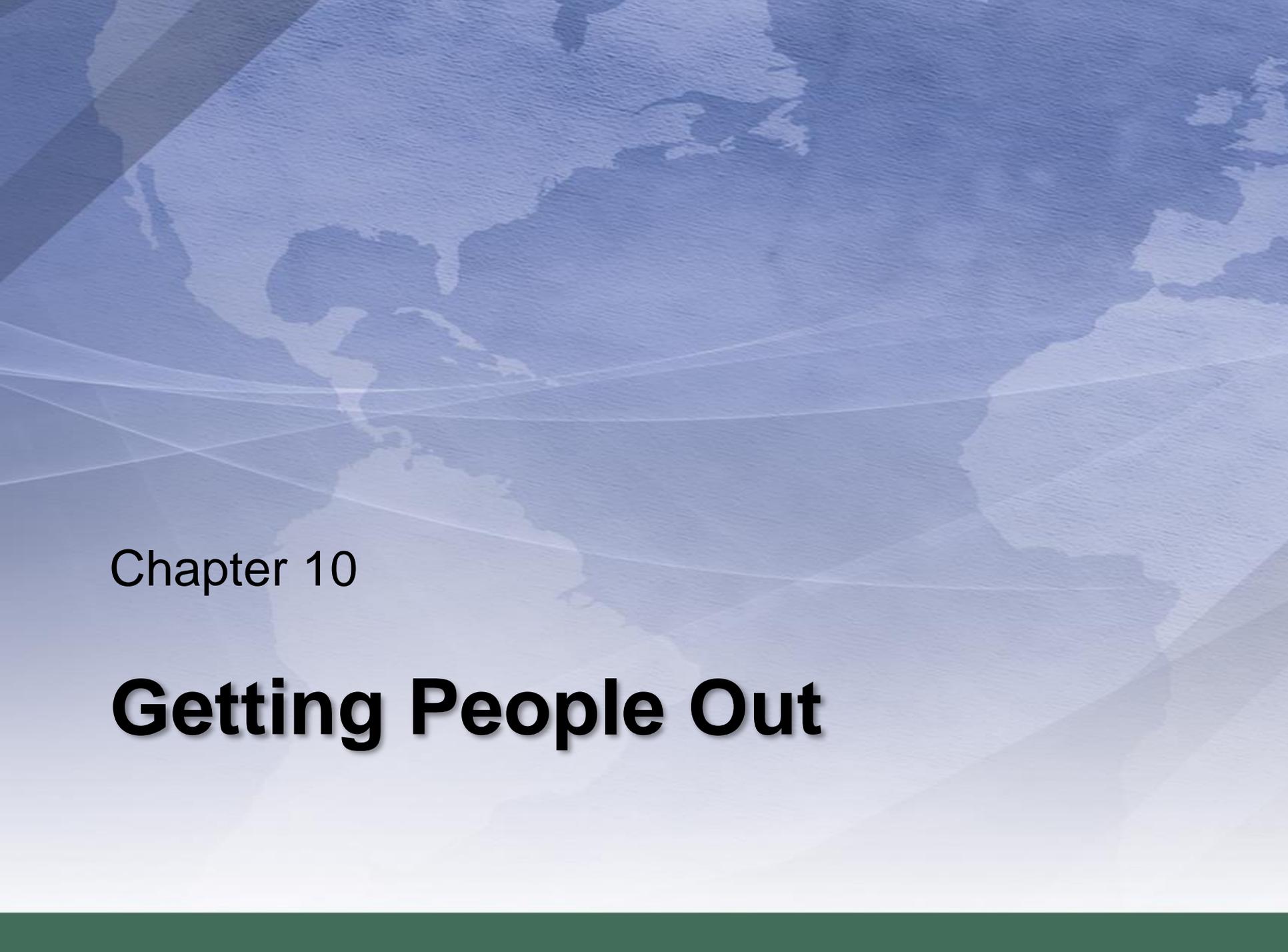




Fire Protection Systems Practice

- Any questions regarding the practice?



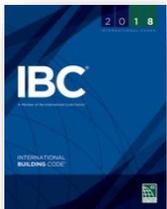


Chapter 10

Getting People Out

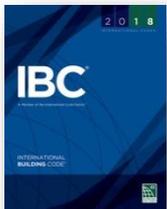
Design of Exit System

- The potential number of people in a building is determined by calculating the design occupant load
 - Areas without fixed seating
 - Occupant load factor from Table 1004.5
 - Gross floor area is the entire floor area within the exterior walls, exclusive of vent shafts and courts
 - Net floor area is the actual occupied area within the exterior walls



Design of Exit System

- Areas with fixed seating
 - Occupant load is based on the number of fixed seats installed
 - Benches/pews for sitting or viewing = 18 inches per person
 - Benches for dining = 24 inches per person
- Areas with BOTH fixed seating and non-fixed seating





Occupant Load Calculation

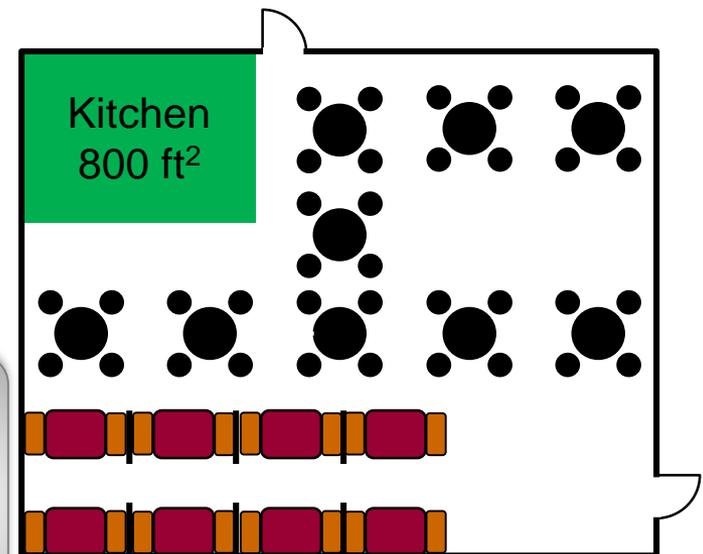
- Given:
 - Restaurant with 5,000 square feet of area of tables and chairs
 - 8 booths 6 feet wide each
 - 800 square feet kitchen

$$\text{Kitchen: } 800 \div 200 = 4$$

$$\text{Dining Area: } 5,000 \div 15 = 334$$

$$\begin{aligned} \text{Booths: } 6' \div 24'' &= 3/\text{bench} \\ 3 \times 16 &= 48 \end{aligned}$$

$$\begin{array}{r} 4 \\ 334 \\ + 48 \\ \hline 386 \end{array}$$



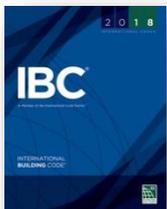
Exits from Spaces

- Each room or space is evaluated
- Exit access is 1st portion of egress system
- Minimum of 2 exits required
- Table 1006.2.1 allows one exit

Table 1006.2.1
Spaces with One Exit or Exit Access Doorway

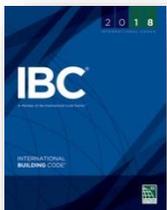
Occupancy	Maximum Occupant Load
A, B, E ^a , F, M, U	49
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4, R	10
S	29

a. Day care maximum occupant load is 10.



