CONST-181
Building Code Interpretation: Non-Structural

Question 1

0.15 / 0.15 pts

Where the common path of travel is within the permitted limits, a Group B occupancy may have a single means of egress where the maximum occupant load is _____

- 10
- 20
- 29
- 49 (selected)

TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A[c], E, M	49	75	75	75[a]
B	49	100	75	100[a]
F	49	75	75	100[a]
H-1, H-2, H-3	3	NP	NP	25[b]
H-4, H-5	10	NP	NP	75[b]
I-1, I-2[d], I-4	10	NP	NP	75[a]
I-3	10	NP	NP	100[a]
R-1	10	NP	NP	75[a]
R-2	20	NP	NP	125[a]
R-3[e]	20	NP	NP	125[a, g]
R-4[e]	20	NP	NP	125[a, g]
S[f]	29	100	75	100[a]
U	49	100	75	75[a]

Question 2

In general, through which one of the following spaces is egress not specifically prohibited ?

- private offices (selected)
- storage rooms
- kitchens
- closets

5. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes.

Question 3

0.15 / 0.15 pts

Up to an additional 100 feet of travel distance is available where the last portion of exit access travel occurs _____ .

- within a corridor
- within a 1-hour-rated corridor
- on an exterior egress balcony
- on an exterior exit stairway

1017.2.1 Exterior egress balcony increase. *Exit access* travel distances specified in Table 1017.2 shall be increased up to an additional 100 feet (30 480 mm) provided that the last portion of the *exit access* leading to the exit occurs on an exterior egress balcony constructed in accordance with Section 1021. The length of such balcony shall be not less than the amount of the increase taken.

Question 4

0.15 / 0.15 pts

A corridor having a required capacity of 125 persons in a Group E occupancy shall be a minimum of _____ inches in width.

- 36
- 44
- 60
- 72

TABLE 1020.3
MINIMUM CORRIDOR WIDTH

OCCUPANCY	MINIMUM WIDTH (inches)
Any facility not listed in this table	44
Access to and utilization of mechanical, plumbing or electrical systems or equipment	24
With an occupant load of less than 50	36
Within a dwelling unit	36
In Group E with a corridor having an occupant load of 100 or more	72
In corridors and areas serving stretcher traffic in ambulatory care facilities	72
Group I-2 in areas where required for bed movement	96

Question 5

0.15 / 0.15 pts

An aisle accessway in a merchandise pad of a Group M occupancy shall be a minimum of _____ inches in width on at least one side of each merchandising element.

- (●) 30
- ( ) 36
- ( ) 44
- ( ) 48

1018.4 Aisle accessways in Group M. An *aisle accessway* shall be provided on not less than one side of each element within the *merchandise pad*. The minimum clear width for an *aisle accessway* not required to be *accessible* shall be 30 inches (762 mm). The required clear width of the *aisle accessway* shall be measured perpendicular to the elements and merchandise within the *merchandise pad*. The 30-inch (762 mm) minimum clear width shall be maintained to provide a path to an adjacent *aisle* or *aisle accessway*. The *common path of egress travel* shall not exceed 30 feet (9144 mm) from any point in the *merchandise pad*.

Question 6

0.15 / 0.15 pts

Enclosures for interior exit stairways connecting a minimum of _____ stories shall be 2-hour fire-resistance rated

- ( ) 3
- (●) 4
- ( ) 5
- ( ) 6

1023.2 Construction. Enclosures for interior exit *stairways* and *ramps* shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. *Interior exit stairway* and *ramp* enclosures shall have a *fire-resistance rating* of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the interior exit *stairways* or *ramps* shall include any *basements*, but not any *mezzanines*. Enclosures for interior *exit stairways* and *ramps* shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours.

Question 7

0.15 / 0.15 pts

Group I-1, I-2 and I-3 occupancies and ambulatory care facilities, a refuge area serving a horizontal exit shall be sized for capacity based on _____ square feet for each occupant to be accommodated.

- (●) 3
- ( ) 6
- ( ) 15
- ( ) 30

1026.4.1 Capacity. The capacity of the refuge area shall be computed based on a *net floor area* allowance of 3 square feet (0.2787 m^2) for each occupant to be accommodated therein. Where the *horizontal exit* also forms a *smoke compartment*, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and Group B ambulatory care facilities shall comply with Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2 as applicable.

SECTION 407
GROUP I-2

407.5.3 Refuge area. Refuge areas shall be provided within each *smoke compartment*. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining *smoke compartment*. Where a *smoke compartment* is adjoined by two or more *smoke compartments*, the minimum area of the refuge area shall accommodate the largest *occupant load* of the adjoining compartments. The size of the refuge area shall provide the following:

1. Not less than 30 net square feet (2.8 m^2) for each care recipient confined to bed or stretcher.
2. Not less than 6 square feet (0.56 m^2) for each ambulatory care recipient not confined to bed or stretcher and for other occupants.

Areas or spaces permitted to be included in the calculation of refuge area are corridors, sleeping areas, treatment rooms, lounge or dining areas and other low-hazard areas.

SECTION 408
GROUP I-3

408.6.2 Refuge area. Not less than 6 net square feet (0.56 m^2) per occupant shall be provided on each side of each *smoke barrier* for the total number of occupants in adjoining *smoke compartments*. This space shall be readily available wherever the occupants are moved across the *smoke barrier* in a fire emergency.

SECTION 420
GROUPS I-1, R-1, R-2, R-3 AND R-4

420.6.1 Refuge area. Refuge areas shall be provided within each *smoke compartment*. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining *smoke compartment.* Where a *smoke compartment* is adjoined by two or more *smoke compartments*, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments. The size of the refuge area shall provide the following:

1. Not less than 15 net square feet (1.4 m^2) for each care recipient.
2. Not less than 6 net square feet (0.56 m^2) for other occupants.

Areas or spaces permitted to be included in the calculation of the refuge area are corridors, lounge or dining areas and other low-hazard areas.

SECTION 422
AMBULATORY CARE FACIILITIES

422.3.2 Refuge area. Not less than 30 net square feet (2.8 m^2) for each nonambulatory care recipient shall be provided within the aggregate area of *corridors*, care recipient rooms, treatment rooms, lounge or dining areas and other low-hazard areas within each *smoke compartment*. Each occupant of an *ambulatory care facility* shall be provided with access to a refuge area without passing through or utilizing adjacent tenant spaces.

Question 7

0.15 / 0.15 pts

Group I-1, I-2 and I-3 occupancies and ambulatory care facilities, a refuge area serving a horizontal exit shall be sized for capacity based on _____ square feet for each occupant to be accommodated.

- (●) 3
- ( ) 6
- ( ) 15
- ( ) 30

1026.4.1 Capacity. The capacity of the refuge area shall be computed based on a *net floor area* allowance of 3 square feet (0.2787 m^2) for each occupant to be accommodated therein. Where the *horizontal exit* also forms a *smoke compartment*, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and Group B ambulatory care facilities shall comply with Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2 as applicable.

Question 8

0.15 / 0.15 pts

What is the minimum required width of an egress court serving 40 occupants from an office building? (in Inches)

- ( ) 36
- (●) 44
- ( ) 48
- ( ) 60

1029.2 Width or capacity. The required capacity of egress courts shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm), except as specified herein. Egress courts serving Group R-3 and U occupancies shall be not less than 36 inches (914 mm) in width. The required capacity and width of egress courts shall be unobstructed to a height of 7 feet (2134 mm). The width of the egress court shall be not less than the required capacity.

1005.3.2 Other egress components. The capacity, in inches, of *means of egress* components other than *stairways* shall be calculated by multiplying the *occupant load* served by such component by a means of egress capacity factor of 0.2 inch (5.1 mm) per occupant.

Question 9

0.15 / 0.15 pts

Where horizontal exits are used in the means of egress in a Group I-2 hospital, the horizontal exits can be used for a maximum of _____ of the required exits.

- 1
- 2
- 1/2
- 2/3

1026.1 General. Horizontal *exits* serving as an *exit* in a *means of egress* system shall comply with the requirements of this section. A *horizontal exit* shall not serve as the only exit from a portion of a building, and where two or more *exits* are required, not more than one-half of the total number of *exits* or total exit minimum width or required capacity shall be horizontal *exits*.

Exceptions:

1. Horizontal *exits* are permitted to comprise two-thirds of the required *exits* from any building or floor area for occupancies in Group I-2.

Question 10

0.15 / 0.15 pts

Where a window well is provided to serve an emergency escape and rescue opening, it shall have a minimum horizontal area of _____ square feet

- 5
- 5.7
- 9
- 10

1031.5 Area wells. An *emergency escape and rescue opening* with the bottom of the clear opening below the adjacent grade shall be provided with an area well in accordance with Sections 1031.5.1 through 1031.5.3.

1031.5.1 Minimum size. The minimum horizontal area of the area well shall be 9 square feet (0.84 m^2), with a horizontal projection and width of not less than 36 inches (914 mm). The area well shall allow the *emergency escape and rescue opening* to be fully opened.

Question 1

0.15 / 0.15 pts

When occupied as the residence for the proprietor, Group R-1 occupancies containing a maximum of _____ sleeping units for rent or hire are not required to comply with Chapter 11.

- (●) 5
- ( ) 6
- ( ) 10
- ( ) 15

1103.2.11 Residential Group R-1. Buildings of Group R-1 containing not more than five *sleeping units* for rent or hire that are also occupied as the residence of the proprietor are not required to comply with this chapter.

Question 2

0.15 / 0.15 pts

In a Group I-1, Condition 2 occupancy, a minimum of _____ percent of the dwelling units and sleeping units shall be accessible units.

- ( ) 4
- (●) 10
- ( ) 20
- ( ) 50

1108.5.1.2 Accessible units in Group I-1, Condition 2. In Group I-1, Condition 2, at least 10 percent, but not less than one, of the dwelling units and sleeping units shall be *Accessible units*. Accessible dwelling units and sleeping units shall be dispersed among the various classes of units.

Question 3

0.15 / 0.15 pts

A self-storage facility containing 160 storage spaces shall be provided with a minimum of _____ accessible individual self-storage spaces.

- one
- two
- five
- eight

TABLE 1109.3
ACCESSIBLE SELF-SERVICE STORAGE FACILITIES

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

Question 4

0.15 / 0.15 pts

The maximum distance of the accessible route from any separate-sex toilet room to a family or assisted-use toilet room shall be _____.

- 200
- 300
- 500
- unlimited

1110.2.1.4 Location. Family or assisted-use toilet and bathing rooms shall be located on an *accessible route*. Family or assisted-use toilet rooms shall be located not more than one *story* above or below separate-sex toilet rooms. The *accessible route* from any separate-sex toilet room to a family or assisted-use toilet room shall not exceed 500 feet (152 m).

Question 5

0.15 / 0.15 pts

In a large manufacturing plant, a minimum of how many of the 24 drinking fountains shall be accessible to standing persons?

- 0
- 4
- 12
- 24

1110.5.2 More than the minimum number. Where more than the minimum number of drinking fountains specified in Section 1110.5.1 is provided, 50 percent of the total number of drinking fountains provided shall comply with the requirements for persons who use a wheelchair and 50 percent of the total number of drinking fountains provided shall comply with the requirements for standing persons.

Question 6

0.15 / 0.15 pts

In a covered mall building, the maximum distance from any point within a mall to an exit shall be _____ feet.

- 75
- 200
- 250
- 300

402.8.5 Distance to exits. Within each individual tenant space in a *covered* or *open mall building*, the distance of travel from any point to an *exit* or entrance to the *mall* shall be not greater than 200 feet (60 960 mm).

The distance of travel from any point within a *mall* of a *covered mall building* to an *exit* shall be not greater than 200 feet (60 960 mm). The maximum distance of travel from any point within an *open mall* to the perimeter line of the *open mall building* shall be not greater than 200 feet (60 960 mm).

Source: 2021 IBC

Question 7

0.15 / 0.15 pts

In a covered mall building, groupings of kiosks shall be separated a minimum of _____ feet from other structures within the mall.

- 6
- 10
- 20
- 30

402.6.2 Kiosks. Kiosks and similar structures (temporary or permanent) located within the *mall* of a *covered mall building* or within the perimeter line of an *open mall building* shall meet the following requirements:

3. The horizontal separation between kiosks or groupings thereof and other structures within the *mall* shall be not less than 20 feet (6096 mm).

Question 8

0.15 / 0.15 pts

A high-rise building is defined as a building having an occupied floor located more than _____ feet above the lowest level of fire department vehicle access.

- 55
- 75
- 120
- 160

[BG] HIGH-RISE BUILDING. A building with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

Question 9

0.15 / 0.15 pts

What is the minimum required classification for the interior finish of atrium walls and ceilings?

- A
- B
- C
- DOC FF-1

404.8 Interior finish. The *interior finish* of walls and ceilings of the *atrium* shall be not less than Class B. Sprinkler protection shall not result in a reduction in class.

Question 10

0.15 / 0.15 pts

An underground building need not be divided into at least two compartments when a floor level is located a maximum of _____ feet below the lowest level of exit discharge.

- 30
- 60
- 75
- 120

405.4 Compartmentation. Compartmentation shall be in accordance with Sections 405.4.1 through 405.4.3.

405.4.1 Number of compartments. A building having a floor level more than 60 feet (18 288 mm) below the finished floor of the lowest *level of exit discharge* shall be divided into not fewer than two compartments of approximately equal size. Such compartmentation shall extend through the highest *level of exit discharge* serving the underground portions of the building and all levels below.

Exception: The lowest *story* need not be compartmented where the area is not greater than 1,500 square feet (139 m^2) and has an *occupant load* of less than 10.