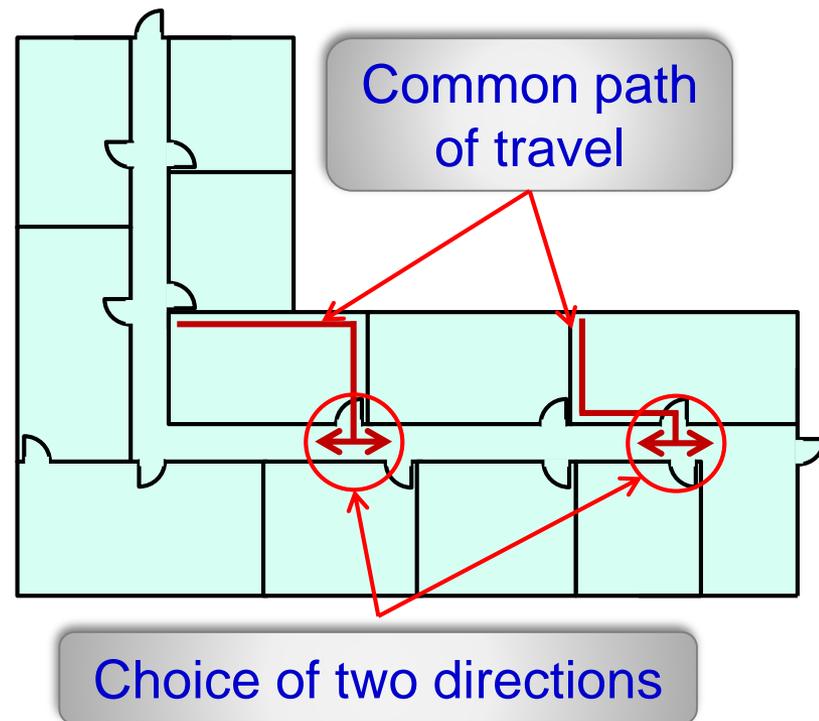
Number of Exits

- Additional exits or exit access doorways may be required
 - Occupant load is 501 to 1,000 requires a minimum of 3 exits or exit access doorways
 - Occupant load exceeds 1,000 requires at least 4 exits or exit access doorways
- Each room or space is evaluated
- Each floor is evaluated
- The building is evaluated



Common Path of Egress Travel

- Maximum of 75 feet for most occupancies
 - 25 feet for H-1, H-2 and H-3
 - 100 feet for sprinklered B, F or S
 - 100 feet for B, F or S with occupant load ≤ 30
 - 125 feet for sprinklered R-2
 - 100 feet for I-3



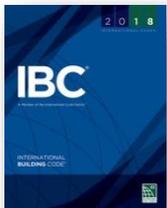
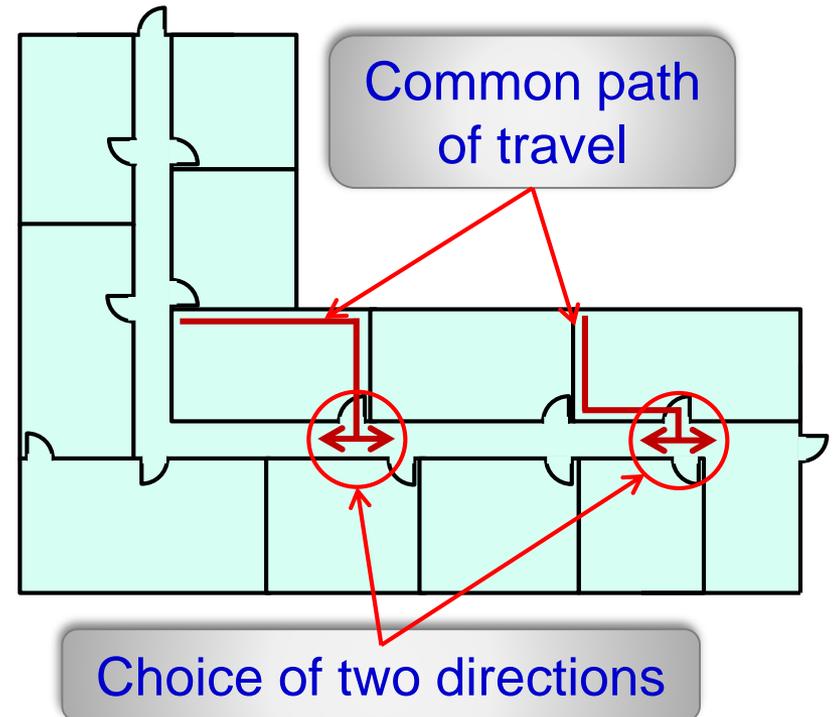
Common Path of Egress Travel

Without sprinkler system (feet)

Occupancy	Occupant load		With sprinkler system ^a (feet)
	OL ≤ 30	OL ≥ 30	
A, E, M	75	75	75
B	100	75	100
I-1, I-2, I-4	NP	NP	75
R-2	NP	NP	125
S ^b	100	75	75

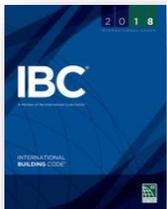
NP = Not permitted.

- Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
- The length of common path of egress travel distance in a Group S-2 open parking garage shall be not more than 100 feet.



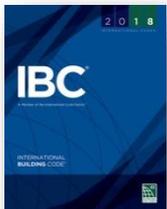
Exit

- An “exit” is where the occupant has either:
 - Left the building; or
 - Entered a protected egress path, such as a:
 - Stair enclosure
 - Exit passageway
 - Horizontal exit



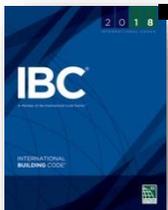
Exit Discharge

- The portion of the egress system from the exit to a public way
- Must be at grade or provide direct access to grade
- Occupants must be able to directly access the public way without obstructions



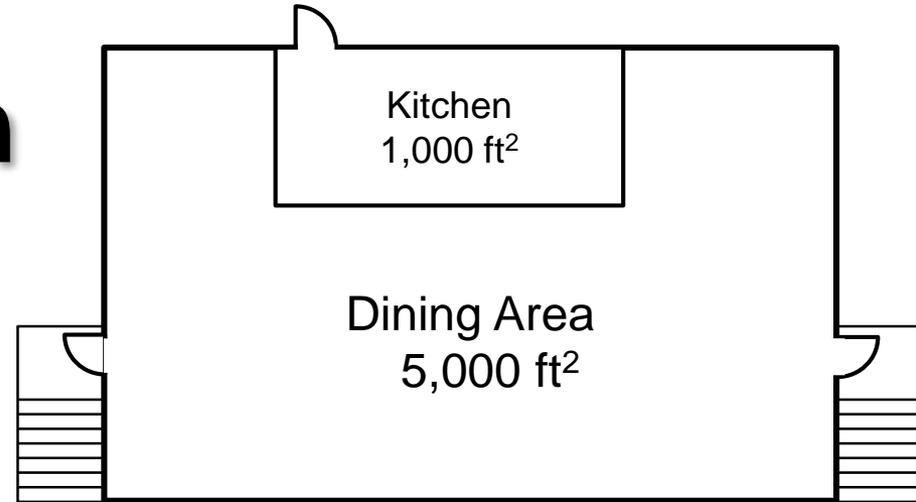
Making it Wide Enough

- The width of the means of egress doors, corridors, and other egress paths, other than stairways, is calculated by multiplying the occupant load by 0.2 inches
- The width of stairs is based on 0.3 inches per occupant
- The width must be arranged so that if one of the paths is lost, the total width is not reduced by more than 50 percent
- These widths must then be maintained to the public way
- Widths can be reduced to 0.2 inches for stairs and 0.15 inches for other locations if the building is equipped with an:
 - Automatic fire sprinkler system
 - Emergency voice/alarm communication system





Exit Width Calculation



- **Given:** Restaurant with 5,000 square feet dining area
- Determine Dining Occupant Load:

$$5,000 \div 15 \text{ ft}^2/\text{occupant} = 334 \text{ occupants}$$

- Determine exit path width:

$$334 \times 0.2''/\text{occupant} = 66.8''$$

Minimum 2 exits required
Clear door width $\geq 34''$
2 doors = 68''

- Determine stair width:

$$334 \times 0.3''/\text{occupant} = 100.2''$$

2 stairs $\geq 50.1''$ width = 100.2''