Source: 2021 IBC

Class 9:
Chapter 10, Sections 1001 through 1005, 1008, 1009, 1013 and 1015

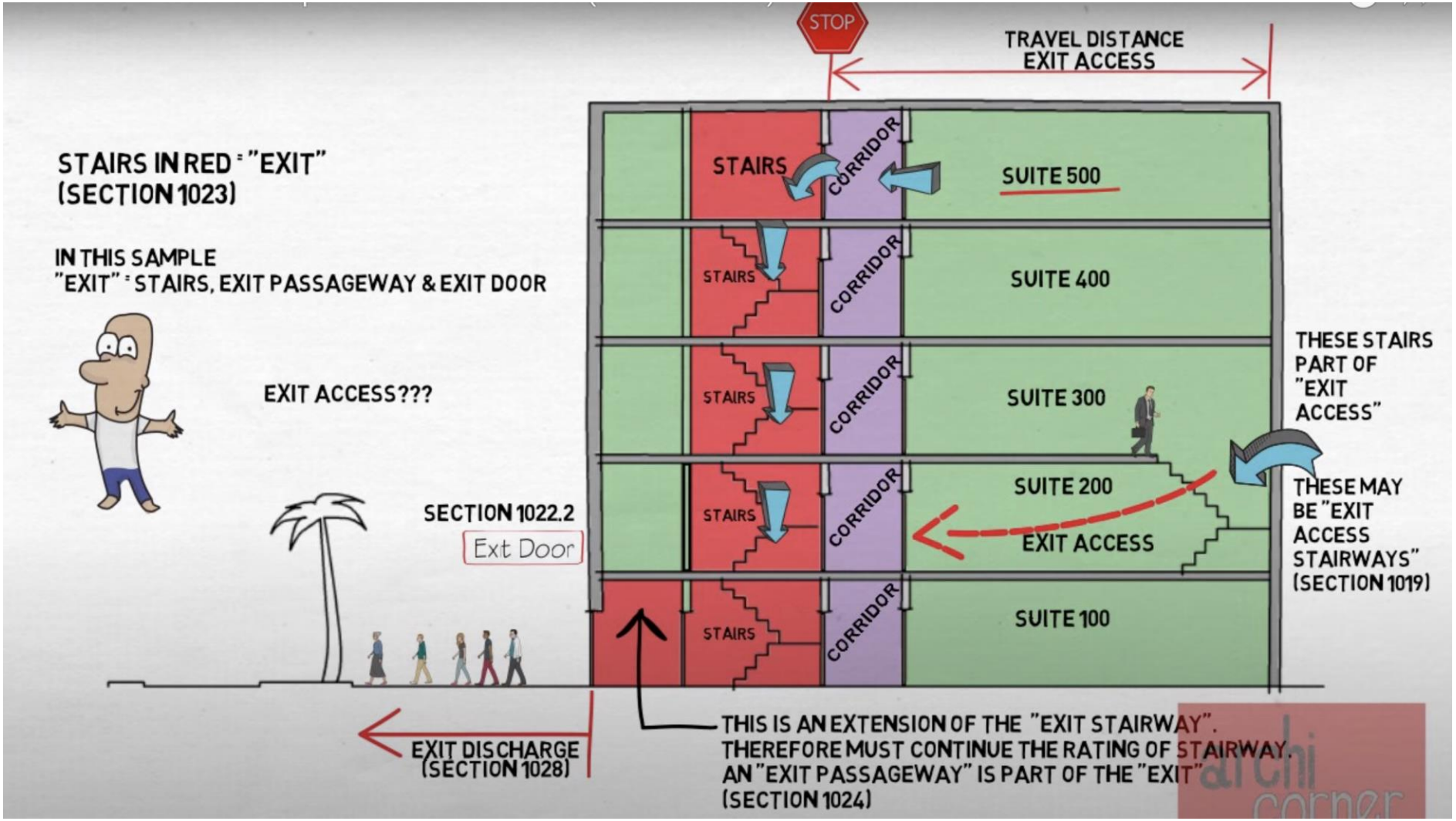
Source: 2021 IBC

Chapter Overview

Exit Access
Exit
Exit Discharge
Special Attention

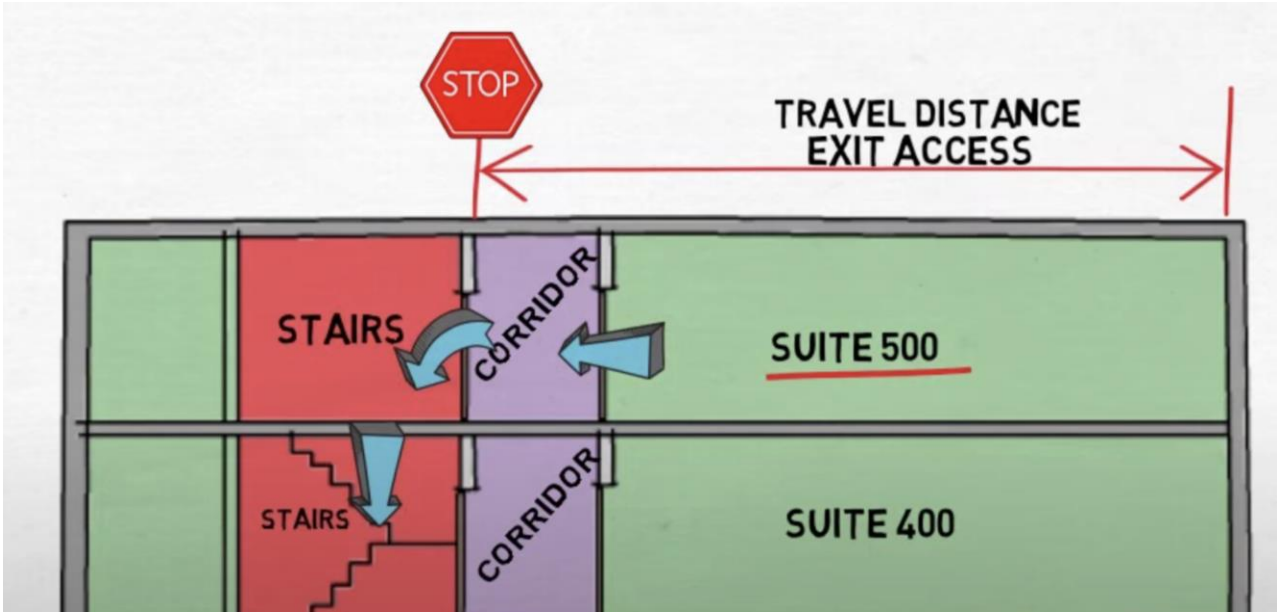
Source: 2021 IBC

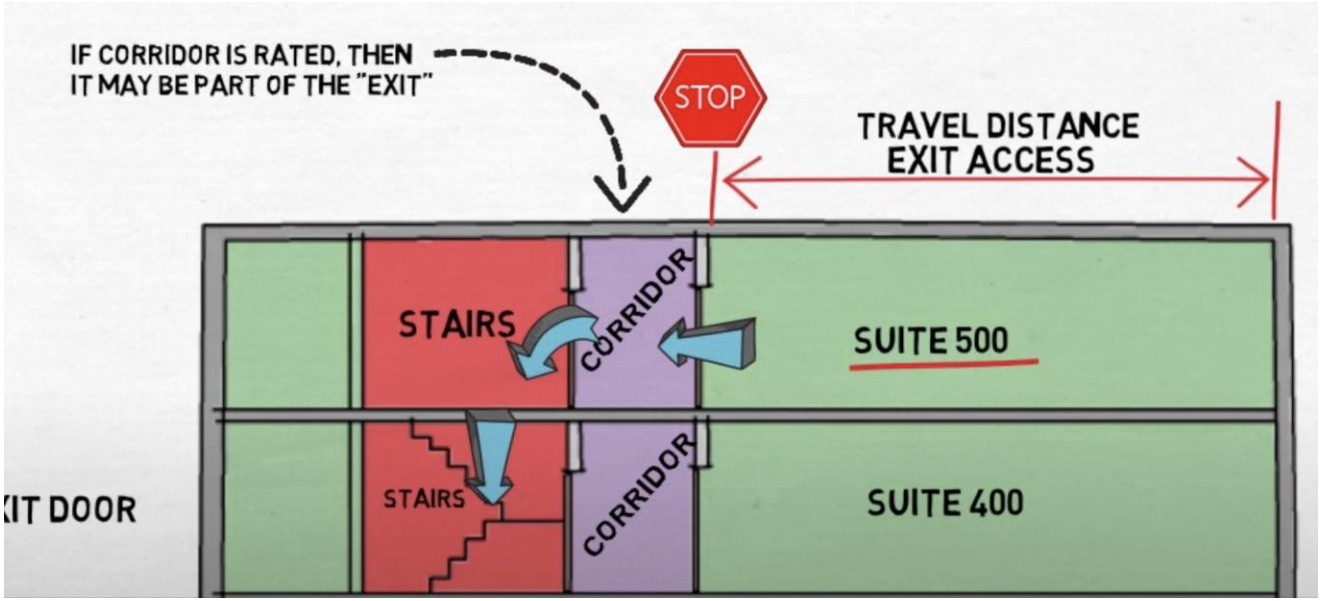
What is egress



Source: archicorner

What is exit access vs exit

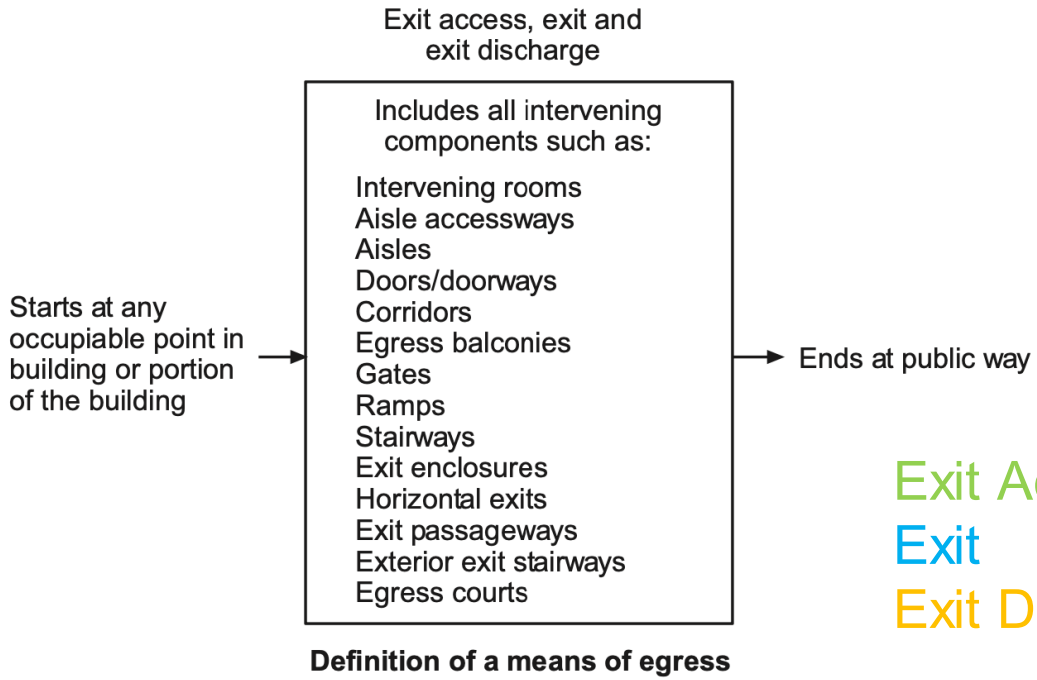




Source: archicorner

1001.1 General

Ch 10 Review:- https://www.youtube.com/watch?v=QX3UWV-kOK4



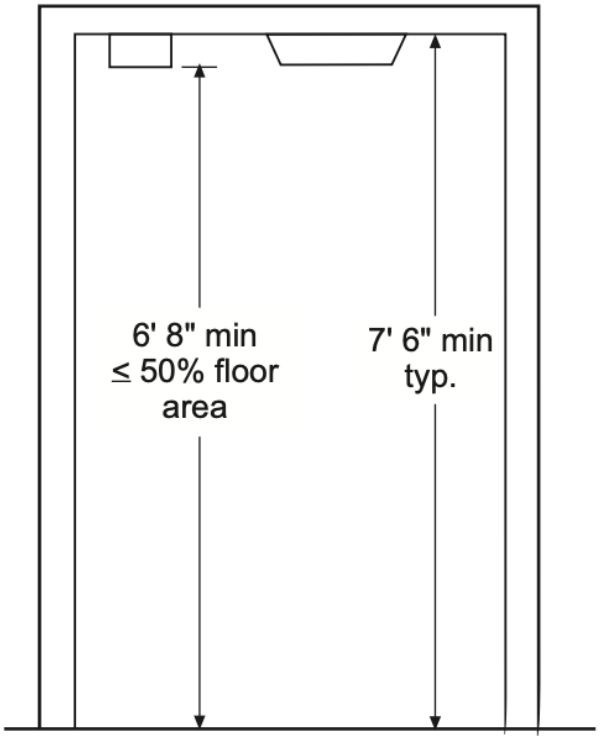
Definition of a means of egress

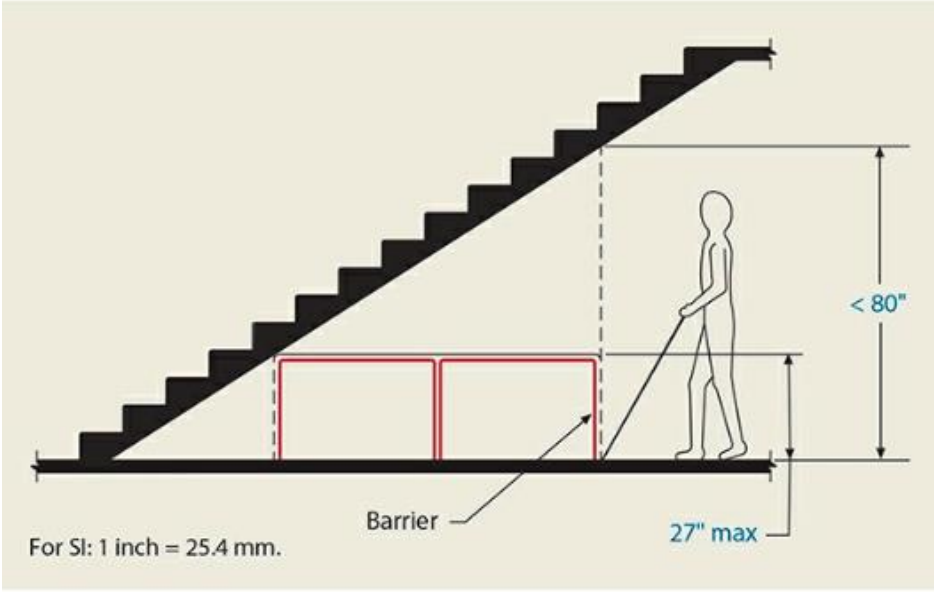
Building components along the path of egress travel might include aisle accessways, aisles, doors or doorways, intervening rooms, gates, corridors, ramps, exit access stairways, interior exit stairways, exit passageways, horizontal exits, exterior balconies, exterior exit stairways and egress courts.

Source: 2021 IBC

1003.2, Ceiling Height

Minimum Stairway Ceiling Height - Building Codes And Accident Prevention - YouTube





03-2 **Reduced vertical clearance.**

Corridor, aisle, passageway or any walking surface along egress of path travel

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

The minimum ceiling heights established for environmental concerns are addressed in Section 1208.2. Habitable spaces, such as bedrooms and living rooms in residential occupancies, occupiable spaces and corridors must be at least 7 feet 6 inches in height. In other areas, reduced headroom is permitted.

Source: 2021 IBC

1003.2, Ceiling Height

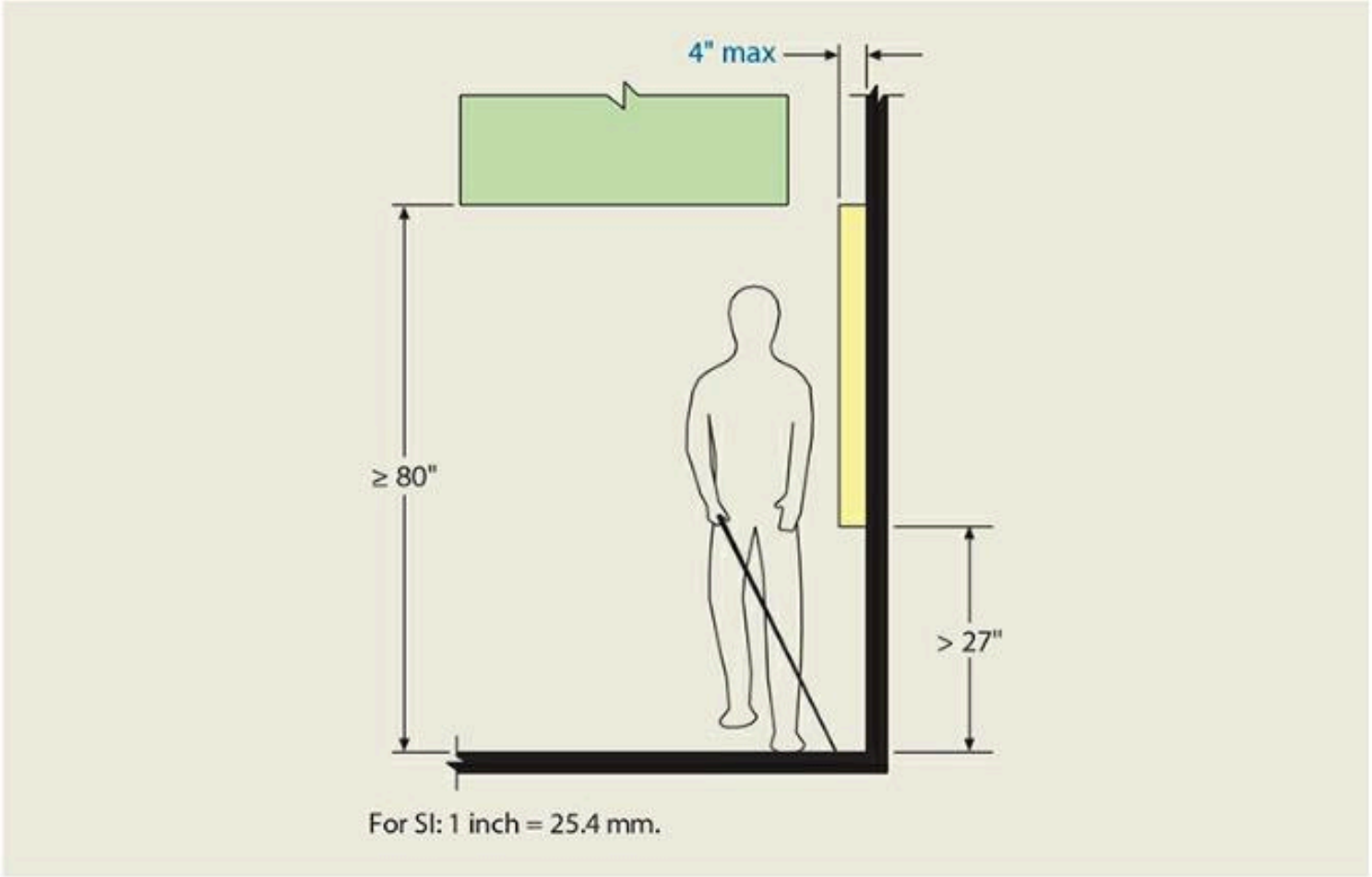


Figure 1003-4 **Limits of protruding objects.**

Source: 2021 IBC

1004.1, 1004.5 Design Occupant Load

AC 022 - Egress: How to calculate occupant loads (Part 2 of 2) - Gross vs. Net. Sq. Ft. - YouTube

TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

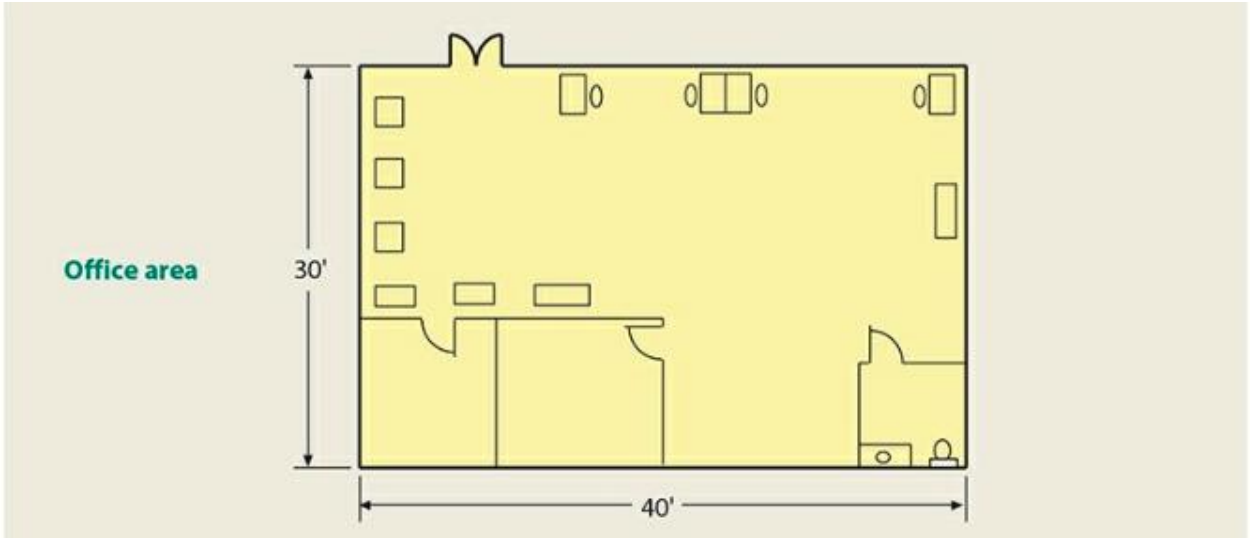
FUNCTION OF SPACE	OCCUPANT LOAD FACTOR[a]
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8
Courtrooms—other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational	
Classroom area	20 net
Shops and other vocational room areas	50 net
Exercise rooms	50 gross
Group H-5 fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas	
Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	120 gross
Kitchens, commercial	200 gross
Library	
Reading rooms	50 net
Stack area	100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 402.8.2
Mercantile	60 gross
Storage, stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools	
Rink and pool	50 gross
Decks	15 gross
Stages and platforms	15 net
Warehouses	500 gross

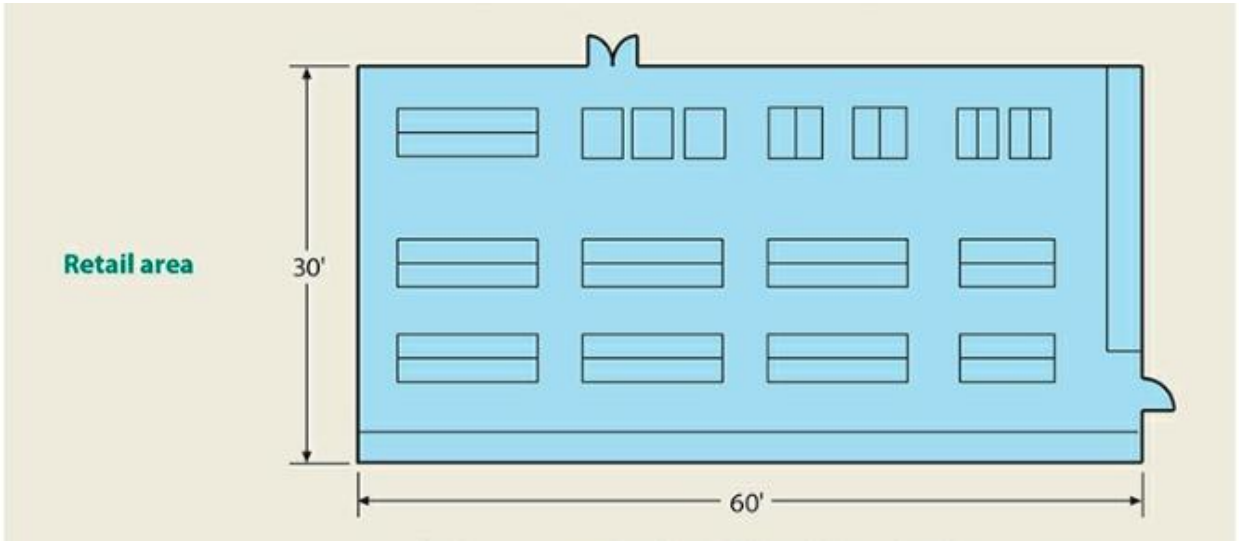
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Floor area in square feet per occupant.

Source: 2021 IBC

1004.1, 1004.5 Design Occupant Load





Source: 2021 IBC

1004.1, 1004.5 Design Occupant Load

TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR[a]
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Baggage claim	20 gross
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Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
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Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8
Courtrooms—other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational	
Classroom area	20 net
Shops and other vocational room areas	50 net
Exercise rooms	50 gross
Group H-5 fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas	
Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	120 gross
Kitchens, commercial	200 gross
Library	
Reading rooms	50 net
Stack area	100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 402.8.2
Mercantile	60 gross
Storage, stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools	
Rink and pool	50 gross
Decks	15 gross
Stages and platforms	15 net
Warehouses	500 gross

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Floor area in square feet per occupant.