- Add Sprinklers and Emergency Communication System

$$334 \times 0.15''/\text{occupant} = 50.1''$$

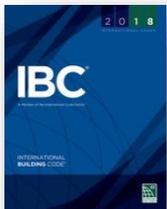
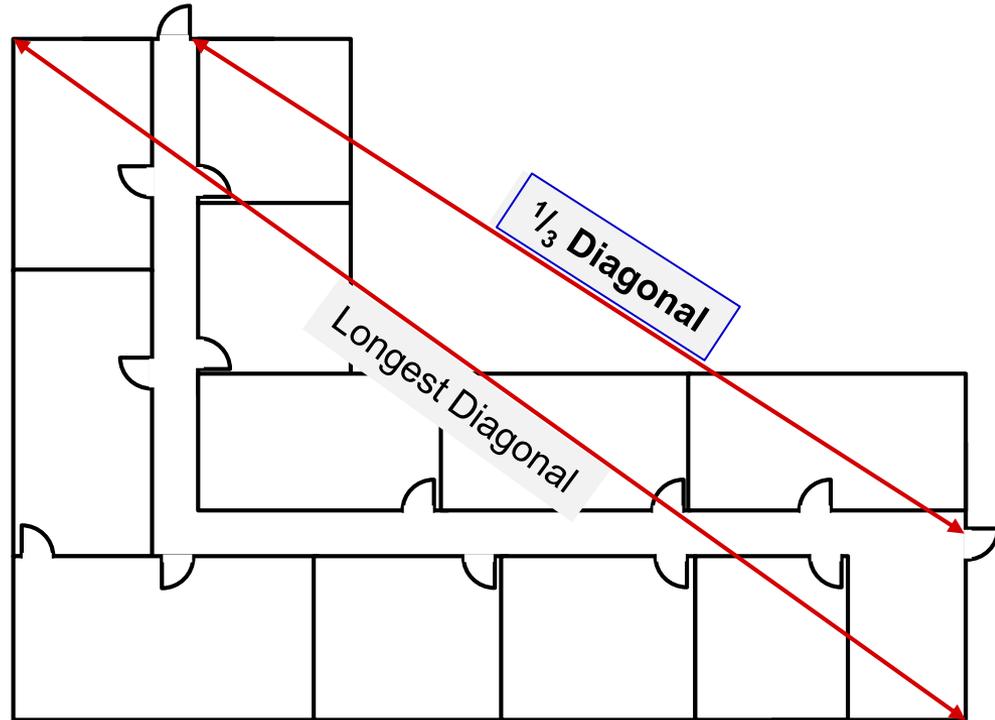
Minimum 2 exits required
Clear door width $\geq 32''$
2 doors = 64''

$$334 \times 0.2''/\text{occupant} = 66.8''$$

2 stairs $\geq 44''$ width = 88''

Horizontal Travel

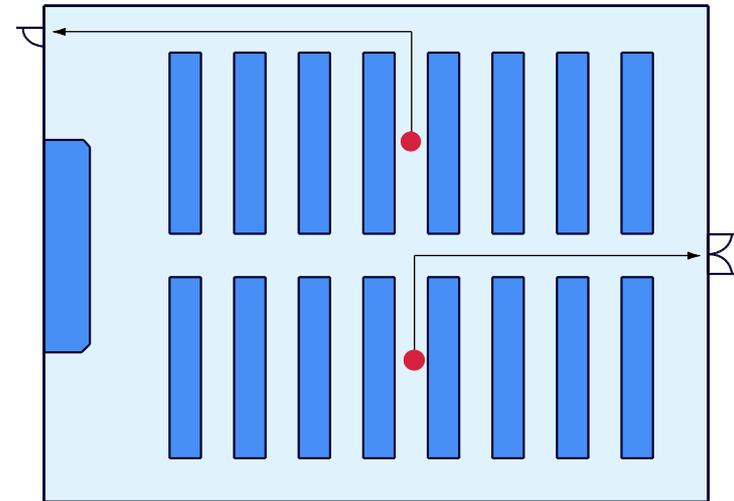
- When 2 or more exits are required, they must be separated by $\frac{1}{2}$ the longest diagonal of the room, space or floor
- When sprinklered, separation is reduced to $\frac{1}{3}$



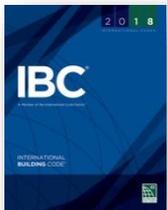
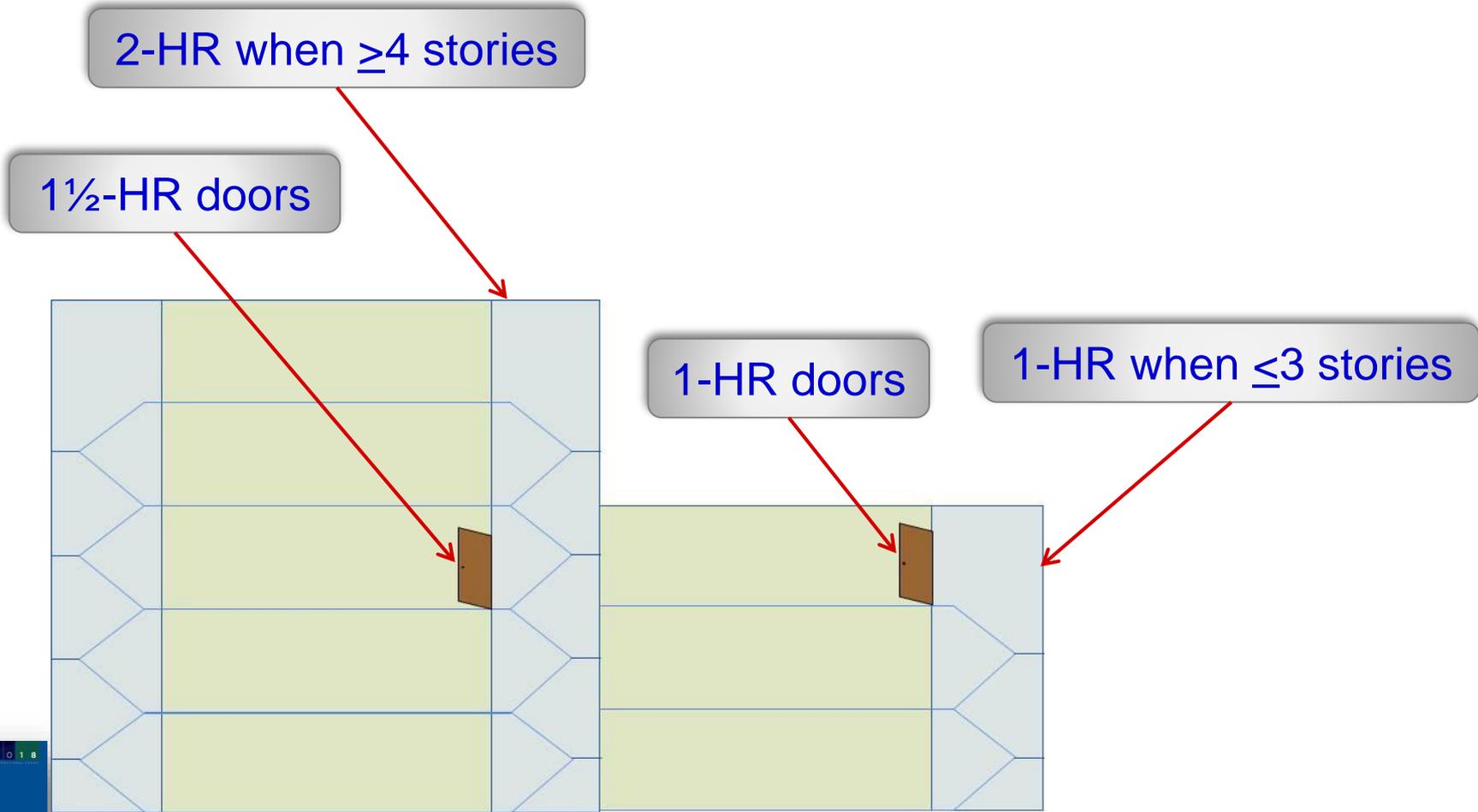
Horizontal Travel

- The distance a person has to travel in a building to get to an exit is limited
- Table 1017.2-Exit Access Travel Distance

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

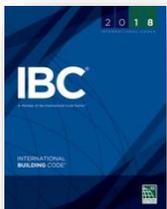
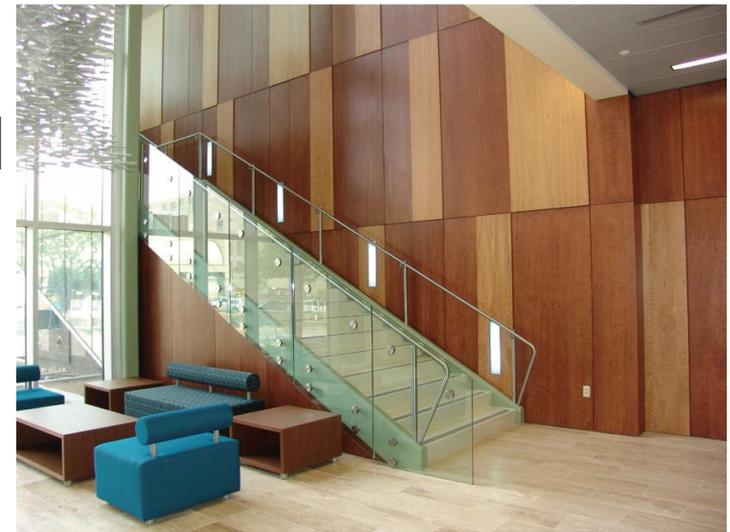


Vertical Travel



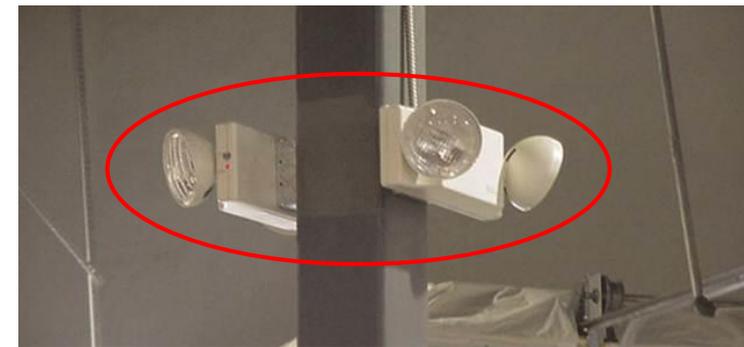
Exit Access Stairs and Ramps

- Open stairways and ramps used as part of MOE are called exit access stairways and ramps
- Use is limited
- Travel distance measurement continues till an exit is reached
- If enclosed, are not protected by same level of protection as an exit stair or ramp



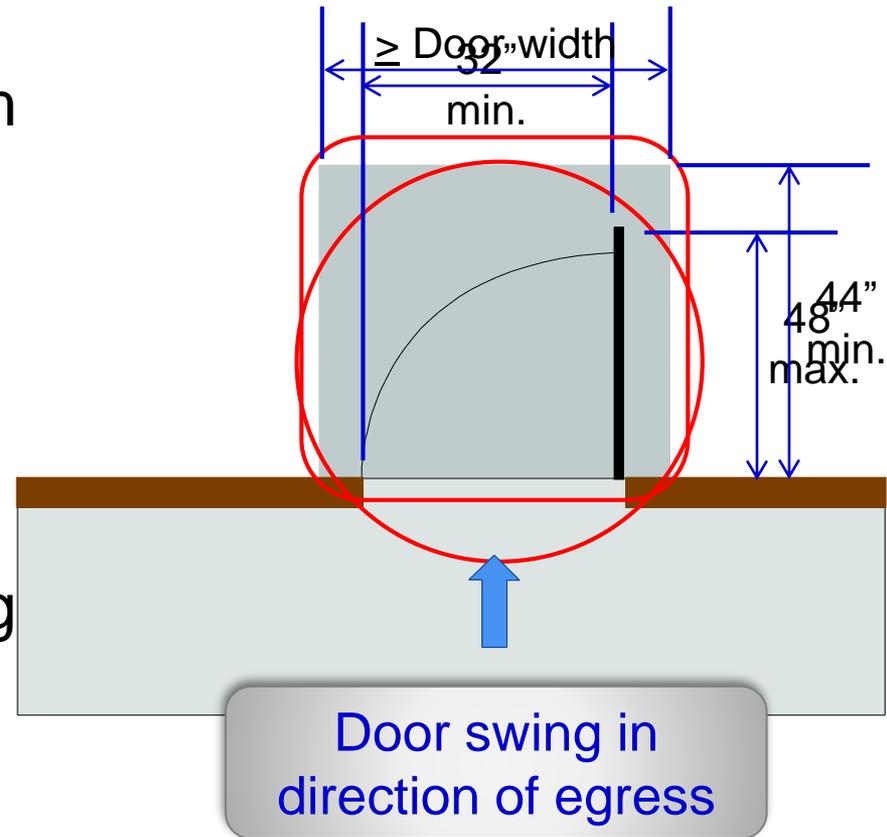
Egress Path Identification

- Exit signs are required whenever 2 exits or exit access doors are required
 - Additional floor-level exit signs in R-1
 - Illuminated from either an internal or external light source
- Egress path must be illuminated
 - Emergency path lighting is required in areas and buildings that are required to have 2 or more exits



Doors

- All doors in an egress system must be side-swinging
 - Some exceptions
- Doors must provide a minimum clear width of 32 inches measured at 90°
- Maximum width of a swinging door leaf is 48 inches
- Doors serving an occupant load of 50 or more, must swing in the direction of travel
- Floor or landing required



Door Hardware

- Readily openable from the egress side without the use of a key or special knowledge or effort
- Operated without tight grasping, tight pinching, or twisting of the wrist in areas where people with physical disabilities may be present



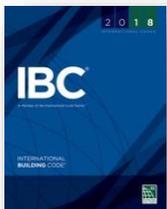
Minimum 34"
Maximum 48"

Panic Hardware

- Required on doors in:
 - Group H
 - Group A – 50 or more occupants
 - Group E - 50 or more occupants

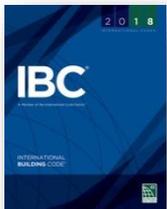
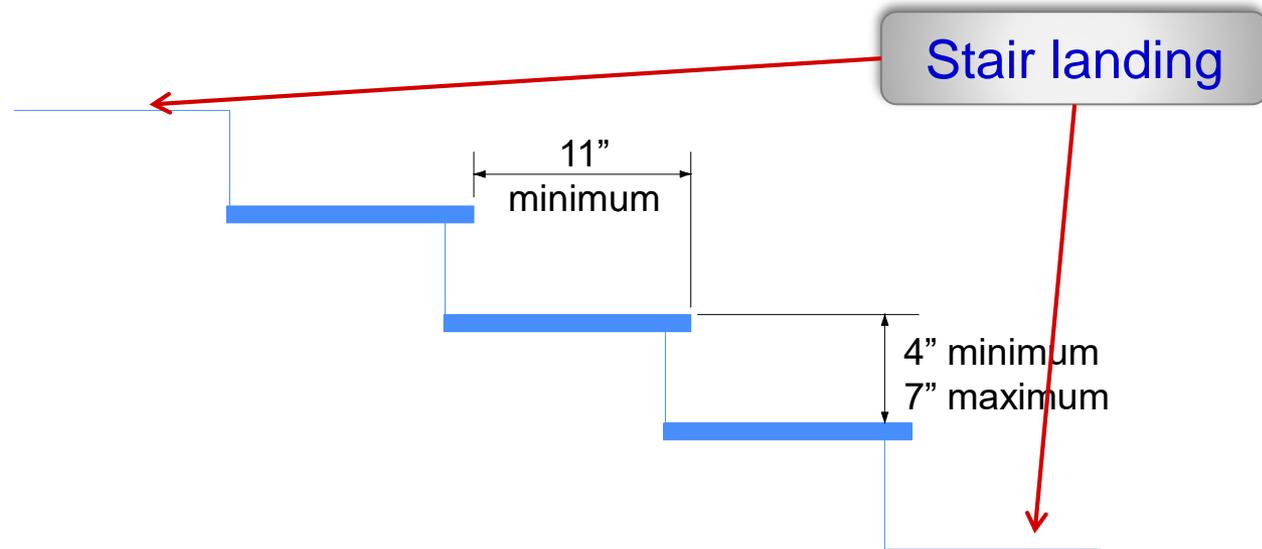
FIRE EXIT Hardware – 1010.1.10

- *Fire exit hardware* is panic hardware listed for use on fire door assemblies.
- LISTING REQUIREMENT:
 - Fire exit hardware – UL 10C and UL 305
 - Panic Hardware – UL 305



Stairways

- Minimum width
 - 36 inches for <50 persons
 - 44 inches for ≥ 50 to 146 persons
 - Number of people multiplied by 0.3 inches
 - If sprinklers and emergency voice/alarm communication system, minimum width is number of people multiplied by 0.2 inches



Ramps

- Slopes are limited to a maximum of 1:12
- Ramps not used as a part of the means of egress can slope at 1:8
- Width is number of persons multiplied by 0.2inches