Source: 2021 IBC

1004.1, 1004.5 Design Occupant Load

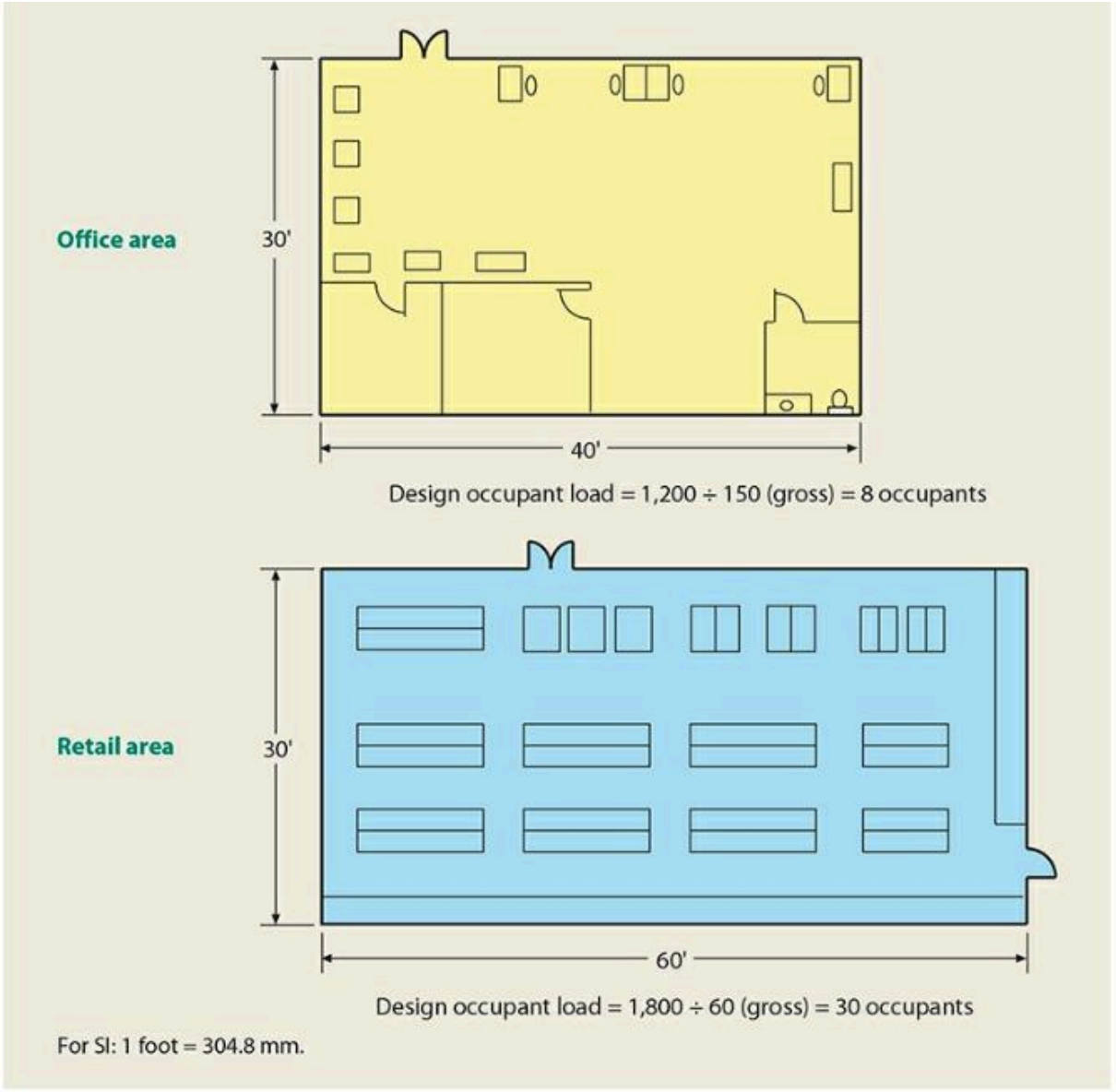


Figure 1004-5 **Design occupant load examples.**

Source: 2021 IBC

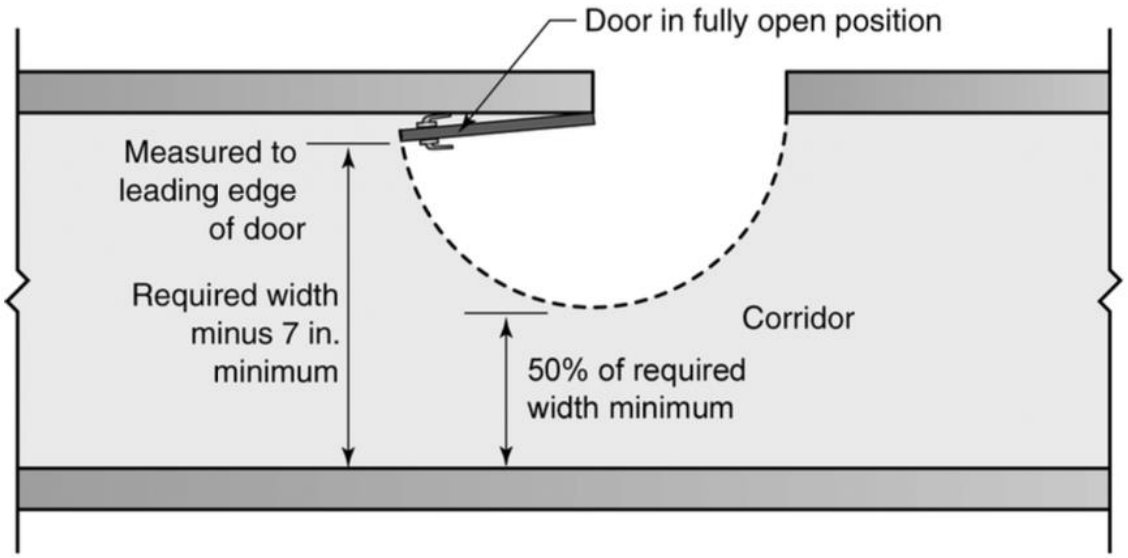
1005.2, 1005.3 Width and Capacity

- The minimum width, in inches, of any means of egress components shall not be less than that specified for such component, elsewhere in the IBC. The capacity, in inches, of means of egress stairways shall be calculated by multiplying the occupant load served by such stairway by a means of egress capacity factor of 0.3 inches (7.6 mm) per occupant. The capacity, in inches, of means of egress components other than stairways shall be calculated by multiplying the occupant load served by such component by a means of egress capacity factor of 0.2 inches (5.1 mm) per occupant. See the exceptions that reduce the capacity factors to 0.2 inches and 0.15 inches, respectively, for buildings equipped throughout with an automatic sprinkler system and an emergency voice/alarm communication system.
- In a given means of egress system, different components will afford different capacities. The most restrictive component will establish the capacity of the overall system. Doorways, aisles, stairways and corridors also have minimum established widths that must be provided.

Source: 2021 IBC

1005.2, 1005.3 Width and Capacity

AC 011 - Egress: How to Calculate Egress Widths. - YouTube



Measurement of minimum required egress width
Section 1005.7.1

Width, in terms of a means of egress system or component, is the clear, unobstructed usable width afforded along the exit path by the individual components. Unless the code provides for a permitted projection, the minimum required clear width may not be reduced throughout the travel path.

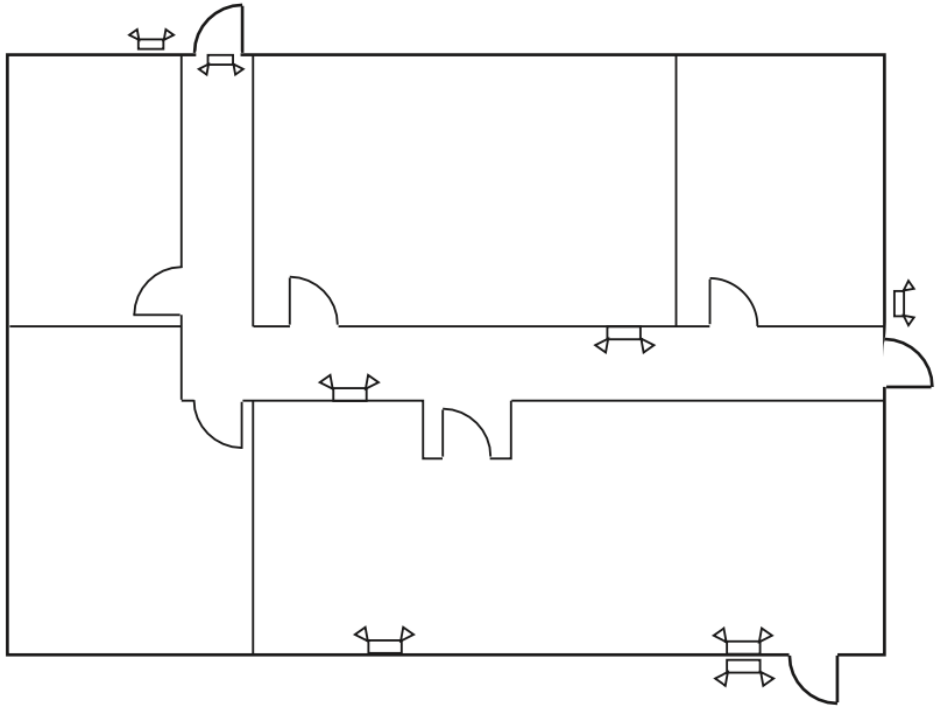
Source: 2021 IBC

1008.2, 1008.3 Emergency Power

- The means of egress serving a room or space shall be illuminated at all times that the room or space is occupied. See the exceptions for (1) Group U occupancies; (2) aisle accessways in Group A; (3) dwelling and sleeping units in Groups R-1, R-2 and R-3; and (4) sleeping units of Group I. The power supply for means of egress illumination shall normally be provided by the premises electrical supply. In the event of power supply failure in rooms and spaces that require two or more means of egress, an emergency electrical system shall automatically illuminate all of the following areas: (1) aisles, (2) corridors and (3) exit access stairways and ramps. Additional requirements for emergency power for illumination is required for buildings that require at least two means of egress and for special spaces such as fire pump rooms and large public restrooms.
- Often identified as emergency lighting, a completely separate source of power from the premise's wiring system is required when the life-safety risk in a building becomes sufficiently great. This threshold is recognized as the point at which the occupant load of the room, area or building is high enough so that two means of egress are required.

Source: 2021 IBC

1008.2, 1008.3 Emergency Power



For the building occupant to be able to negotiate safely the means of egress system, the entire system must be illuminated any time the building is occupied. The illumination must provide an intensity of at least one foot-candle at the floor level. Stairway walking surfaces must be provided with at least 10 footcandles of illumination when the stairway is in use.

Source: 2021 IBC

1009.1, 1009.2 General

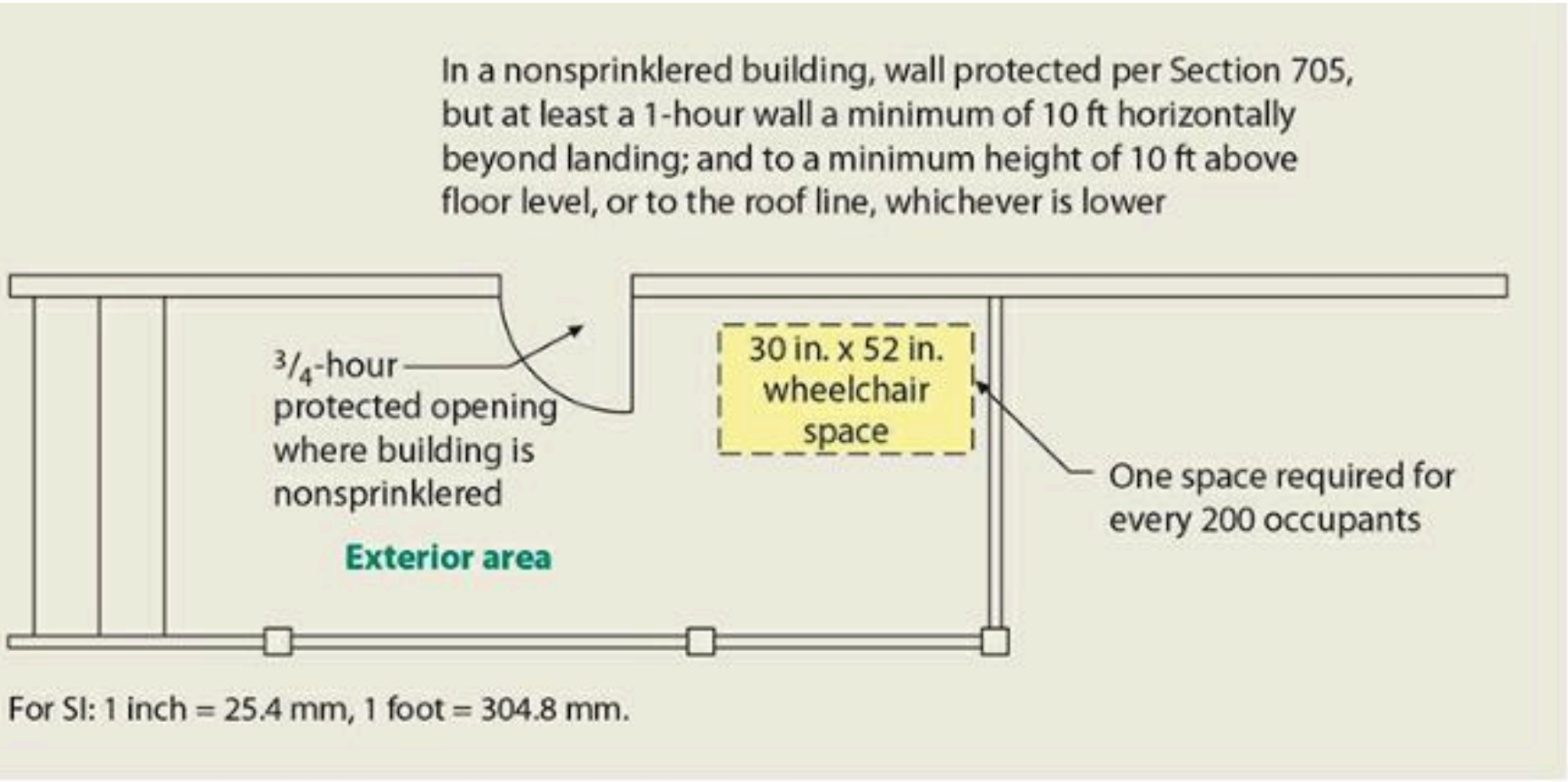
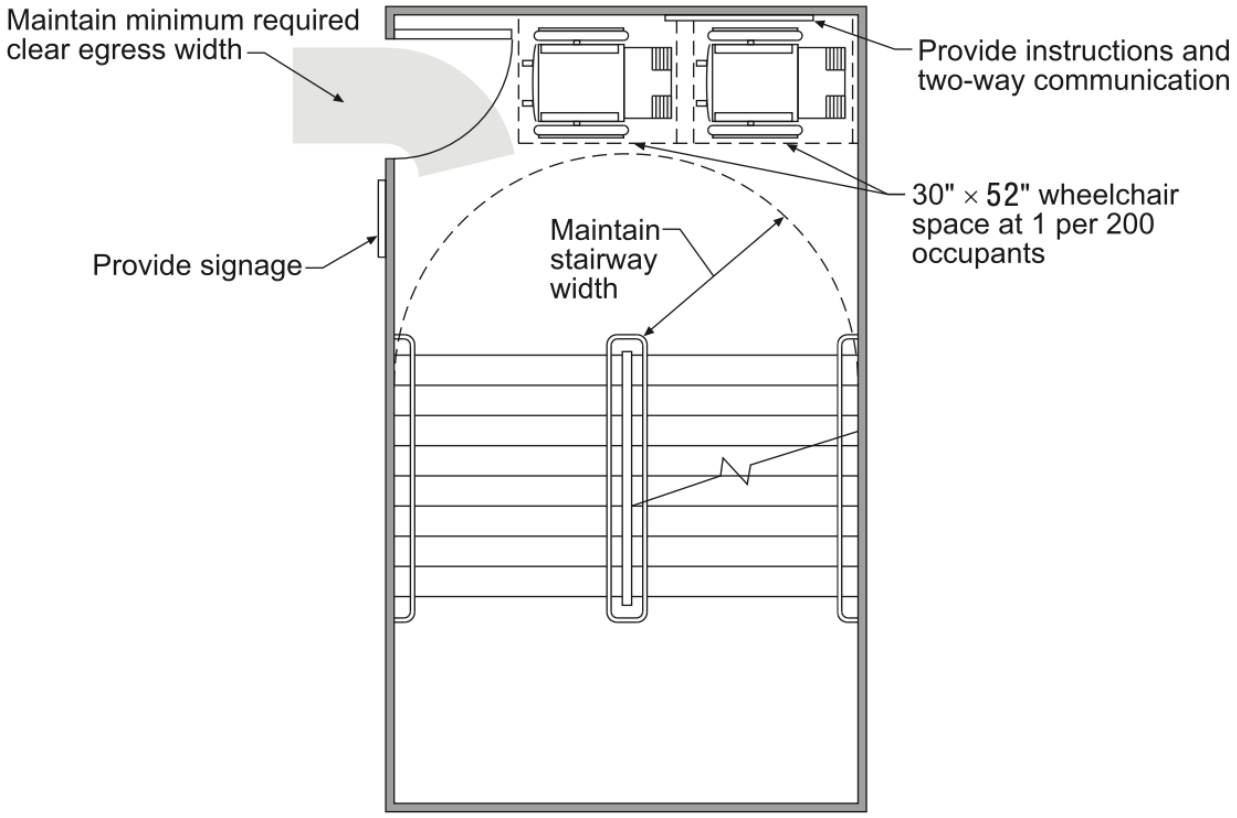


Figure 1009-2 Exterior area for assisted rescue.

Exterior stairways and nonaccessible exit discharge areas may be served by exterior areas for assisted rescue. These specific exterior refuge areas must be adequately separated from the interior of the building by fire-resistance-rated construction and fire-protected openings.

Source: 2021 IBC

1009.6 Areas of Refuge



For SI: 1 inch = 25.4 mm.

Required areas of refuge

Although three or more means of egress from an accessible space may be required, only two of the exitways must be accessible. However, where an area of refuge is used as part of the egress system, the maximum travel distance set forth in Section 1017.2 must be maintained.

Source: 2021 IBC

1009.8 Where Required: Two Way Communication

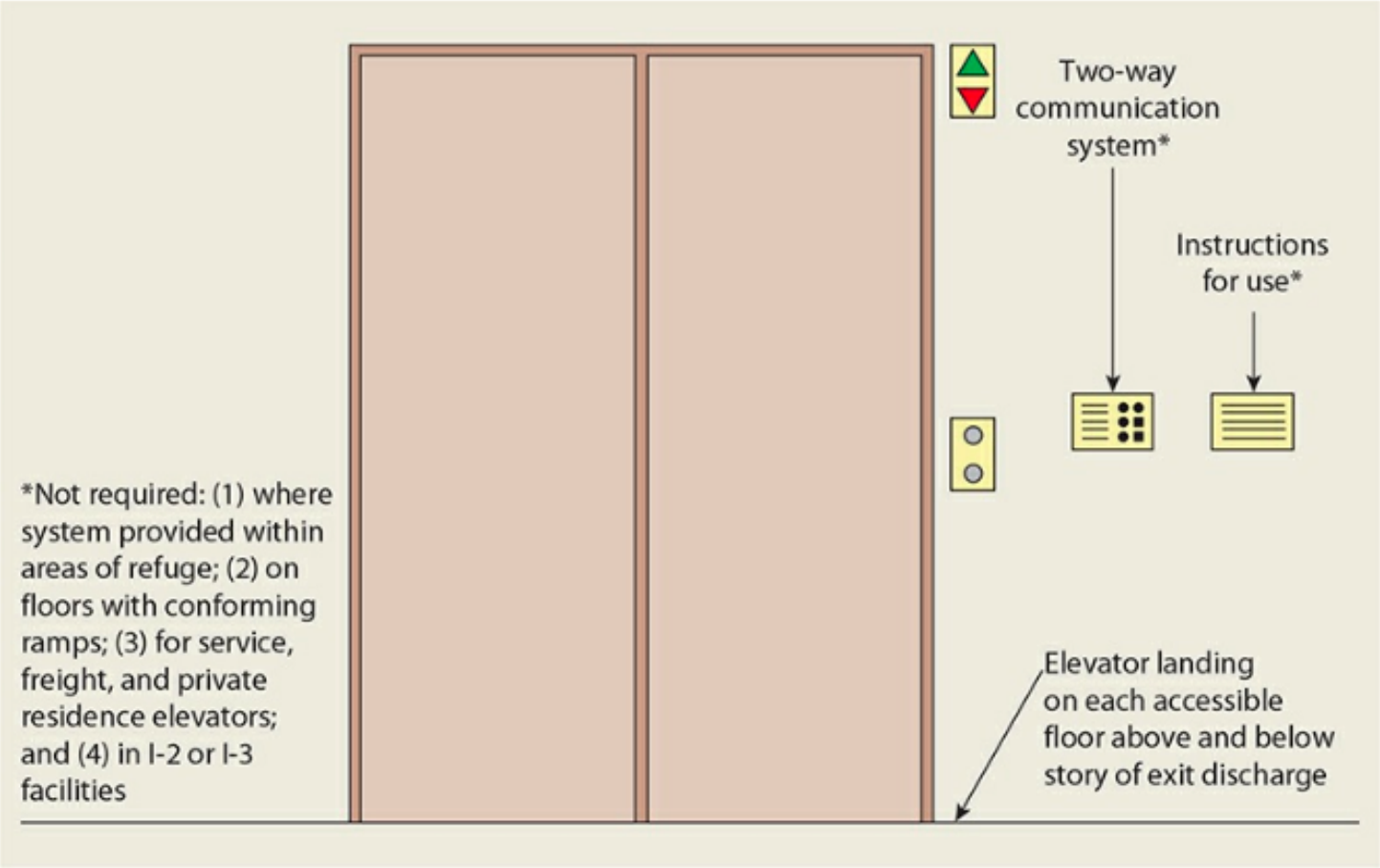


Figure 1009-3 Two-way communication system at elevator landing.

The provisions of Section 1009.6.5 require that all areas of refuge be provided with a two-way communication system. The specific requirements for the system are the same as those for the two-way communication systems mandated at elevator landings as set forth in Section 1009.8.