Handrail

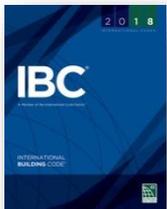
Handrail
Extension

Guard

Edge
Protection

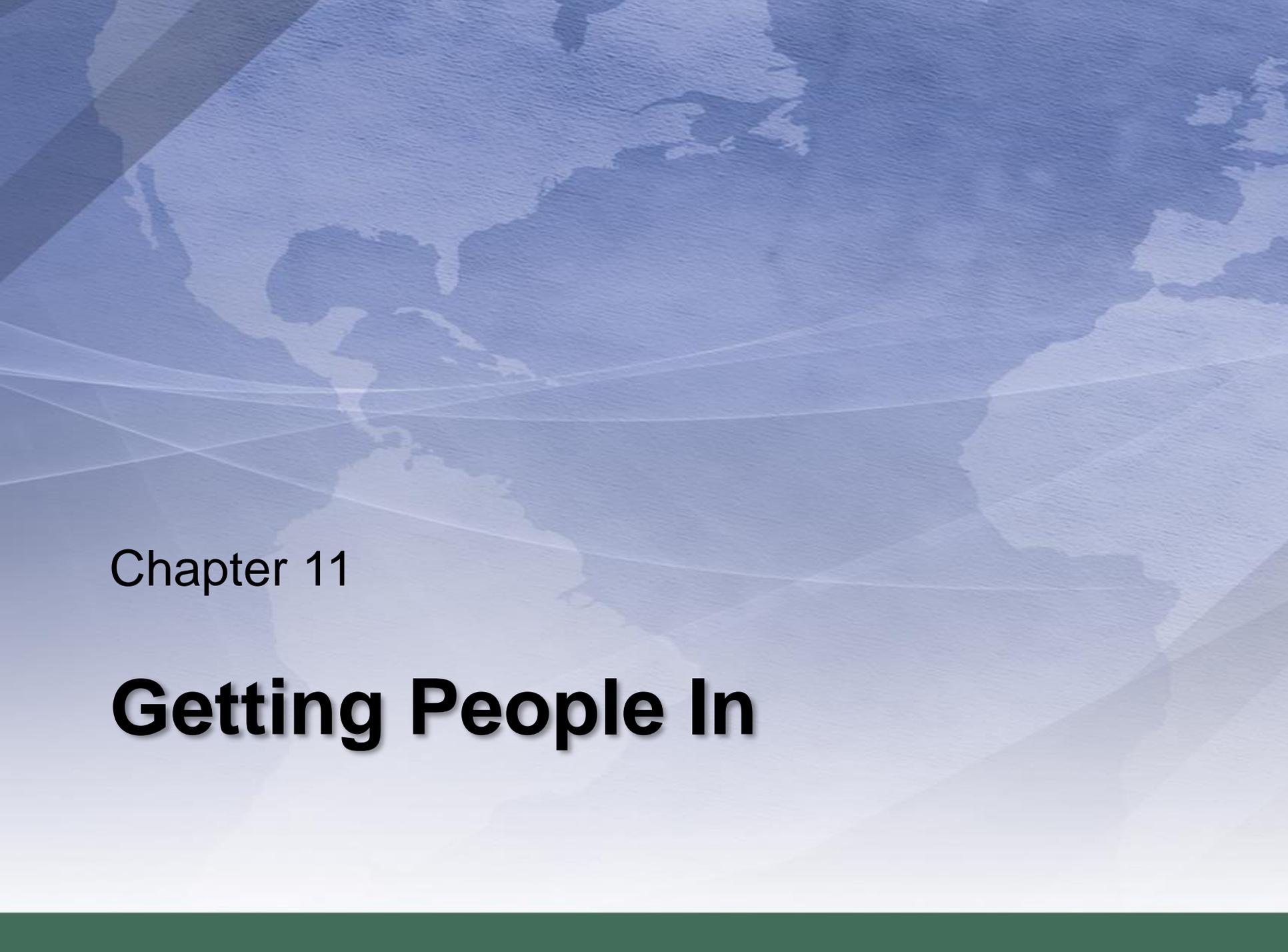


Need discussion or group activity here.



2018 IBC Essentials

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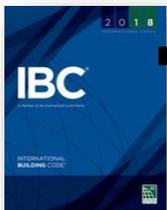


Chapter 11

Getting People In

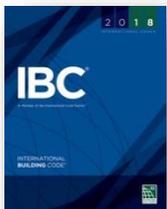
Accessibility

- IBC has accessibility requirements for buildings
- IBC requirements are similar to Americans with Disabilities Act Accessibility Guidelines and the Federal Fair Housing Act
- Referenced standard ICC A117.1 – Accessible and Usable Buildings and Facilities
- Areas not required to be accessible:
 - Construction sites
 - Detached 1- and 2-family dwellings
 - Spaces containing equipment



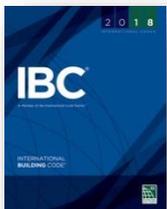
Accessible Path Into the Building

- Accessible path from points where people arrive to the business
 - Public transportation stops
 - Accessible parking spaces
 - Accessible passenger loading zones
 - Public streets or sidewalks
- 60% of public entrances must be accessible



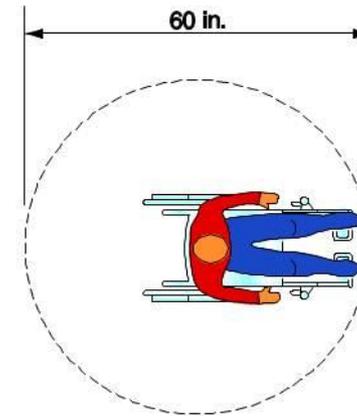
Accessible Path Through the Building

- Accessible route to each portion of the building from the accessible entrance
- Accessible route to other floors
 - Ramps
 - Maximum slope of 1:12
 - Elevators
 - Cars must be large enough for a person in a wheelchair and one additional person
 - Controls must be placed so that a person in a wheelchair can reach them to operate the elevator

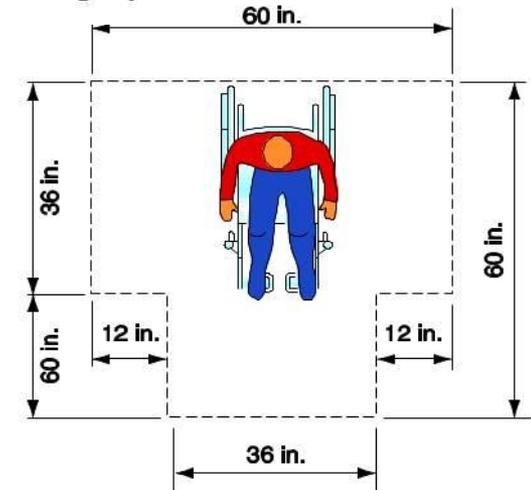


Toilet Facilities

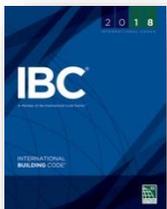
- Toilet rooms
 - Must be accessible
 - Provide an accessible family-use or assisted-use toilet room in Groups A and M
- Water closets
 - At least 1 water closet must be wheelchair accessible



Circular Turning Space

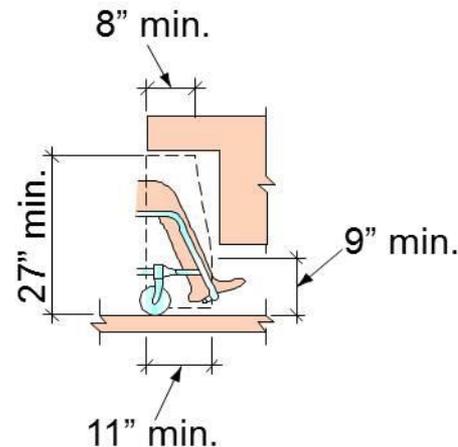


T-Shaped Turning Space

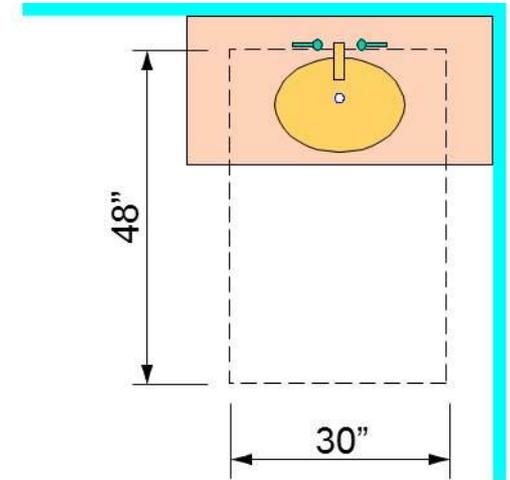


Lavatories and Sinks

- Minimum of 5 percent of the lavatories must be accessible
 - At least 1 in each toilet facility
- Access must be provided to the lavatory



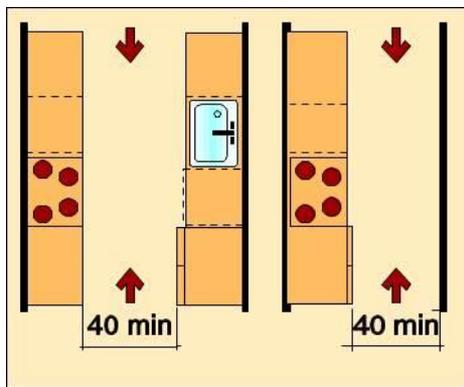
Knee and Toe Clearance



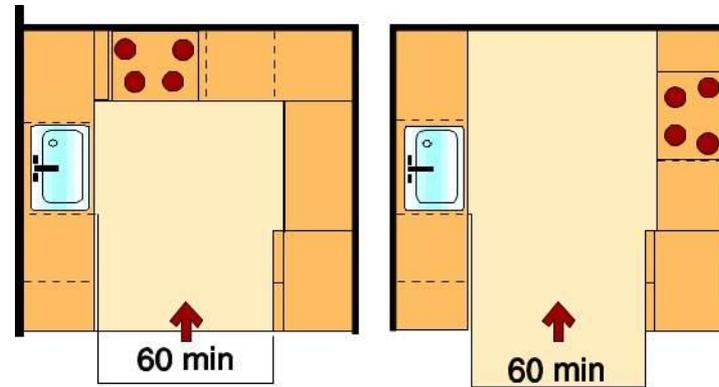
Clear Floor Space at Lavatory

Kitchens

- Commercial kitchens must provide accessible route to approach, enter and exit the kitchen area
- Kitchens in break room type areas must provide accessibility throughout



Pass-through Kitchens

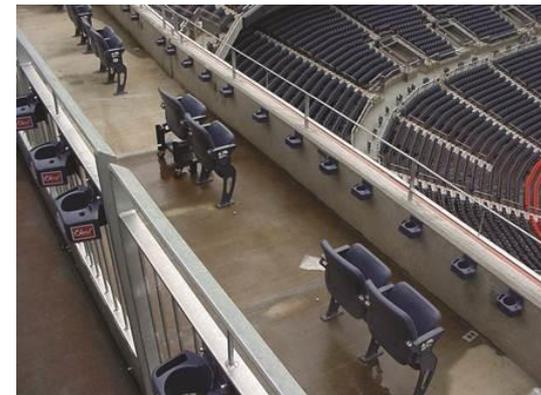


U-Shaped Kitchens

Assembly Seating Areas

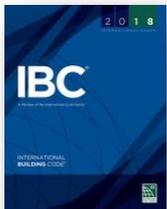
- Dining
 - The total area for seating, interior/exterior, must be accessible with some exceptions
 - 5% made accessible
- Other than dining
 - Based on Table 1108.2.2.1
 - Dispersed throughout seating areas

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF WHEELCHAIR SPACES
4 – 25	1
26 – 50	2
51 – 100	4
101 – 300	5
301 – 500	6
501 – 5,000	6, plus 1 for each 150, or fraction thereof, between 501 through 5,000
5,001 and over	36 plus 1 for each 200, or fraction thereof, over 5,000



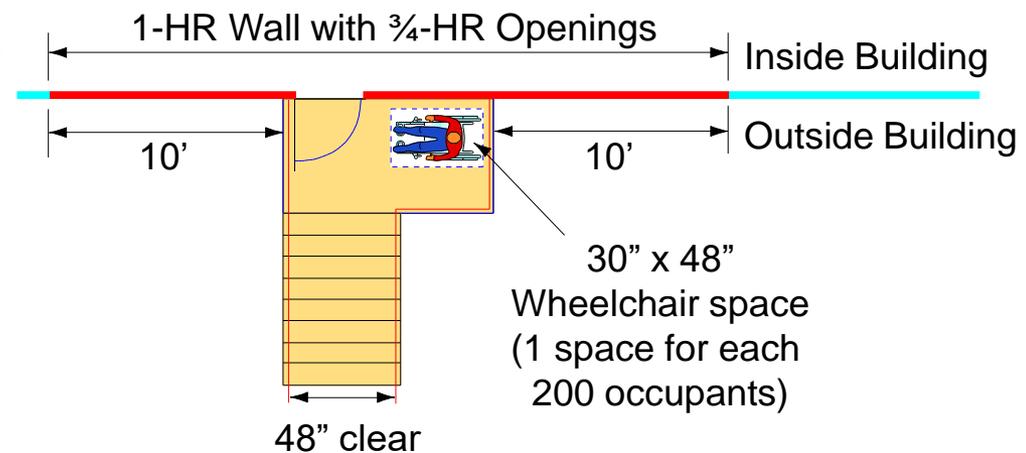
Group R-1 Accessible dwelling units and sleeping units (a portion of IBC Table 1107.6.1.1)

Total number of units provided	Minimum required number of Accessible units without roll-in showers	Minimum required number of Accessible units with roll-in showers	Total number of required Accessible units
1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7
151 to 200	6	2	8
201 to 300	7	3	10



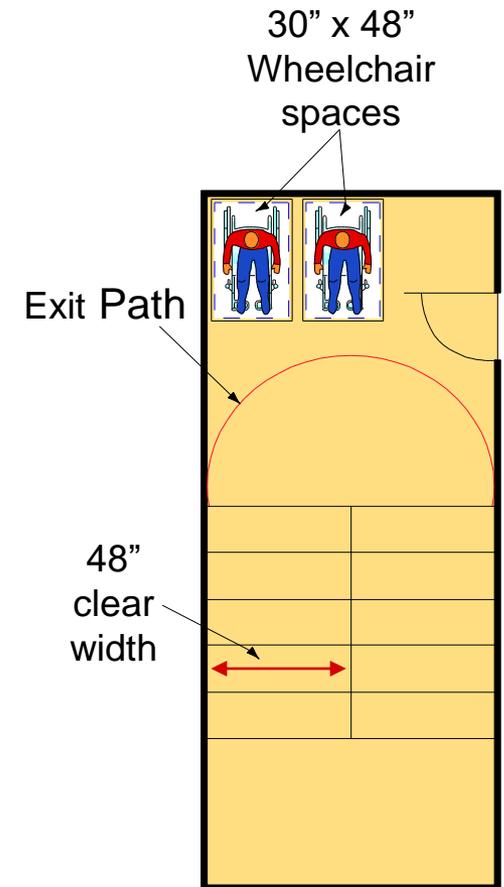
Accessible Means of Egress

- Spaces or buildings requiring only one exit must have one accessible means of egress
- Spaces or buildings requiring ≥ 2 exits must have 2 accessible means of egress
- In buildings >4 stories, an elevator must serve as one of the required accessible means of egress
- Accessible means of egress must continue to public way or Area of Assisted Rescue which leads to the public way