Source: 2021 IBC

1010.6 Floor Elevations (Details in CH 11)

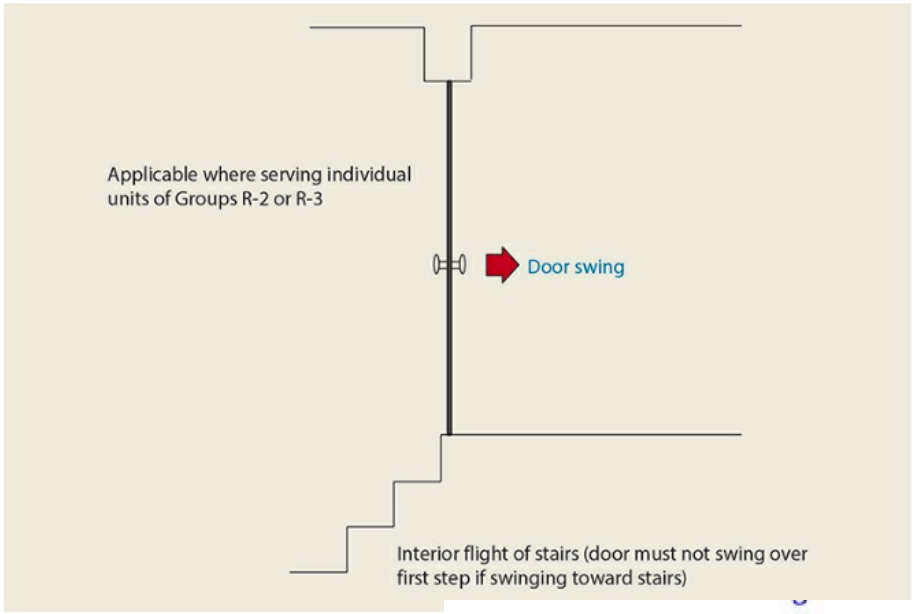


Figure 1010-6 **Floor level at doors.**

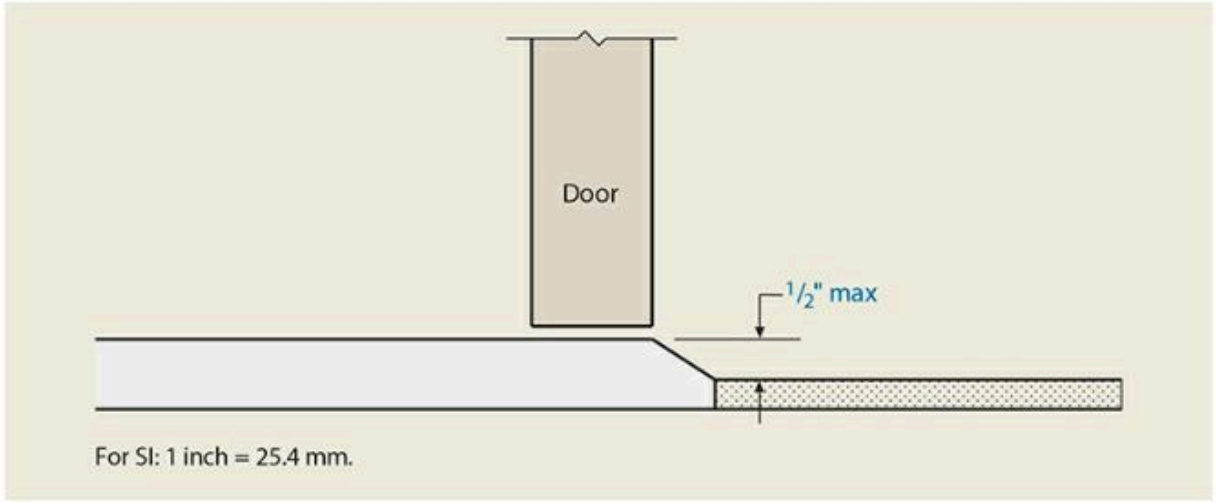
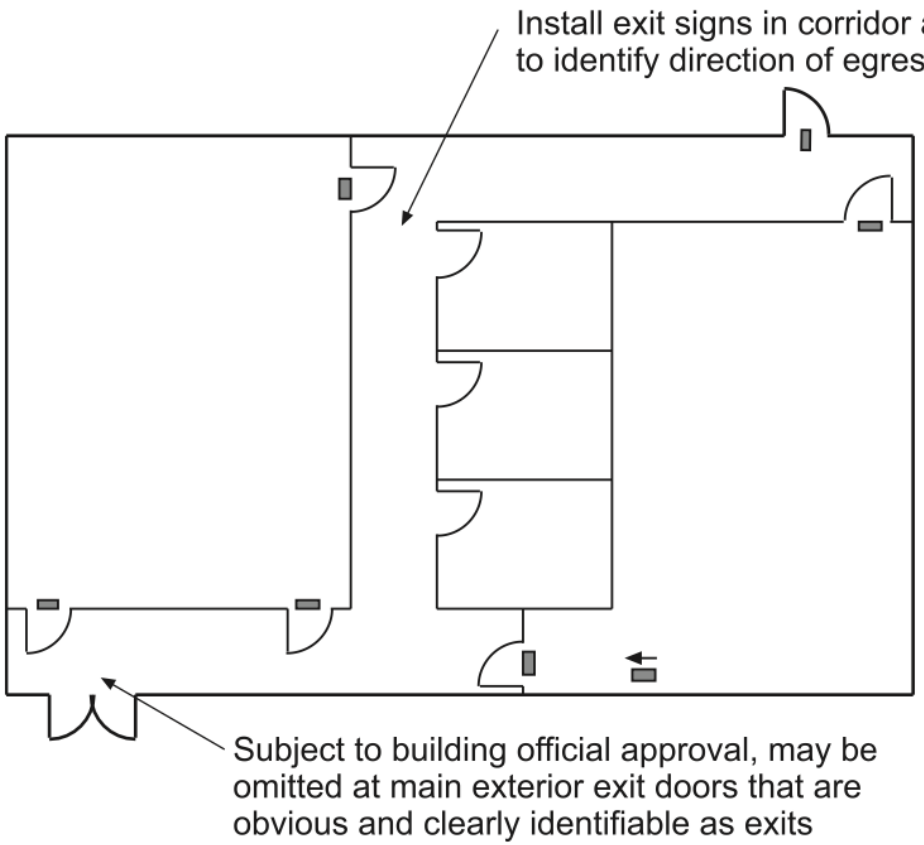


Figure 1010-5 **Floor elevation.**

Source: 2021 IBC

1013.1 Where Required: Exit Signs



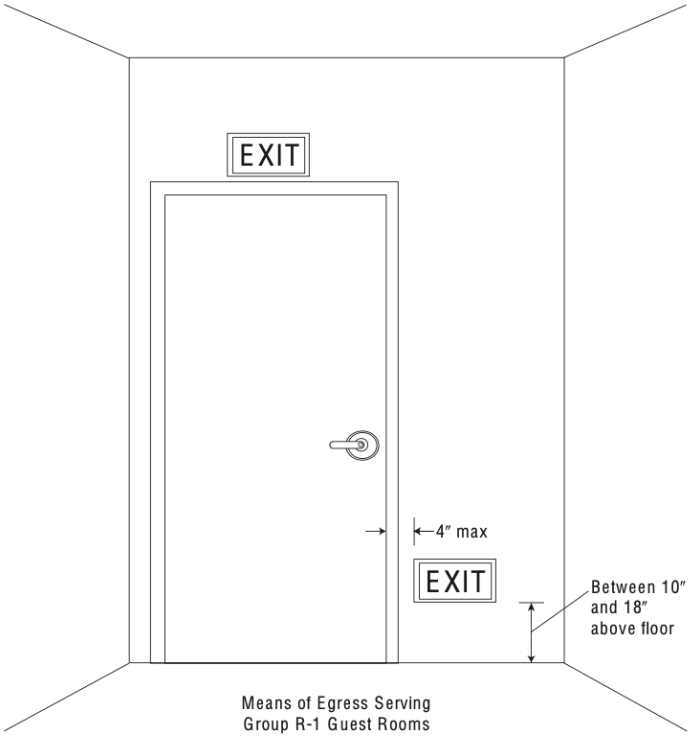
[A Brief History of the Exit Sign | ARTiculations - YouTube]

Additional exit signs may be necessary in lengthy exit access corridors and exit passageways to reinforce the direction of egress travel. It is possible that individuals subjected to extended travel would question the availability of an exit and attempt to locate an alternative egress path.

Source: 2021 IBC

1013.2 Low-level Signs in Group R-1

Exit Sign: Comment Responses | ARTiculations - YouTube



Low-level exit signs must be either electrically powered, self-luminous or photoluminescent exit signs that are listed and labeled in accordance with UL 924 and installed in accordance with the manufacturer's instructions. Consistent with the requirements for all other exit signs, low-level signs shall be illuminated at all times.

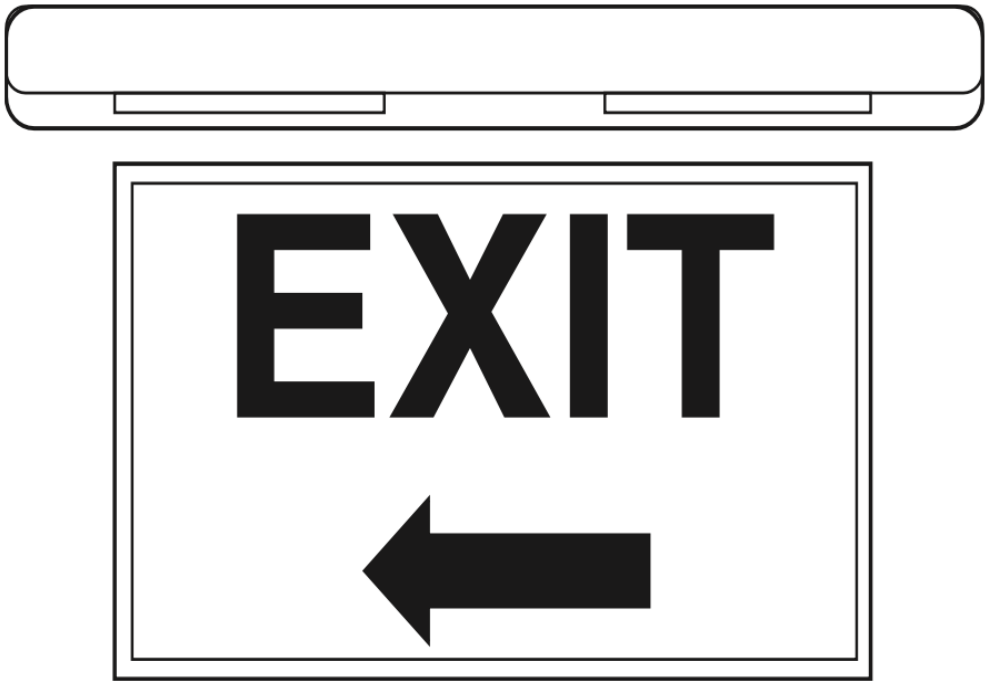
Source: 2021 IBC

1013.3, 1013.6.3 Illumination and Power Source

- Exit signs shall be internally or externally illuminated. See the exception for tactile signs. Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means shall be connected to an emergency system provided from storage batteries, unit equipment or an on-site generator.
- To ensure visibility under all conditions, required exit signs must always be illuminated. For those signs that are internally illuminated, which make up the vast majority of exit signs, compliance with UL 924 is mandated. Such exit signs, which includes electrically- powered, self-luminous and photo luminescent signs, must be listed and labeled. In addition, they must be installed in accordance with the manufacturer's installation instructions.

Source: 2021 IBC

1013.3, 1013.6.3 Illumination and Power Source



Externally-illuminated exit signs are regulated through prescriptive requirements addressing the sign's graphics, illumination and power source. The word "EXIT" must be at least 6 inches in height, and at least 5 foot-candles of external illumination must be provided.

Source: 2021 IBC

1014 Guard and Hand Rail

[When Do You Install A Guardrail or Handrail When Building Stairs? - Builders Education And Safety - YouTube]

[Code Compliance for Handrails and Guardrails - YouTube]

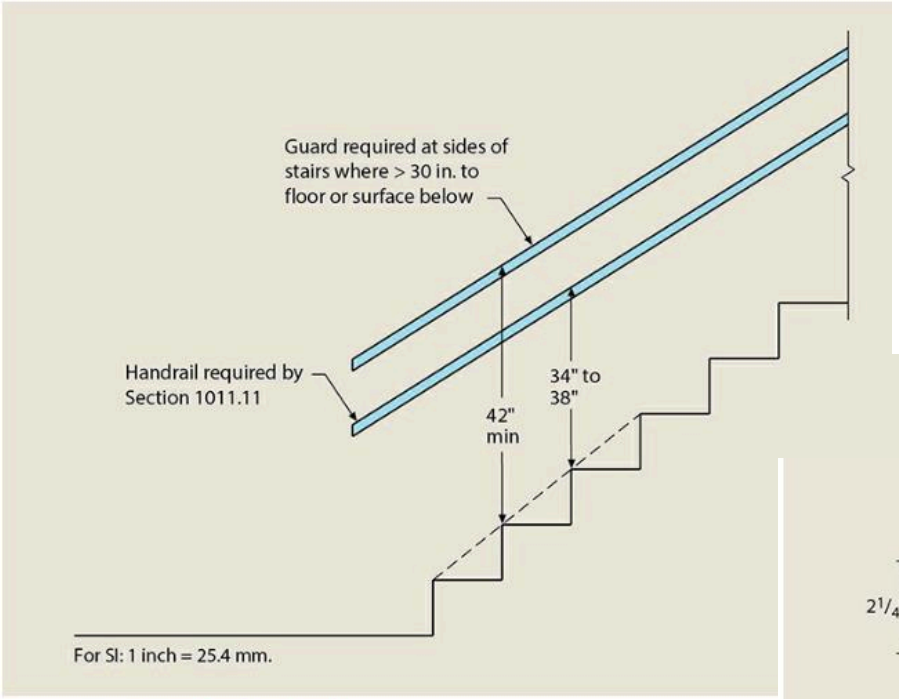


Figure 1014-1 **Guard and handrail.**

Figure 1014-6 **Ramp handrail extensions.**

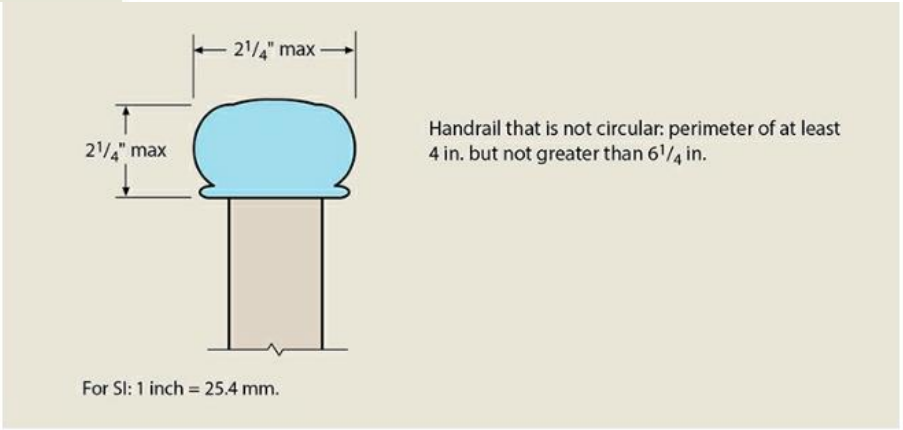


Figure 1014-2 **Noncircular handrail.**

Source: 2021 IBC

1028 Exit Discharge

Exits are intended to discharge directly to the exterior of the building. Three exceptions permit the exit path to include a portion of the building beyond the exit component. An exception to the requirements for the continuity of interior exit stairways (and ramps) is permitted where a maximum of 50 percent of the exits pass through areas on the level of exit discharge. The path of travel to the exterior must be unobstructed and easily recognized. Sprinkler protection is required for the egress path between the termination of the interior exit stairway to the building's exterior, as is fire-resistance-rated construction isolating any areas below the discharge level.

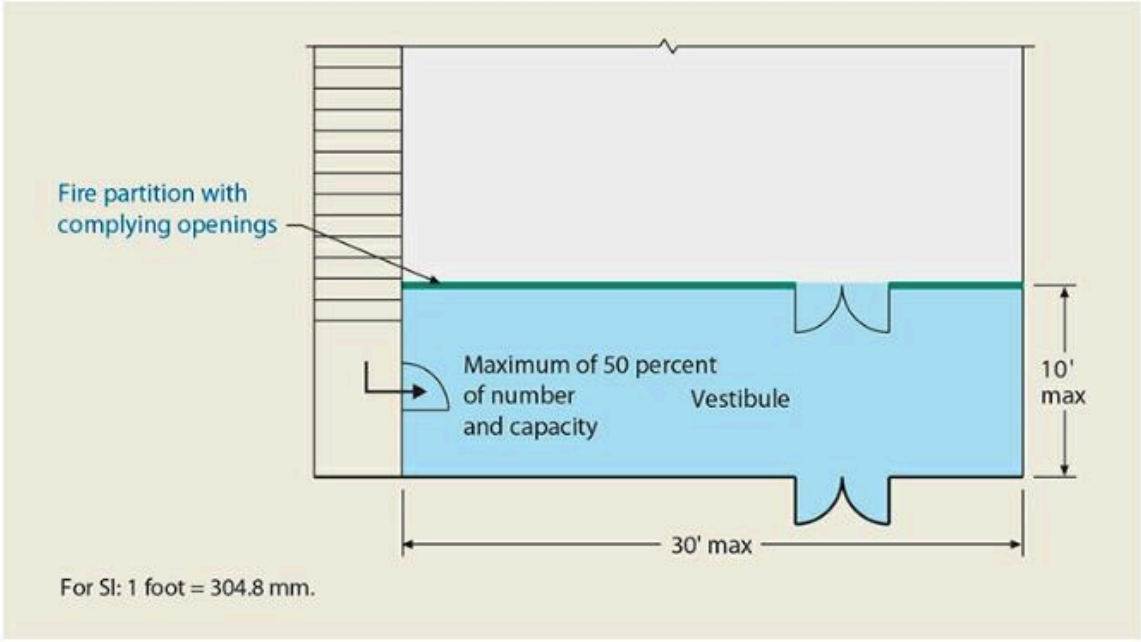


Figure 1028-2 **Exit discharge through vestibule.**

Source: 2021 IBC

Class 10:
Chapter 10, Sections 1010 through 1012 and 1014

Source: 2021 IBC

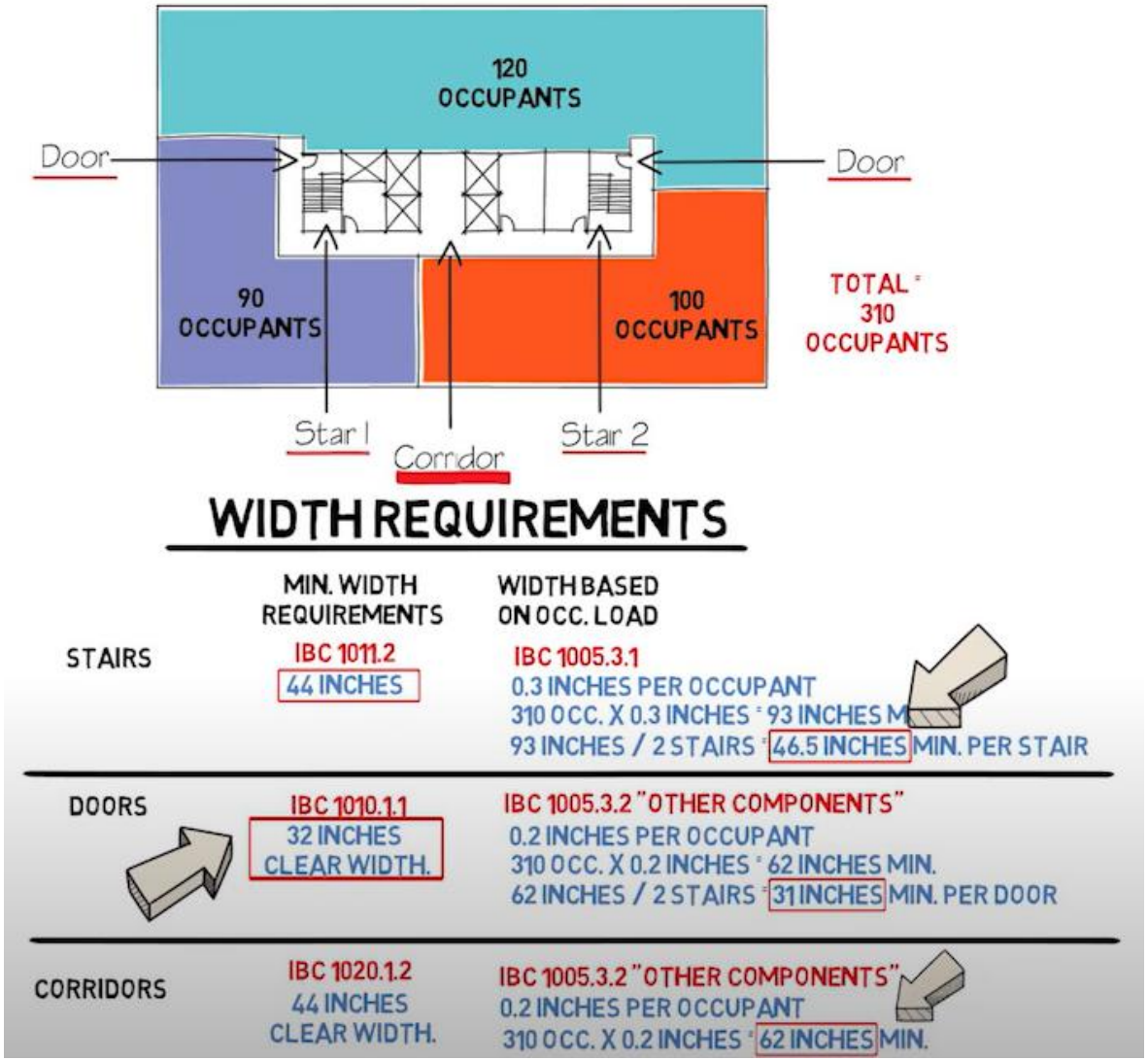
Chapter Overview

Exit Access
Exit
Exit Discharge
Special Attention

[AC 027 - IBC requirements: What is the required distance between exit doors? - YouTube]

Source: 2021 IBC

1010 Objective



Source: 2021 IBC

1010 Objective

- To obtain an understanding of the general system design requirements of a means of egress system, including the determination of occupant load, the required width and capacity of egress components, means of egress identification and illumination, accessible means of egress and the provisions regulating guards.

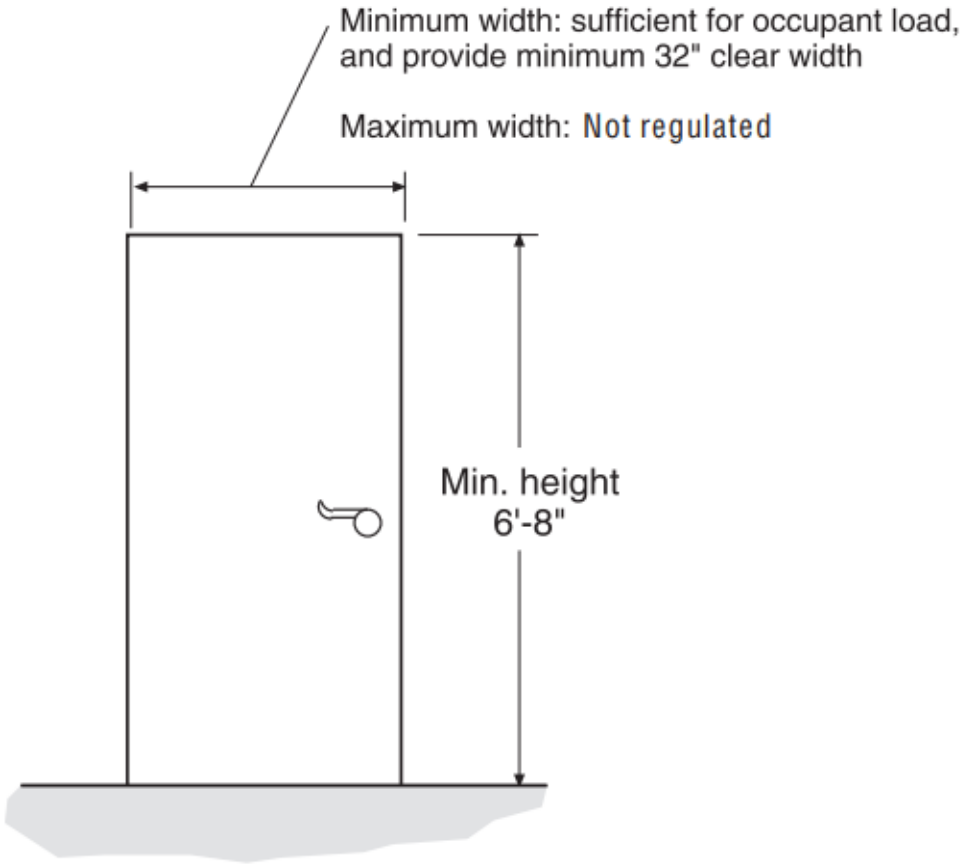
AC 030 - Occupant Load vs Occupancy Groups - YouTube

AC 029 - Number of Exits, Travel Distance & Common Path of Travel - YouTube

Calculating Occupant Loads and Egress Width - YouTube

Source: 2021 IBC

1010.1 Additional Doors and Identification



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

In accordance with Section 1022.2, any building or structure used for human occupancy must have at least one exterior door opening that complies with the minimum width (32 inches) and height (80 inches) requirements of Section 1010.1.1.

Source: 2021 IBC

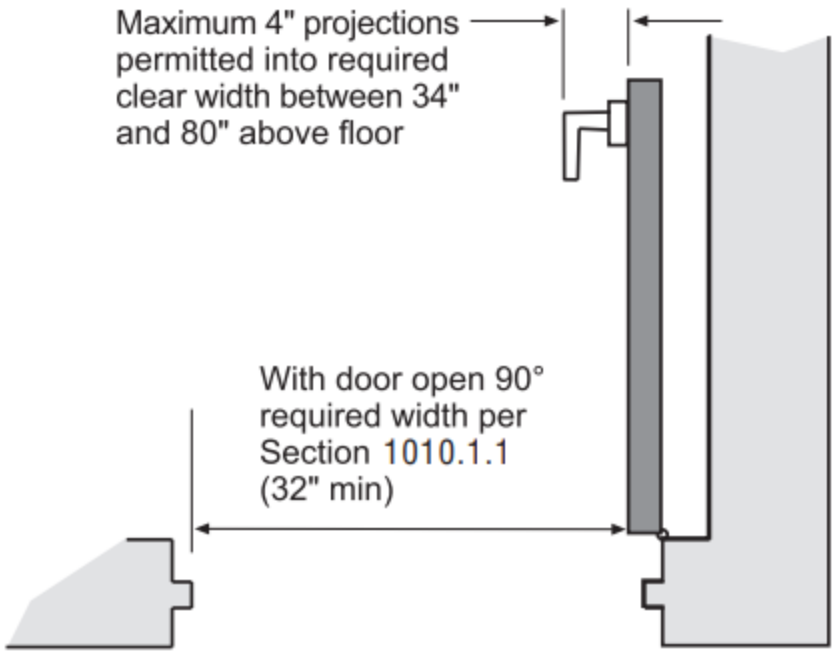
1010.1.1 Sizes of Doors

- The required capacity of each door opening shall be sufficient for the occupant load thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). The minimum clear opening height of doors shall not be less than 80 inches (2032 mm). See the exceptions for clear opening width.
- A clear width of 32 inches is required only to a height of 34 inches above the floor or ground. Beyond this point, projections up to 4 inches into the required width are permitted. Although a single doorway is expected to be used for the egress of one individual at a time, it must also be of adequate width for wheelchair users.

Optional Decoded: Egress Requirements for Door Openings - YouTube

Source: 2021 IBC

1010.1.1 Sizes of Doors



Egress width at doors is net dimension

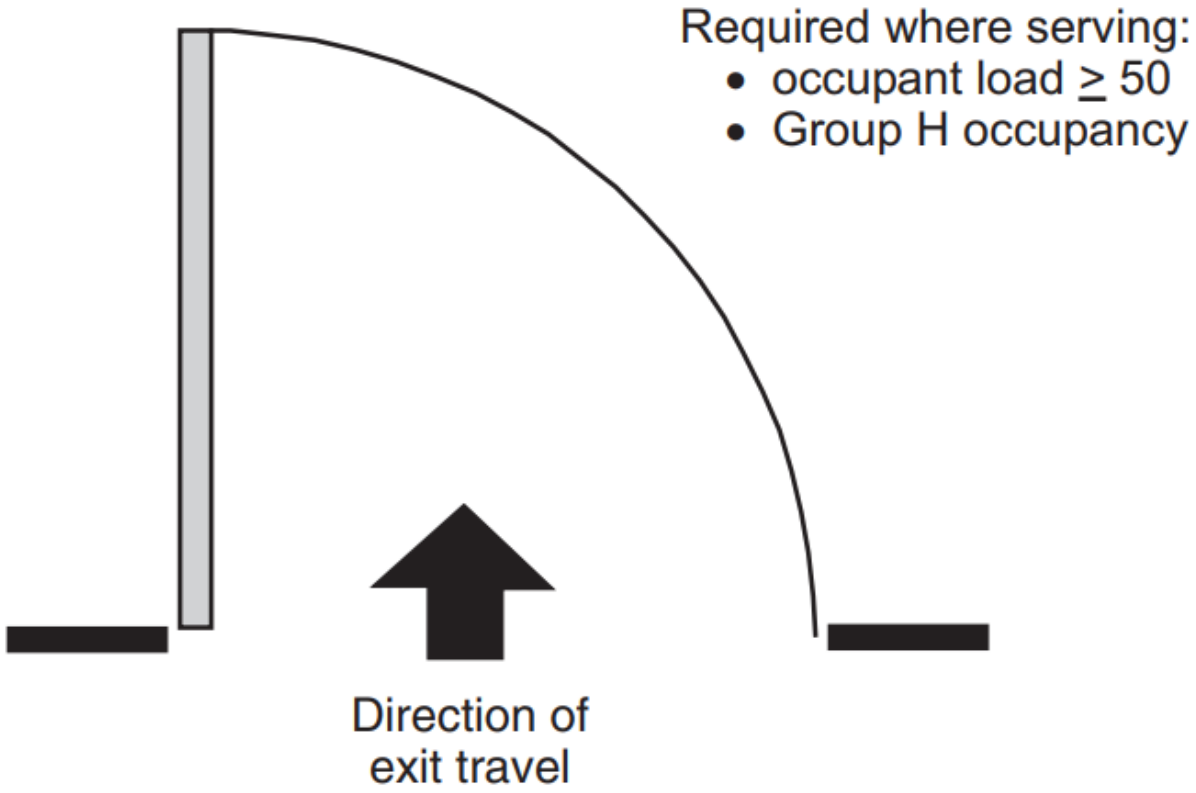
For SI: 1 inch = 25.4 mm, 1 degree = 0.01745 rad.

The maximum width of a door leaf is not regulated by the code. It is expected that a reasonable door opening effort is addressed in Section 1010.1.3 through the regulation of force levels necessary to unlatch and open a door.

Source: 2021 IBC

1010.1.2 Sizes of Doors

Which Doors Can Swing or Open Over A Stairway? - Building Code Information - YouTube

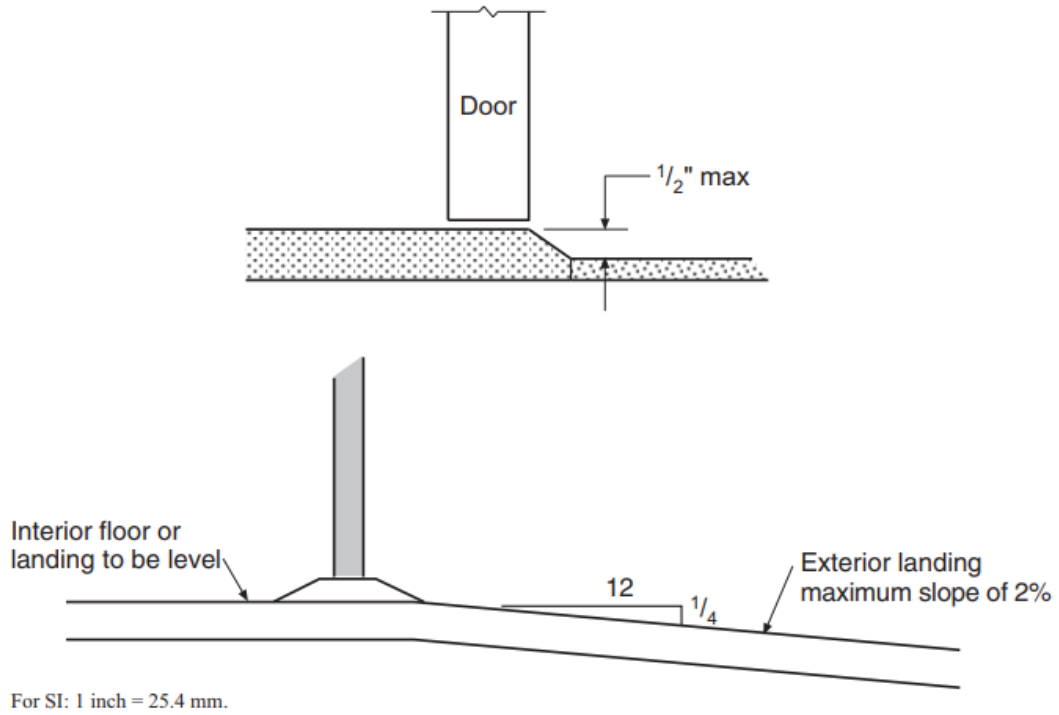


The maximum force needed to unlatch doors in the means of egress is regulated for two conditions: where door hardware operates by push or pull, and where door hardware operates by rotation. The force required to open the door is regulated based on the specific door type.

Source: 2021 IBC

1010.1.4 Floor Elevation

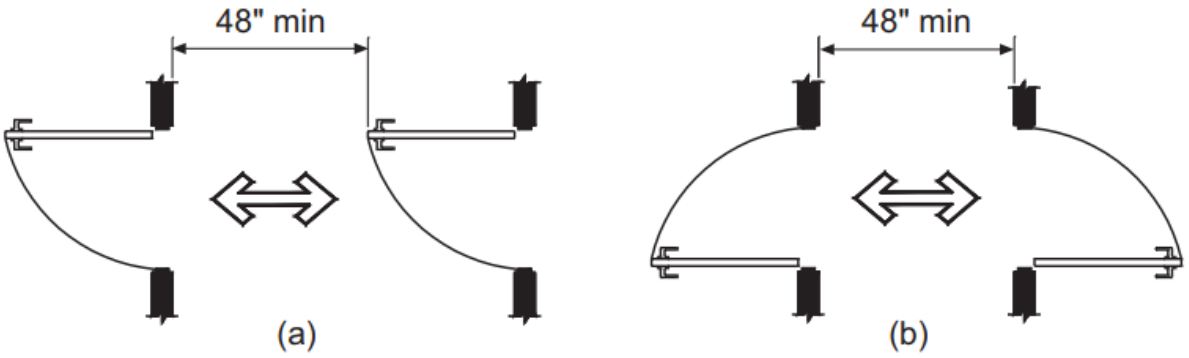
Forensic Architecture Elevation Changes in International Building Code. - YouTube



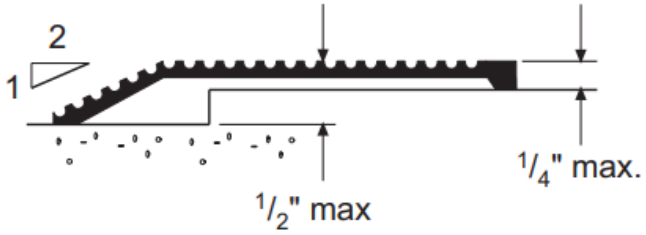
For interior situations, landings should be level. In exterior applications, landings may have a slope not to exceed $^1/_4$ unit vertical in 12 units horizontal (1:48). This maximum slope of 2 percent provides a relatively flat surface while maintaining adequate drainage.

Source: 2021 IBC

1010.1.7 Door Arrangement



Two doors in series



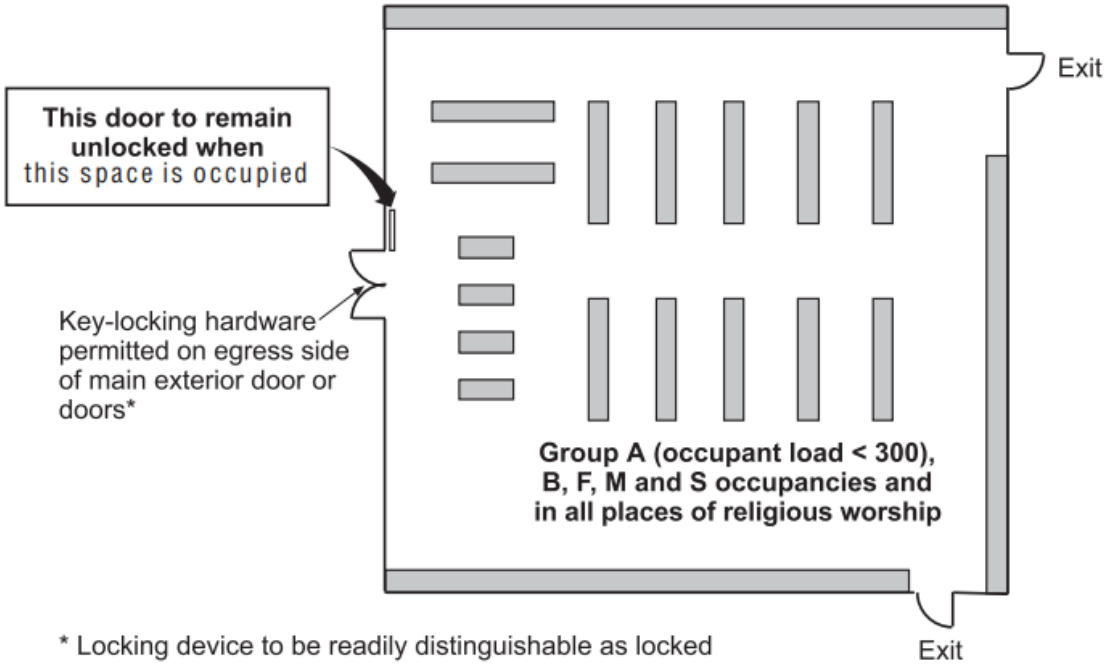
Threshold height

For SI: 1 inch = 25.4 mm.

It is also important that a threshold at a door does not overly restrict safe and efficient passage through the doorway. Where a bevel of 1:2 or less is provided, the maximum threshold height is $^1/_2$ inch. Otherwise, an abrupt change in elevation is limited to $^1/_4$ inch.

Source: 2021 IBC

1010.2 Operations



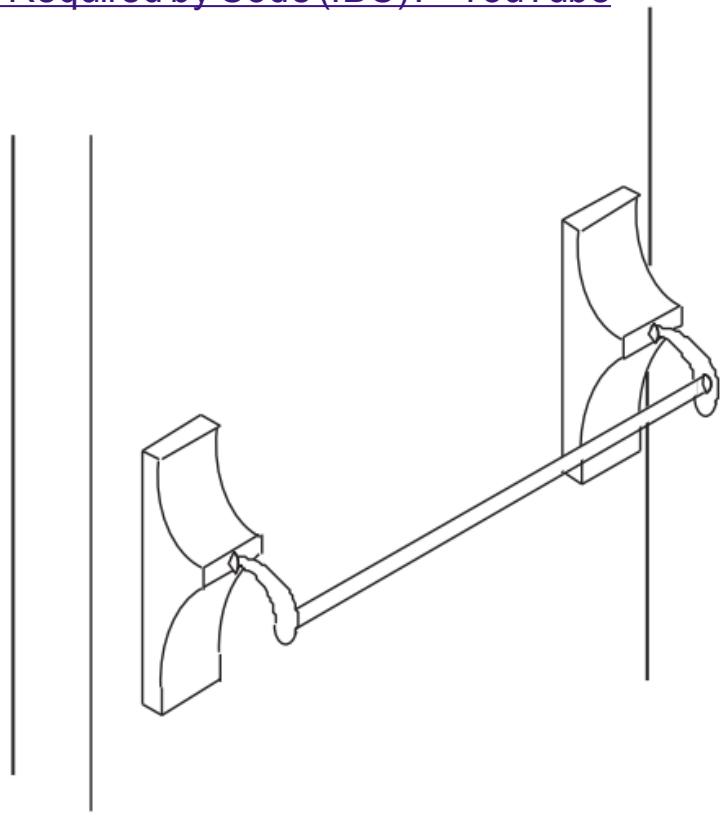
Section 1010.2.4, Exc. 3

A major exception to the lock/latch provisions applies to Groups B, F, M and S occupancies, as well as to places of religious worship and smaller assembly uses. Key-operated locking devices from the egress side of doors are permitted under limited conditions, based on compensating safeguards.

Source: 2021 IBC

1010.2.9 Panic and Fire Exit Hardware

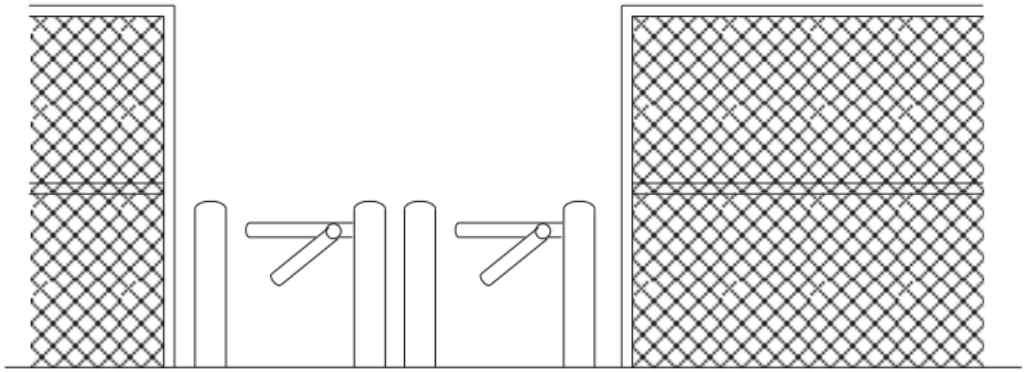
AC 017 - Egress: Where is Panic Hardware or Fire Exit Hardware Required by Code (IBC)? - YouTube



To ensure that contact with the door actuates the releasing device, the code requires that the actuating portion extend for at least one half of the door width. Where balanced or pivoted doors are used, the device width is again limited to one-half of the door width for leverage purposes.