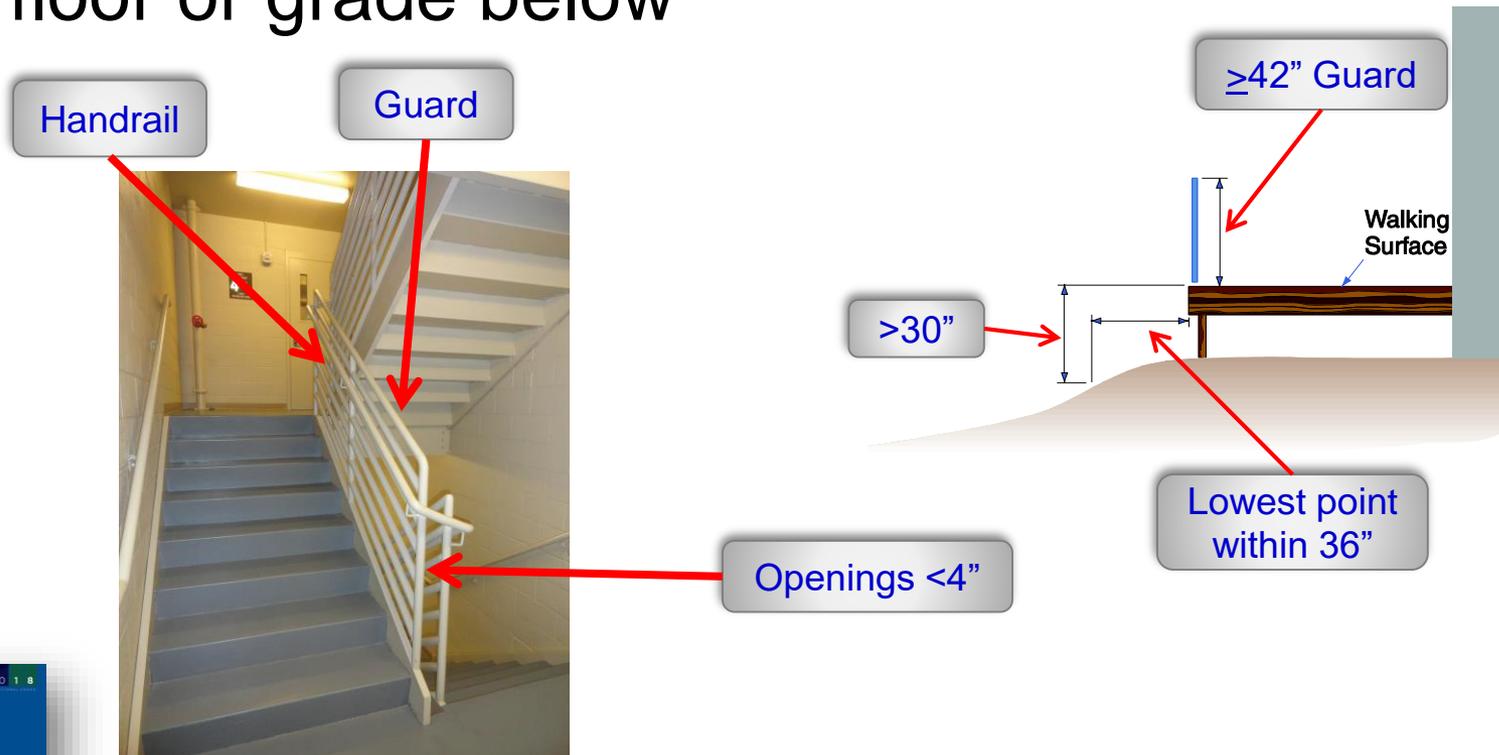
Areas of Refuge

- One wheelchair space for every 200 occupants served by the area of refuge
 - Not required in sprinklered buildings
- Located in:
 - Stairway enclosure
 - Elevator lobby
- 2-way communication required

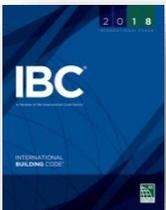
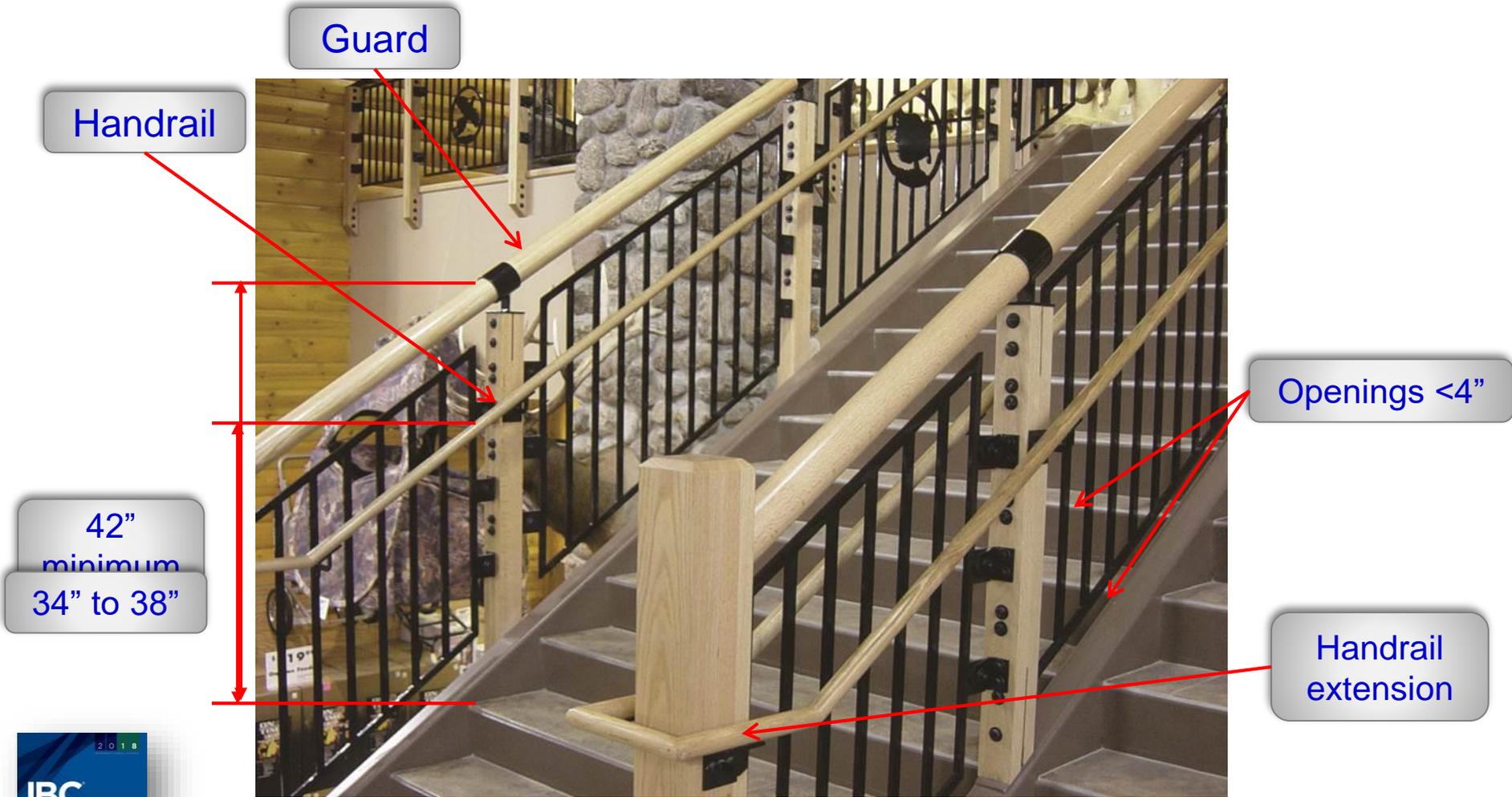


Guards

- Guards are required along open-sided walking surfaces located more than 30 inches above the floor or grade below

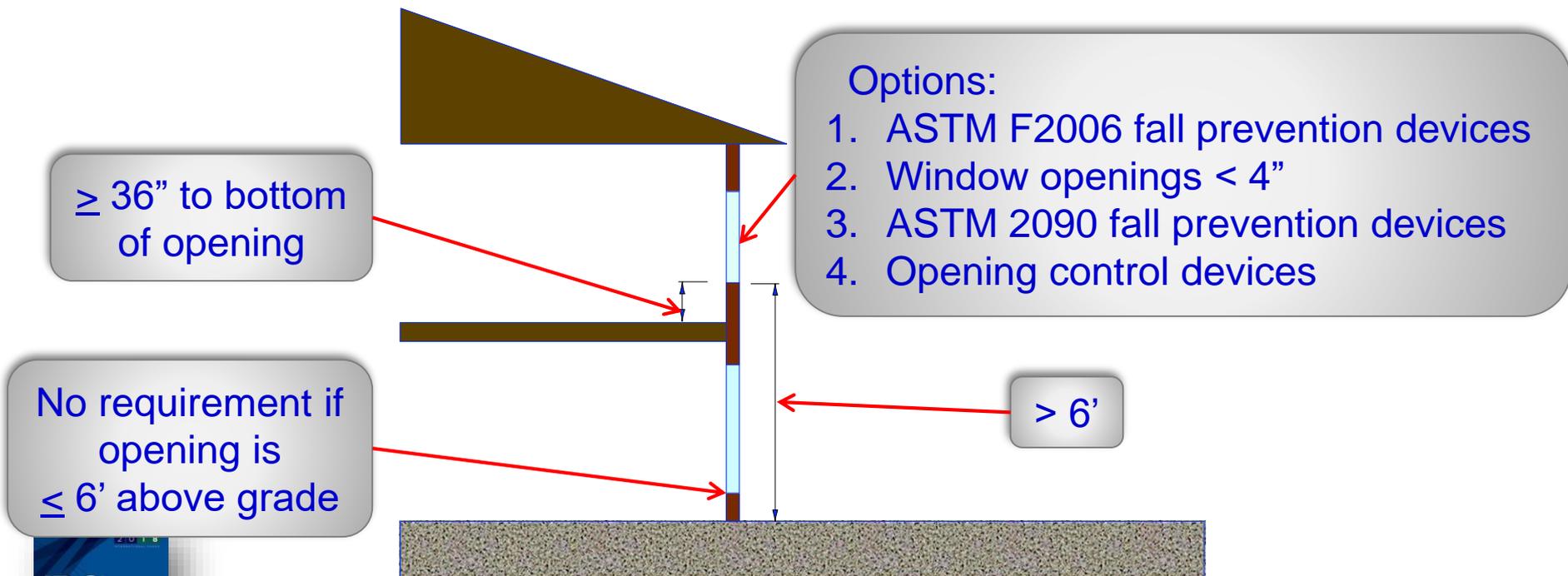


Stairways



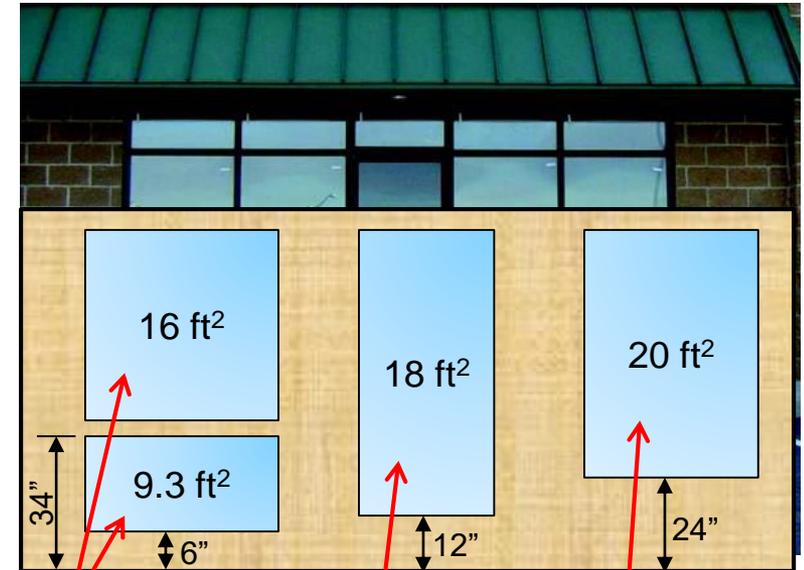
Window-sill Height

- Regulated in R-2 and R-3
- Provide ≥ 36 inches sill or fixed windows



Safety Glazing

- Laminated glass
- Tempered glass
- Safety glazing must be labeled
- Required locations:
 - Doors
 - Within 24 inches of doors
 - Along walking areas and meets size thresholds



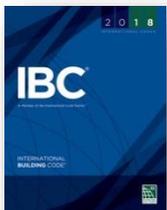
Not required
Top of bottom
panel <36" AFF
Bottom of top
panel >18" AFF

Safety
glazing
required

Not required
Bottom panel
>18" AFF

Safety Glazing

- Required:
 - Tub or shower enclosures
 - Within 60 inches of pool or spa
 - Guard or railing on stairway
 - Within 36 inches of stairway or landing
 - Within 60 inches of walking surface

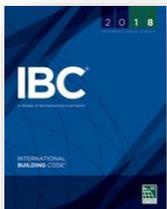
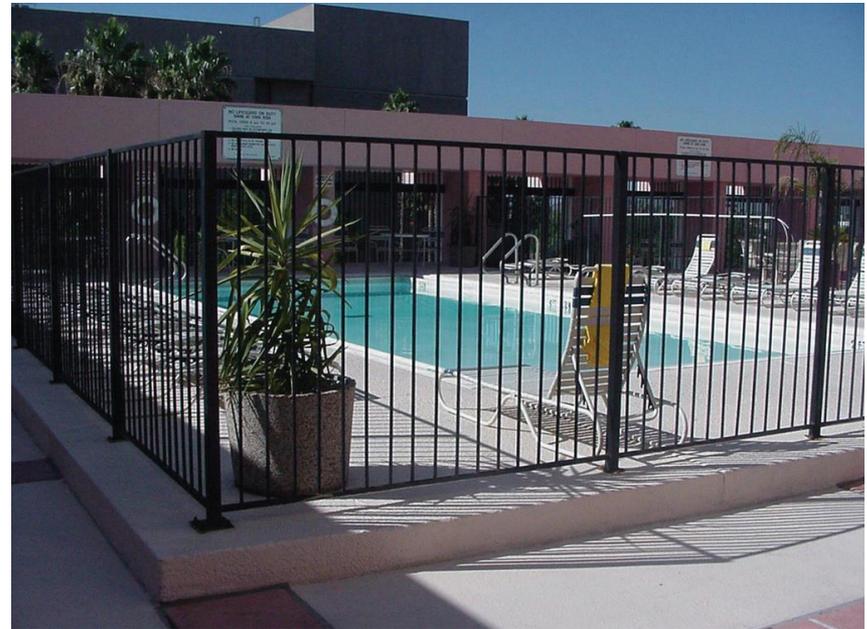


Swimming Pools

- Swimming pools shall comply with the International Swimming Pool and Spa Code

Swimming pool:

- Any structure intended for swimming
- Water depth > 24 inches
- In-ground, above-ground and on-ground pools
- Includes hot tubs and spas
- Includes fixed-in-place wading pools





Life Safety

1. In a Group A-2 restaurant with tables and chairs, the occupant load is determined based on a factor of _____ per person.

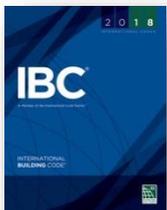
15 ft² net

IBC Table 1004.1.2; Workbook Table 10-1

2. In a Group A-2 restaurant, 2 exit doors are required when the occupant load is _____ or more.

50

IBC Table 1015.1; Workbook Table 10-2





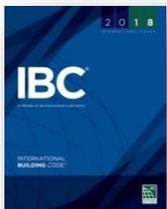
Life Safety

3. In a non-sprinklered Group B office building with an occupant load of 95, the common path of egress travel is limited to _____ feet.

75
IBC §1014.3

4. Exit access travel distance is limited to _____ feet in a Group M occupancy equipped with a fire sprinkler system.

250
IBC Table 1016.2; Workbook Table 10-3





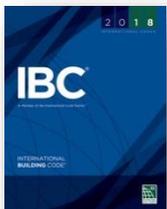
Life Safety

5. Doors must swing in the direction of egress when the occupant load is _____ or more, or the occupancy is Group _____.

50; H
IBC §1008.1.2

6. In buildings with more than 1 required means of egress, at least _____ of the means of egress must be accessible.

2
IBC §1007.1

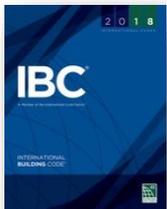




Life Safety Practice



Any questions regarding the practice?

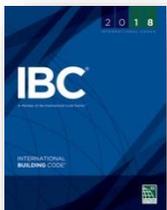




Final Reflection

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

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



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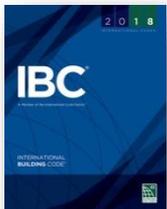
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