Source: 2021 IBC

1010.5 Turnstiles



Each turnstile credited for up to 50-person capacity for egress where each turnstile:

- Will turn freely in direction of egress when power is lost, and upon manual release by employee in area
- Only given credit for 50% of required egress capacity (egress other than by turnstiles required)
- Limited to 39 inches in height
- Has minimum of $16^{1}/_{2}$ inches clear width at and below height of 39 inches
- Has minimum of 22 inches clear width at height above 39 inches

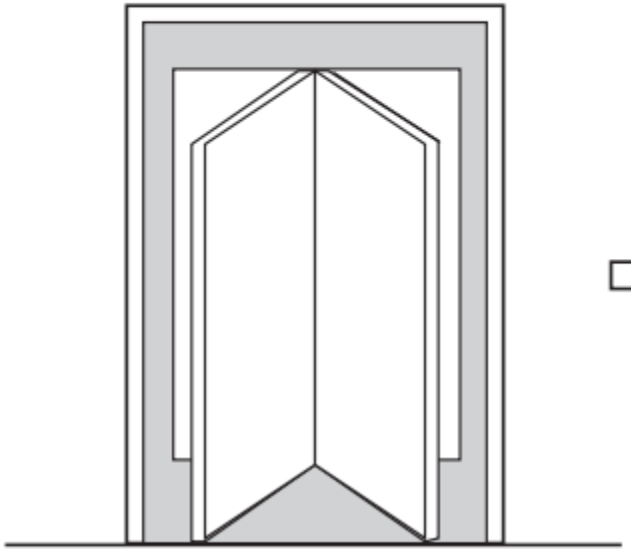
---

Where the turnstile has a height exceeding 39 inches, the restriction to egress is much like that of a revolving door, and the provisions in Section 1010.3.1 apply to this higher type of turnstile. Compliance as a security access turnstile is also permitted.

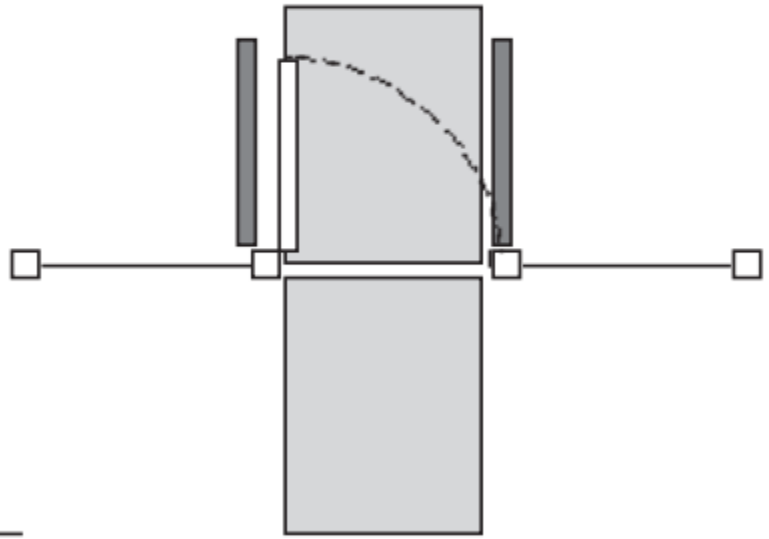
Source: 2021 IBC

1010.3 Special Doors

Revolving door



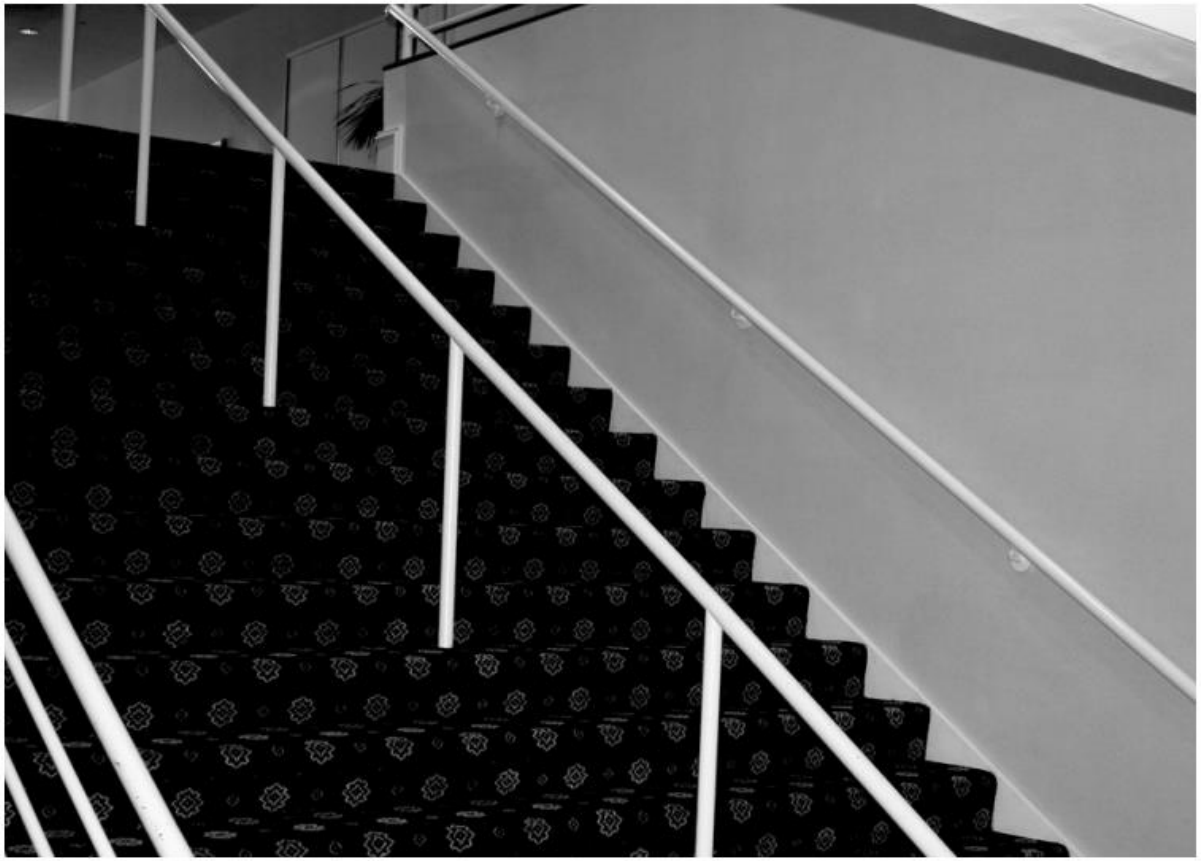
Power-operated door



The various types of special doors are permitted to be used for egress purposes when regulated by occupancy, occupant load, operation, opening force, power supply or other factors that contribute to the effectiveness and reliability of the egress door.

Source: 2021 IBC

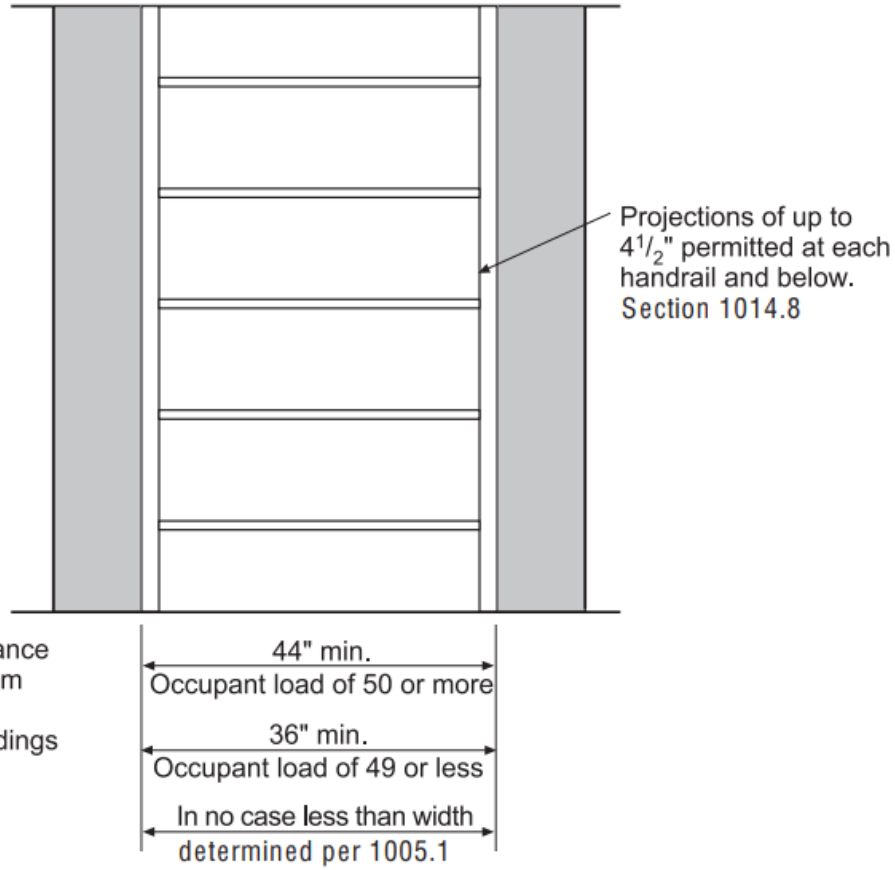
1011.1 General Provision Stairways



The provisions of Section 1011 regulating the design and construction of stairways are applicable to all stairways, including those that may be considered only “convenience” stairs and not considered a portion of any required means of egress.

Source: 2021 IBC

1011.2, 1014.8 Stairways Width

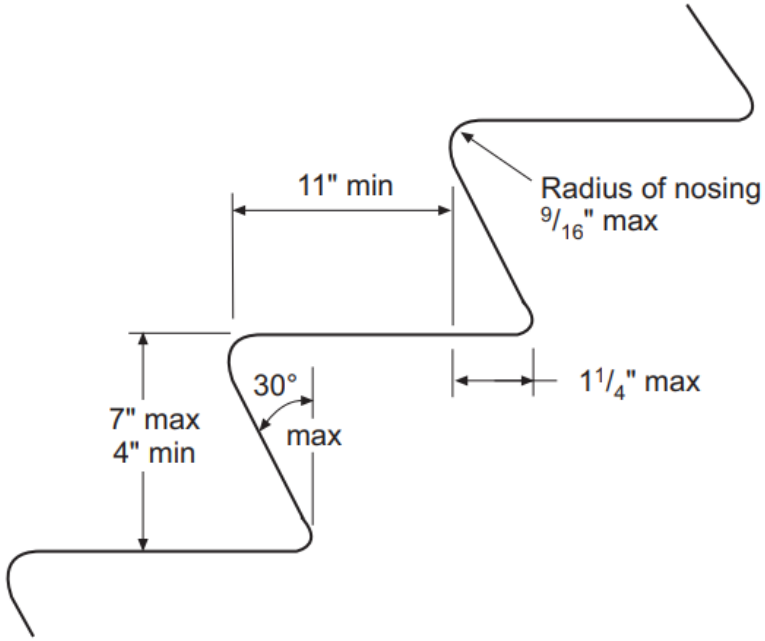


For SI: 1 inch = 25.4 mm.

Stringers, trim and similar decorative features may project a limited amount into the required stairway width unless located above the handrail. Between the rail and the required headroom height of 80 inches, no projection into the required width is permitted.

Source: 2021 IBC

1011.5 Stair Treads and Risers



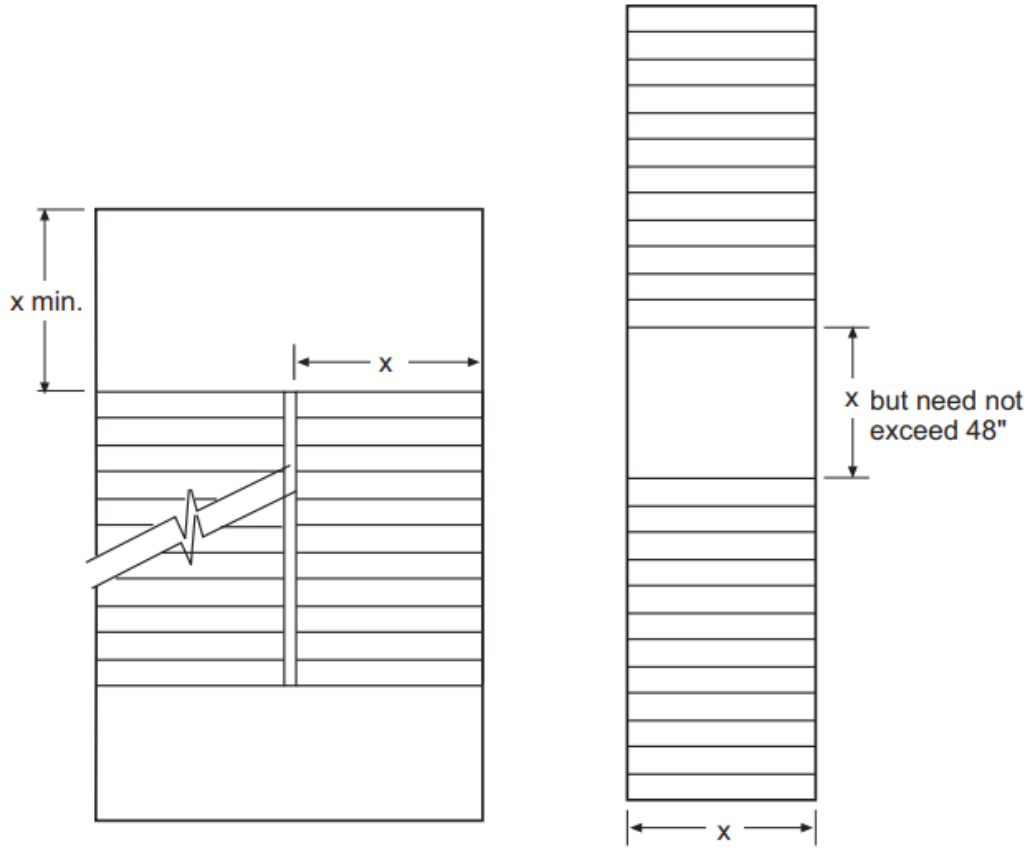
Treads and risers to be of uniform size and shape
(3/8" tolerance permitted between least and greatest within flight)

For SI: 1 inch = 25.4 mm, 1 degree = 0.01745 rad.

Curved stairways, winders, spiral stairways, aisle stairs and alternating tread devices are unique configurations requiring special consideration. The use of these stairways is limited to varying degrees based on occupancy, occupant load, design and use as a required means of egress.

Source: 2021 IBC

1011.6 Stairway Landing

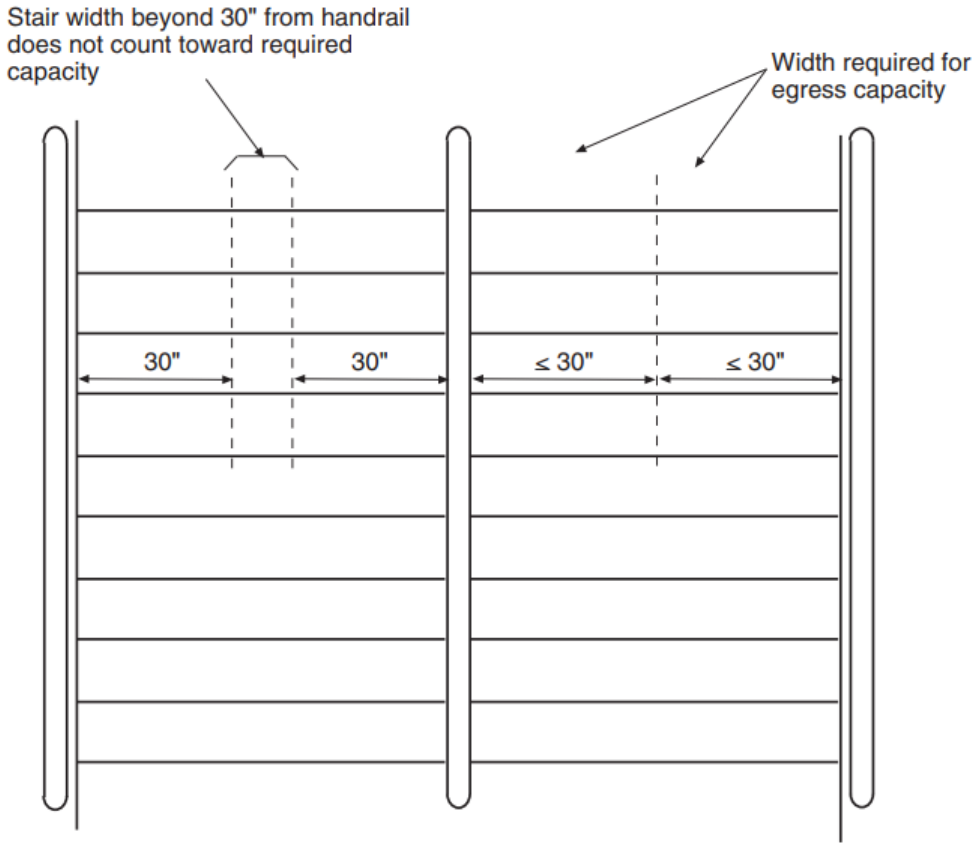


For SI: 1 inch = 25.4 mm.

Because of the difficulty many individuals encounter while negotiating stairs, the code requires a maximum vertical rise between landings of 12 feet. When placed at limited intervals, landings can be used as a resting place for the stair user and can also make stair travel less intimidating.

Source: 2021 IBC

1011.11, 1014.9 Handrail Locations

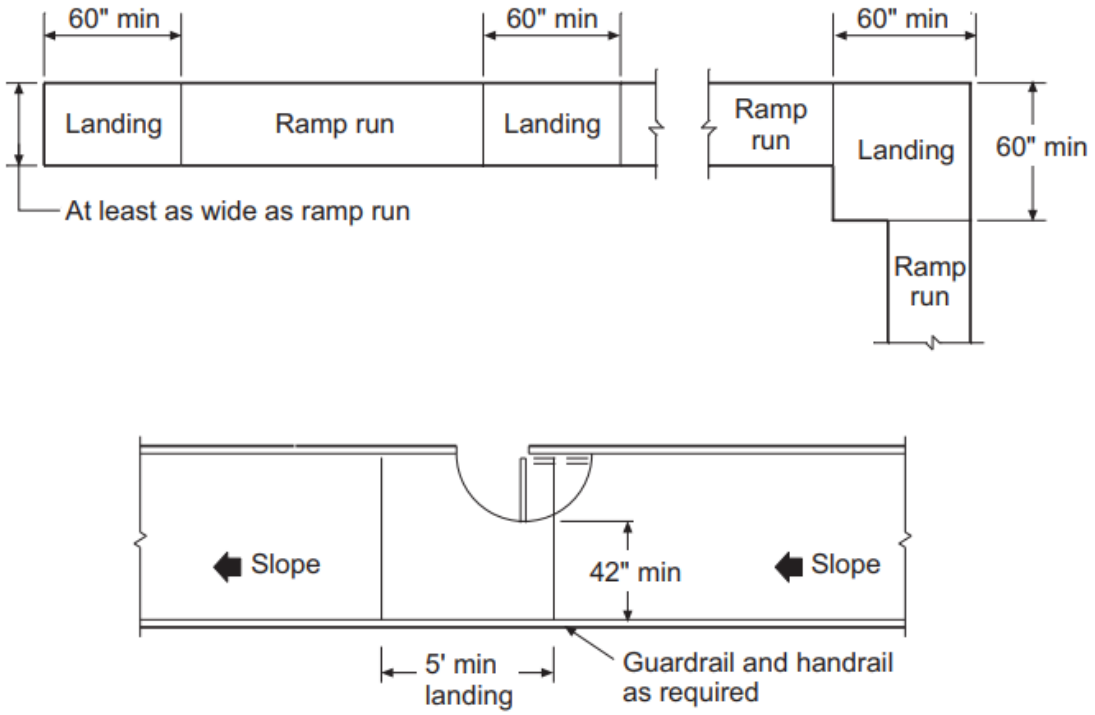


For SI: 1 inch = 25.4 mm.

Various exceptions permit the use of a single handrail, and in some cases no rail, within a dwelling unit. In addition, and applicable to all occupancies, handrails are not required for decks, patios and walkways at any single elevation change where complying landings are provided on each side.

Source: 2021 IBC

1012 Slope, Rise, Width and Handrails

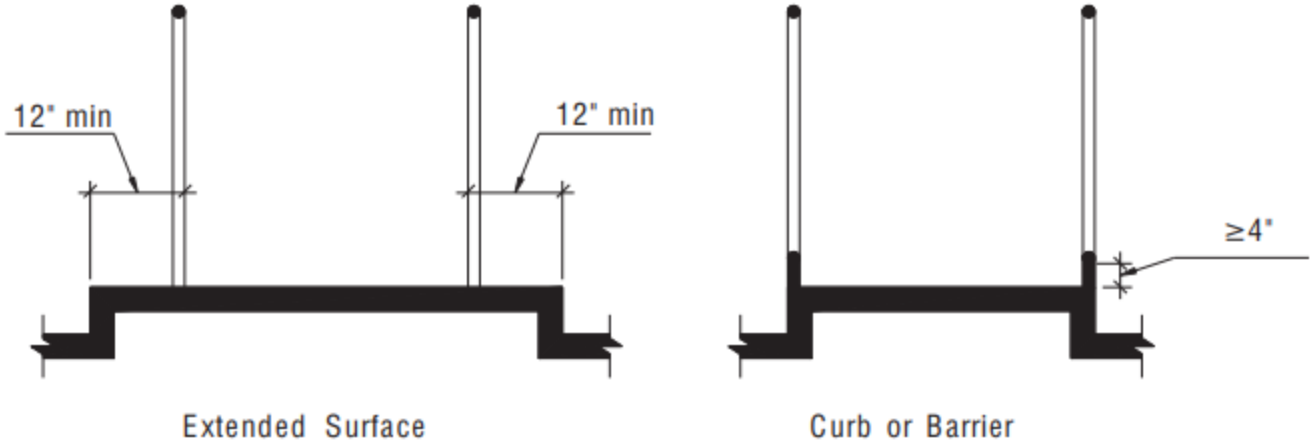


For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

To provide adequate clearance at ramp landings, doors cannot reduce the clear landing width to less than 42 inches. A landing must be at least 60 inches in length and at least as wide as the widest ramp run adjoining the landing.

Source: 2021 IBC

1012.19 Edge Protection



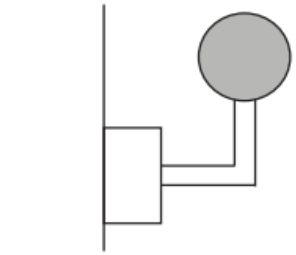
For SI: 1 inch = 25.4 mm

Edge protection is different than that type of protection provided by a guard. The presence of a complying guard does not necessarily provide adequate edge protection, and the presence of adequate edge protection does not typically satisfy the requirements for a guard.

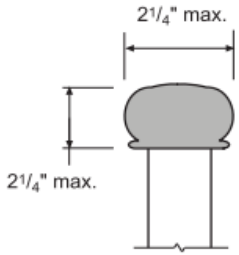
Source: 2021 IBC

1014.2, 1014.3 Handrail Dimensions

Geeking Out on Building Codes | Handrails - YouTube

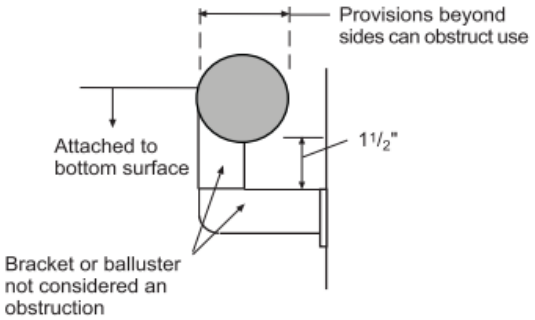


HANDRAIL with circular cross section: $1^1/_4$" min., 2" max. diameter or provide equivalent graspability

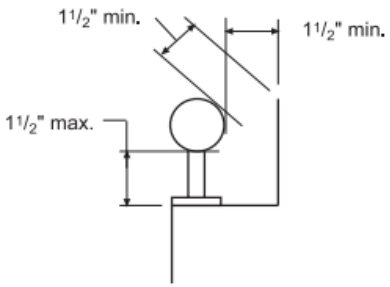


HANDRAIL that is not circular: perimeter of at least 4" but not greater than $6^1/_4$"

TYPE I HANDRAILS



Section 1014.4



Section 1014.7

For SI: 1 inch = 25.4 mm.

A major goal of handrail design and location is to make it easily graspable; hence, it is mandatory that the rail be placed at least $1^1/_2$ inches from any abutting elements, such as a wall. However, the projection of the rail into the required width is limited to no more than $4^1/_2$ inches.

Source: 2021 IBC

Class 11:
Chapter 10, Sections 1006, 1007 and through 1016 and 1021

Source: 2021 IBC

1006.2.1 Occupant Load and Common Path

TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A[c], E, M	49	75	75	75[a]
B	49	100	75	100[a]
F	49	75	75	100[a]
H-1, H-2, H-3	3	NP	NP	25[b]
H-4, H-5	10	NP	NP	75[b]
I-1, I-2[d], I-4	10	NP	NP	75[a]
I-3	10	NP	NP	100[a]
R-1	10	NP	NP	75[a]
R-2	20	NP	NP	125[a]
R-3[e]	20	NP	NP	125[a, g]
R-4[e]	20	NP	NP	125[a, g]
S[f]	29	100	75	100[a]
U	49	100	75	75[a]

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.

a. 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.

b. Group H occupancies equipped throughout with an *automatic sprinkler system* in accordance with Section 903.2.5.

c. For a room or space used for assembly purposes having *fixed seating*, see Section 1029.8.

d. For the travel distance limitations in Group I-2, see Section 407.4.

e. The *common path of egress travel* distance shall only apply in a Group R-3 occupancy located in a mixed occupancy building.

f. The length of *common path of egress travel* distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

g. For the travel distance limitations in Groups R-3 and R-4 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.3, see Section 1006.2.2.6.

Two basic criteria establish the point at which it is necessary to provide at least two paths of egress travel from a portion of a building. Both the maximum occupant load and the maximum common path must not be exceeded in spaces having only one exit or exit access doorway.

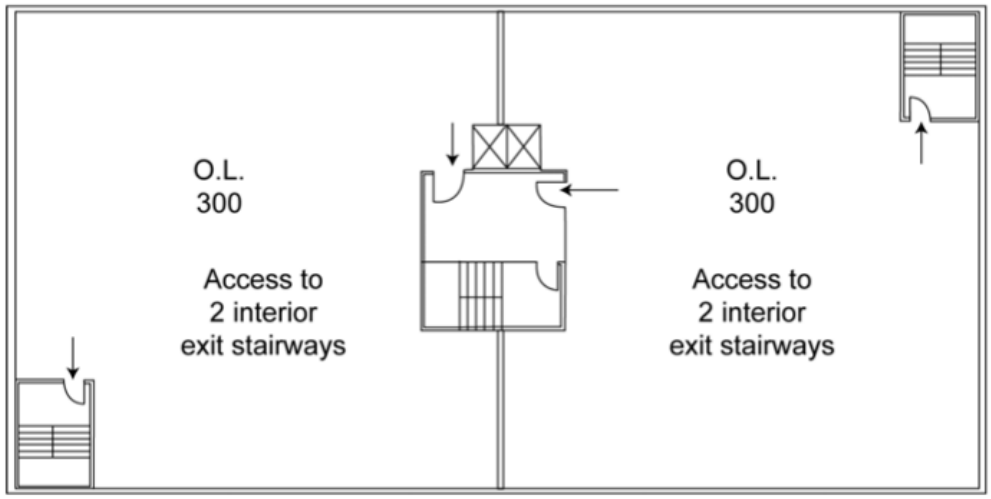
Source: 2021 IBC

1006.3.2 Based on Occupant Load

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

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

Total O.L. = 600
3 exits required from story



Exits from Stories

Although the use of exit access stairways is permitted to connect stories within a building, the path of egress travel to an exit is limited in a manner such that it cannot pass through more than one adjacent story. There are seven conditions under which such exit access travel to an exit through multiple stories is permitted.

Source: 2021 IBC

1006.3.4 Single Exits

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

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

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

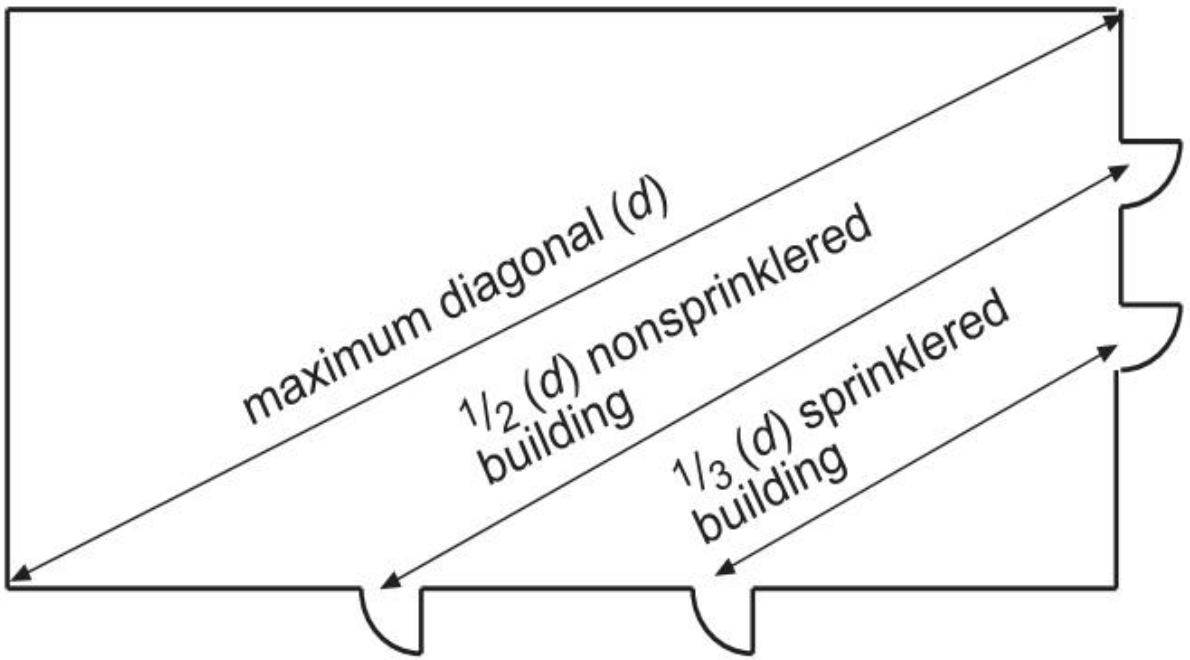
TABLE 1006.3.4(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane	A, B[b], E, F[b], M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2[a, c]	10	75
	S[b, d]	29	75
Second story above grade plane	B, F, M, S[d]	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.
NP = Not Permitted.
NA = Not Applicable.
a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.
b. Group B, F and S occupancies in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall have a maximum exit access travel distance of 100 feet.
c. This table is used for R-2 occupancies consisting of sleeping units. For R-2 occupancies consisting of dwelling units, use Table 1006.3.4(1).
d. The length of exit access travel distance in a Group S-2 open parking garage shall be not more than 100 feet.

Table 1006.3.4(1) is only applicable to Group R-2 occupancies containing dwelling units and allows a single exit from the basement, as well as the first, second and third stories under limited conditions. Table 1006.3.4(2) applies to all other occupancy groups and does not permit a single exit from the third story where serving such occupancies.

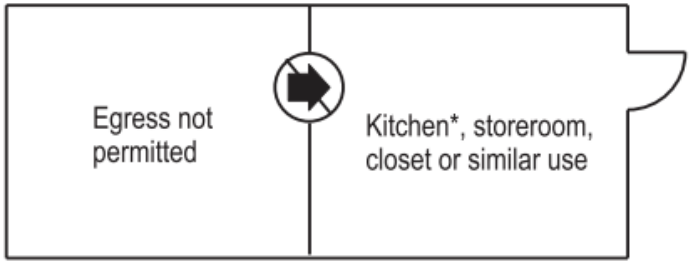
1007.1.1 Doorway Arrangement



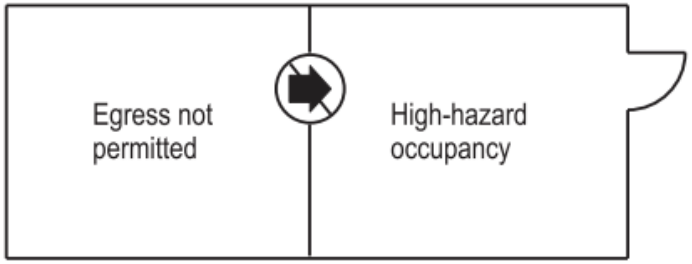
Where more than two exit access doorways are required, they should be situated at reasonable distances from one another so that if one doorway becomes blocked, the others will be available. The use of common sense should dictate the proper separation based on the design and use of the space or room.

Source: 2021 IBC

1016.2, Item 2 Egress through Intervening Spaces



* **Exception**
Kitchen within same dwelling unit or guestroom

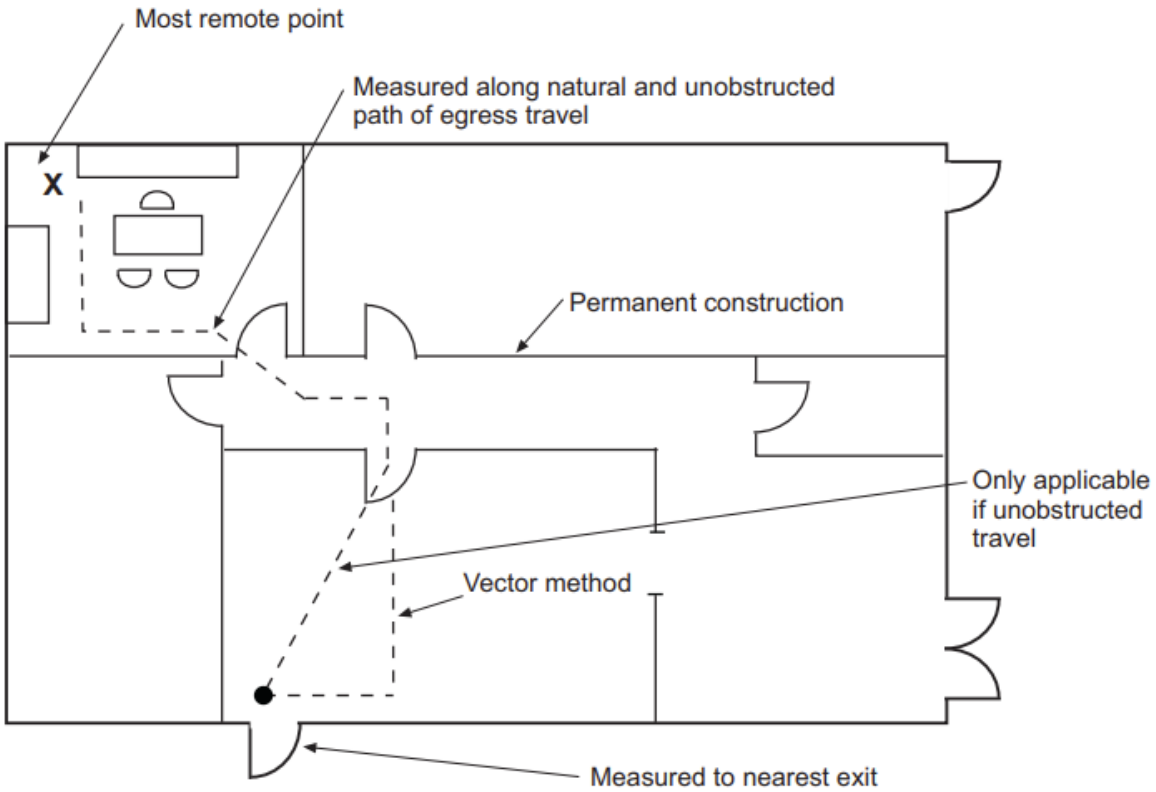


Exception
When space to be entered is the same occupancy group

Similar to an accessible route of travel, egress is limited in that it cannot pass through kitchens, store rooms, closets or spaces used for similar purposes. These types of spaces have a high probability of blocked access and egress, due to obstructions created by the use of the space. A dedicated path created by partial or full-height walls is permitted where exiting through a stockroom serving a Group M occupancy.

Source: 2021 IBC

1017.2, 1017.3 Travel Distance Limitations



In most sprinklered buildings, the code permits a moderate increase in the permitted travel distance over that permitted in nonsprinklered buildings. An increase of 50 feet is typical of most occupancies; however, a travel distance increase of 100 feet is permitted for Group B occupancies protected by a sprinkler system.

Source: 2021 IBC

1017.2, 1017.3 Travel Distance Limitations

TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE[a]

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

For SI: 1 foot = 304.8 mm.

a. See the following sections for modifications to *exit access* travel distance requirements:
Section 402.8: For the distance limitation in malls.
Section 407.4: For the distance limitation in Group I-2.
Sections 408.6.1 and 408.8.1: For the distance limitations in Group I-3.
Section 411.2: For the distance limitation in special amusement areas.
Section 412.6: For the distance limitations in aircraft manufacturing facilities.
Section 1006.2.2.2: For the distance limitation in refrigeration machinery rooms.
Section 1006.2.2.3: For the distance limitation in refrigerated rooms and spaces.
Section 1006.3.4: For buildings with one exit.
Section 1017.2.2: For increased distance limitation in Groups F-1 and S-1.
Section 1030.7: For increased limitation in assembly seating.
Section 3103.4: For temporary structures.
Section 3104.9: For pedestrian walkways.

b. 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.

c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

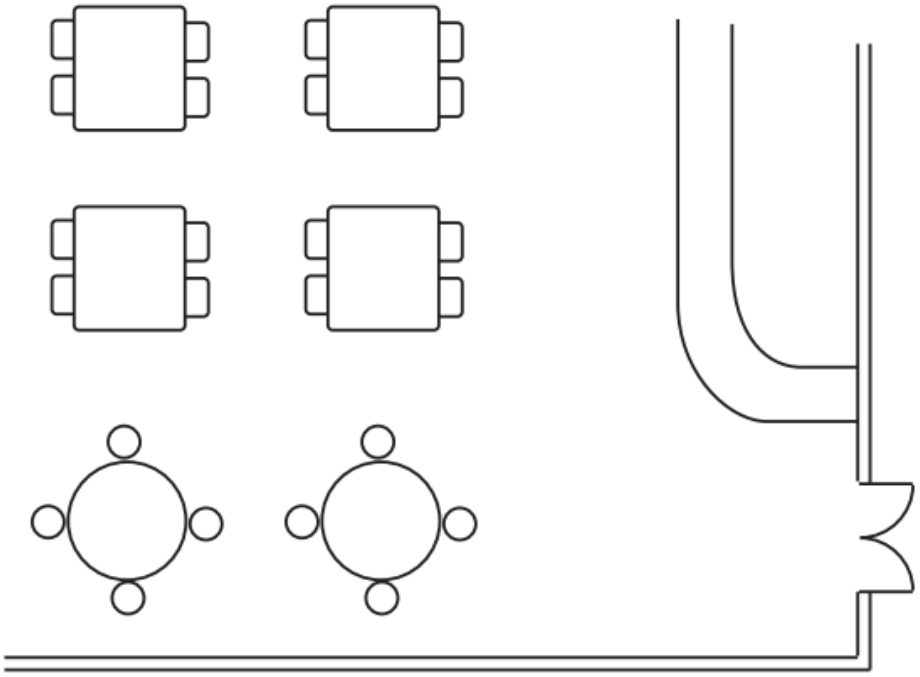
d. Group H occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.1.

e. Group R-3 and R-4 buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3. See Section 903.2.8 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.3.

As an example, where an exit access stairway is provided as a sole means of egress from a mezzanine, the travel distance would be measured from the most remote point on the mezzanine, down the stairway and continue until reaching the entrance to the nearest exit.

Source: 2021 IBC

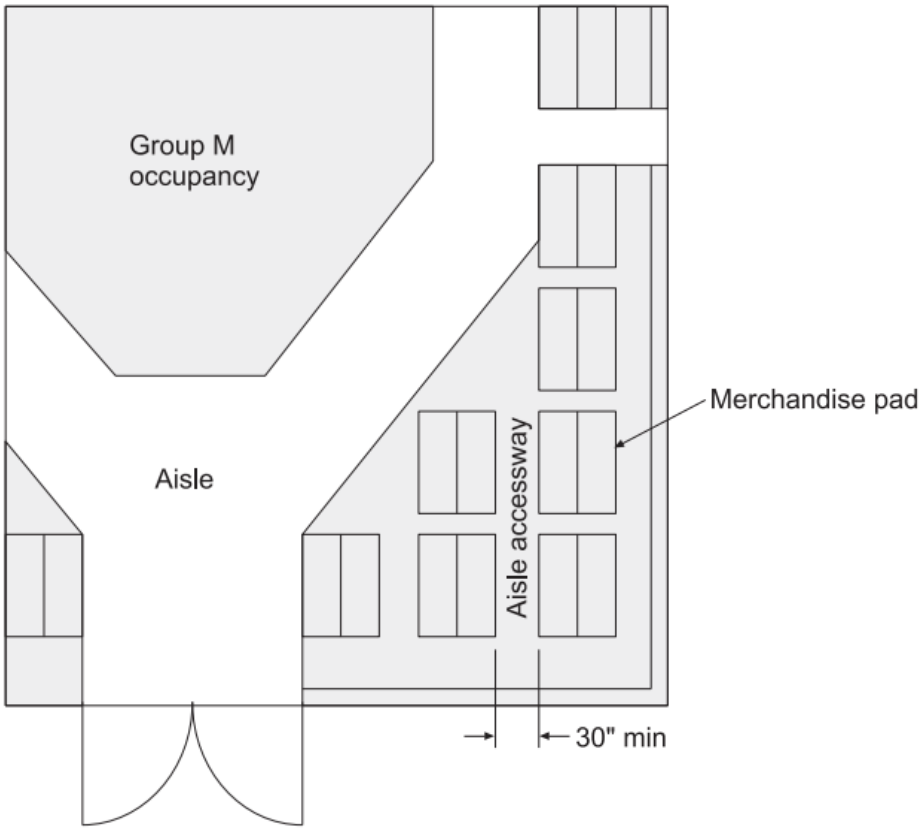
1018.1 Aisles



At least 28 inches of egress width are required for nonpublic aisles not required to be accessible, provided they serve less than 50 persons.

Source: 2021 IBC

1018.4 Aisles Accessway in Group M



For SI: 1 inch = 25.4 mm

Within a merchandise pad, the common path of travel is limited to 75 feet in length. Where the occupant load of the area served by the common path exceeds 50 persons, the common path cannot exceed 30 feet in length from any point in the merchandise pad.

Source: 2021 IBC

1020.1 Corridor Construction

Corridor Inspection - YouTube

TABLE 1020.2
CORRIDOR FIRE-RESISTANCE RATING

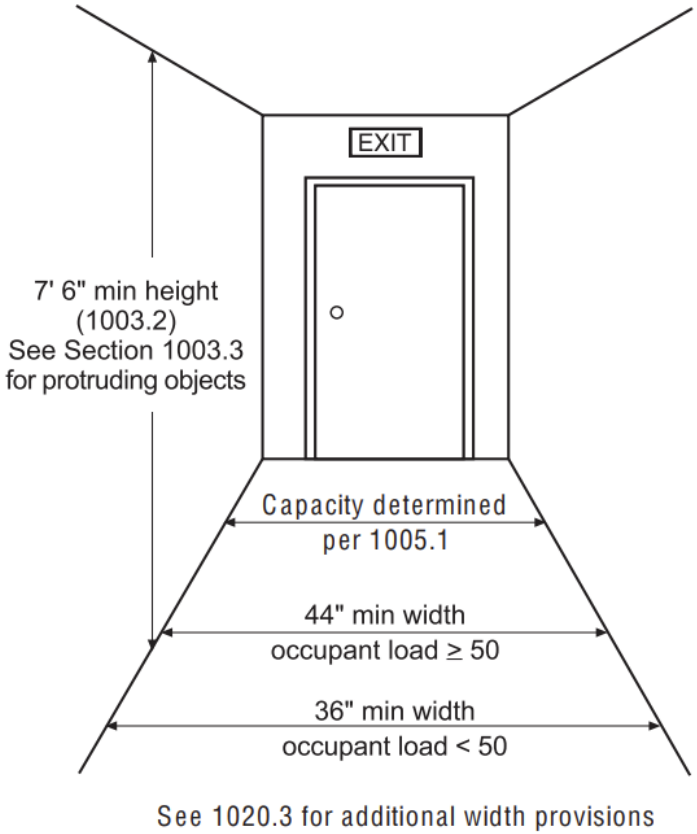
OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system
H-1, H-2, H-3	All	Not Permitted	1[c]
H-4, H-5	Greater than 30	Not Permitted	1[c]
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	0.5[c]/1[d]
I-2[a]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

a. For requirements for occupancies in Group I-2, see Sections 407.2 and 407.3.
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.8.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.
d. Group R-3 and R-4 buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3. See Section 903.2.8 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.3.

Exceptions eliminate the need for a fire-resistance-rated corridor in certain Group E occupancies, in sleeping units or dwelling units of residential occupancies, in open parking garages and in Group B occupancies that are permitted a single means of egress by Section 1006.2.

Source: 2021 IBC

1020.3 Corridors: Width and Capacity

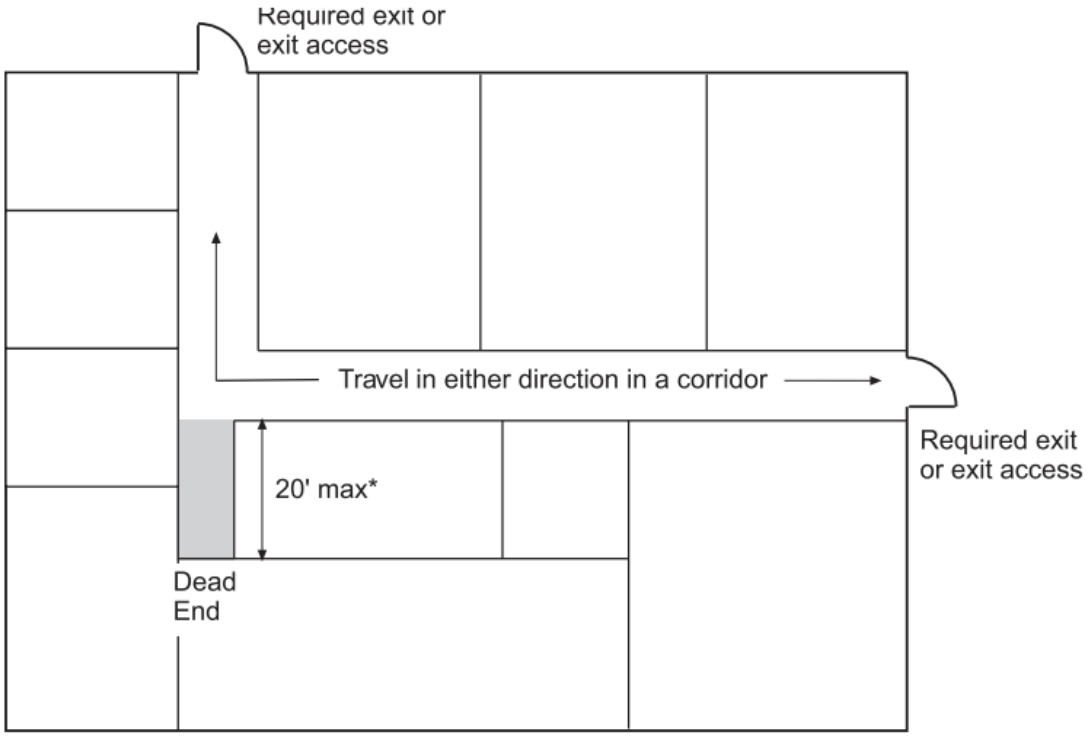


For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Certain occupancies require additional corridor widths based on their specialized uses. Corridors serving 100 or more occupants in Group E educational occupancies must be at least 72 inches in width, and healthcare occupancies require increased widths for bed movement.

Source: 2021 IBC

1020.3 Corridors: Means of Egress



* 50 ft max in sprinklered Group B, E, F, I-1, M, R-1, R-2, R-4, 5 and U occupancies
* Up to 2.5 times the least corridor width
* 50 ft max in I-3 Conditions 2, 3 or 4
*30 ft max in Group I-2, Condition 2 corridors that do not serve patient rooms or treatment spaces

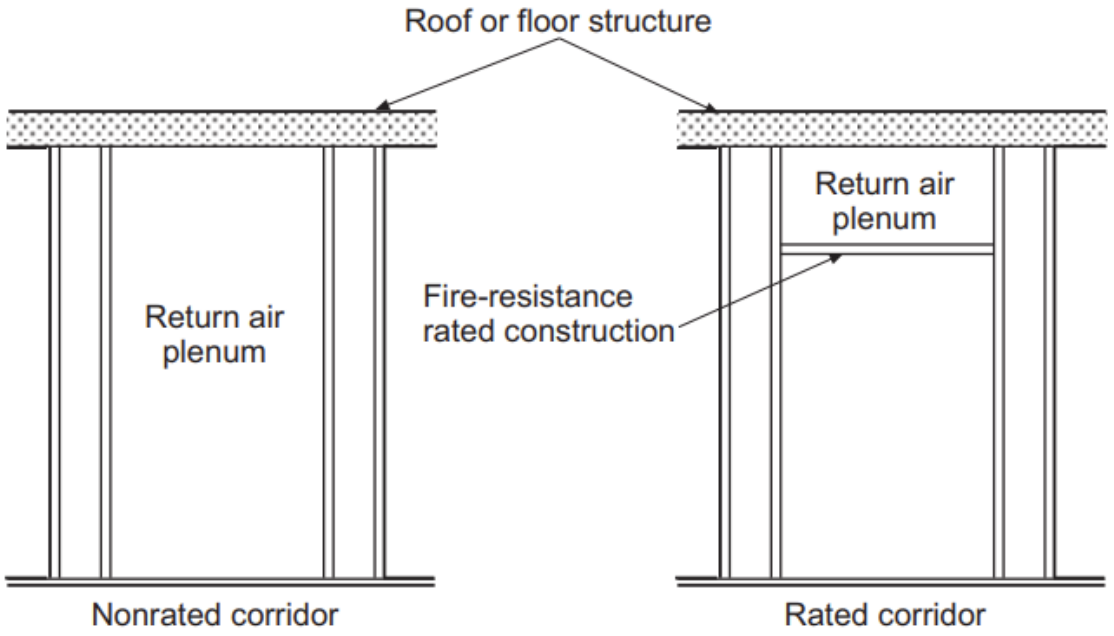
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Once a building occupant enters a corridor during emergency egress conditions, there is an expectation that a direct and obvious exit path is available. Dead-end configurations should be minimal, if not eliminated, to expedite the exiting process.

Source: 2021 IBC

1020.6, 1020.6.1 Air Movement in Corridors: Means of Egress

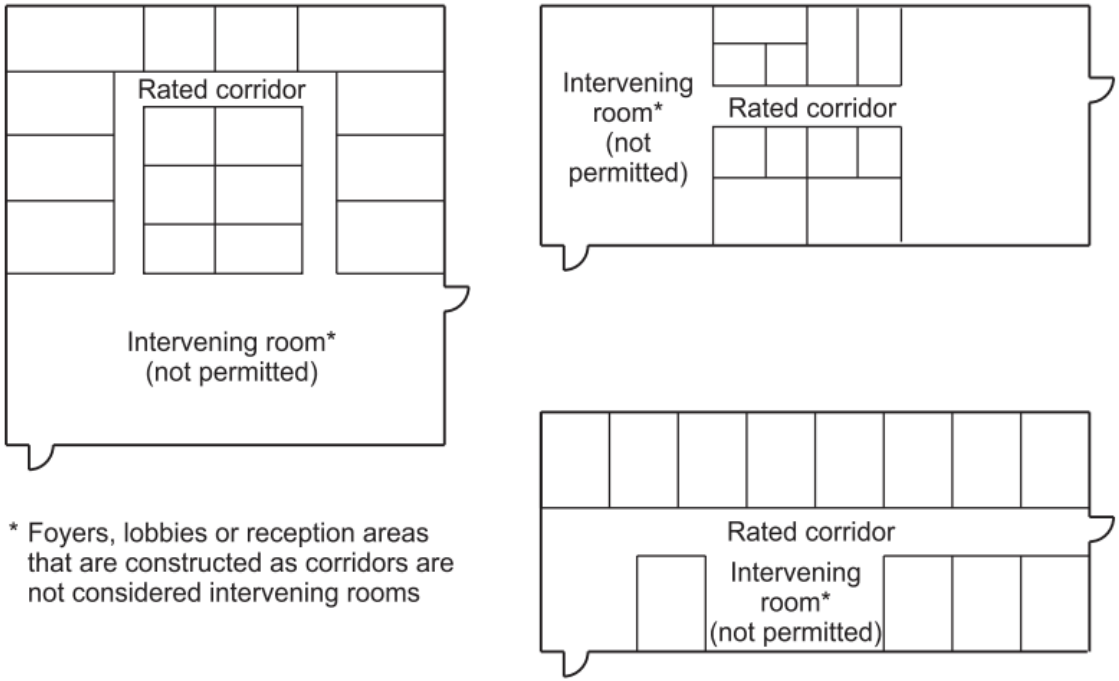
AC 014 - The Best IBC Chapter 10 Overview Ever! (In 10 minutes) - YouTube



Where a corridor is directly supplied with outdoor air, make-up air for exhaust systems in rooms that open directly into a corridor may be taken from the corridor. The rate at which outdoor air is supplied to the corridor must exceed the rate of makeup air taken from the corridor.

Source: 2021 IBC

1020.7 Corridors Continuity



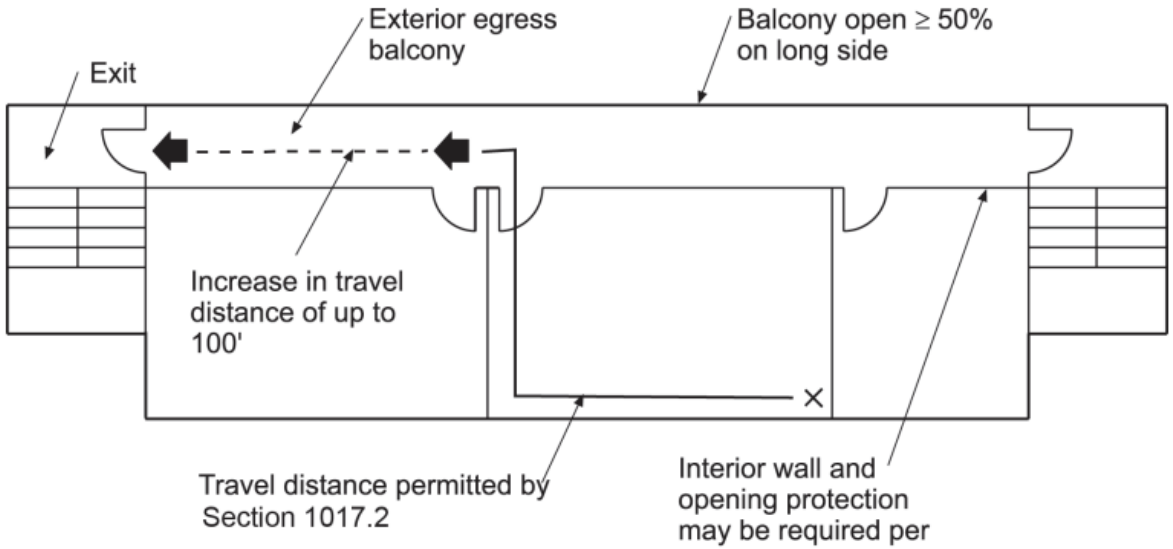
* Foyers, lobbies or reception areas that are constructed as corridors are not considered intervening rooms

Where the path of travel occurs in a corridor not required to be fire-resistance-rated, such travel may then proceed through other intervening spaces, provided all other requirements of the code are met, such as those for common path of egress travel and travel distance.

Source: 2021 IBC

Topic: Egress Balconies
Reference: IBC 1021

Category: Means of Egress
Subject: Exit Access



For SI: 1 foot = 304.8 mm

For an exit access element to be considered an egress balcony, it must be sufficiently open to the exterior to minimize the potential for smoke and toxic gases to accumulate. The code considers openings for at least 50 percent of the long side to be adequately open.

Source: 2021 IBC

2021 IBC Sections 1022 through 1031

Means of Egress IV

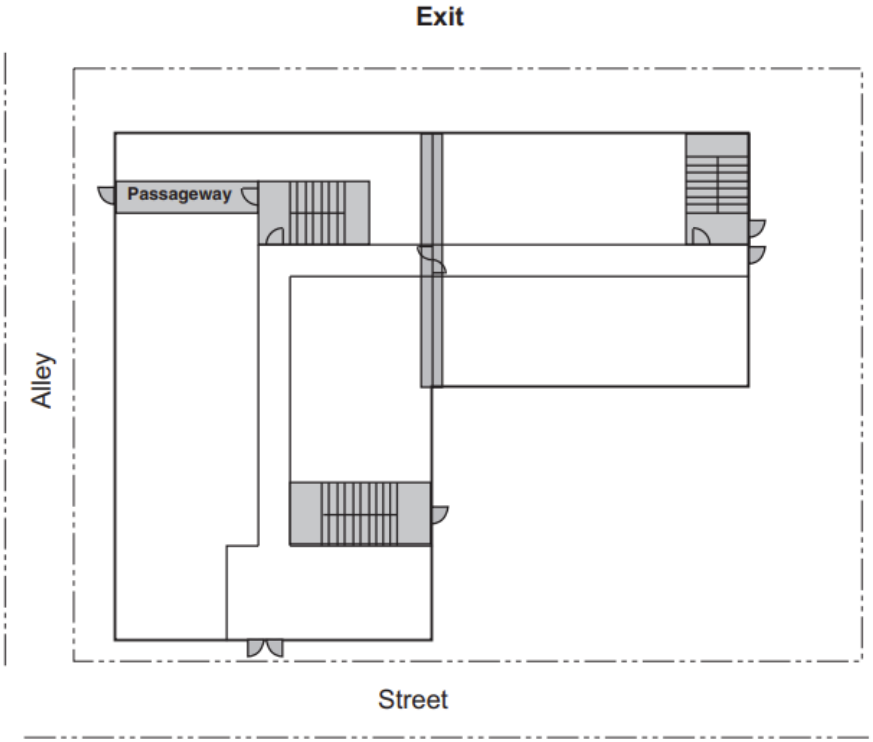
OBJECTIVE: To obtain an understanding of the provisions governing the exit and exit discharge portions of the means of egress, the special requirements applicable to egress from assembly occupancies, and the details for emergency escape and rescue openings.

Source: 2021 IBC

Topic: Definition
Reference: IBC 1022, 202

Category: Means of Egress
Subject: Exits

[What is an exit? - YouTube]

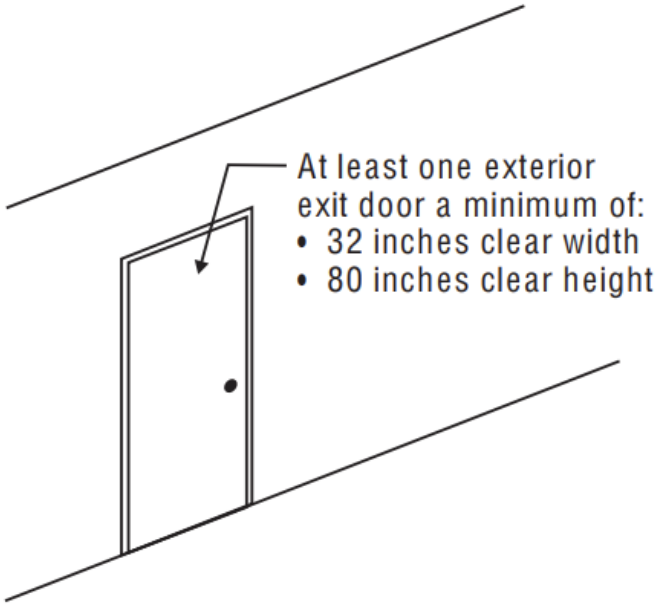


Because an exit must be maintained for egress, it cannot be used for any purpose that interferes with egress. In addition, once a mandated level of protection is provided for occupants reaching an exit, that level cannot be diminished prior to their reaching the exit discharge.

Source: 2021 IBC

Topic: General Provisions
Reference: IBC 1022.1, 1022.2

Category: Means of Egress
Subject: Exits



EXTERIOR EXIT DOOR

All buildings, regardless of size, that are intended for human occupancy must have a minimum of one exit door that meets the minimum width and height requirements of Section 1010.1.1. The intent of this provision is to override any exceptions for minimum door width and height that may apply in other locations throughout the building.

Source: 2021 IBC

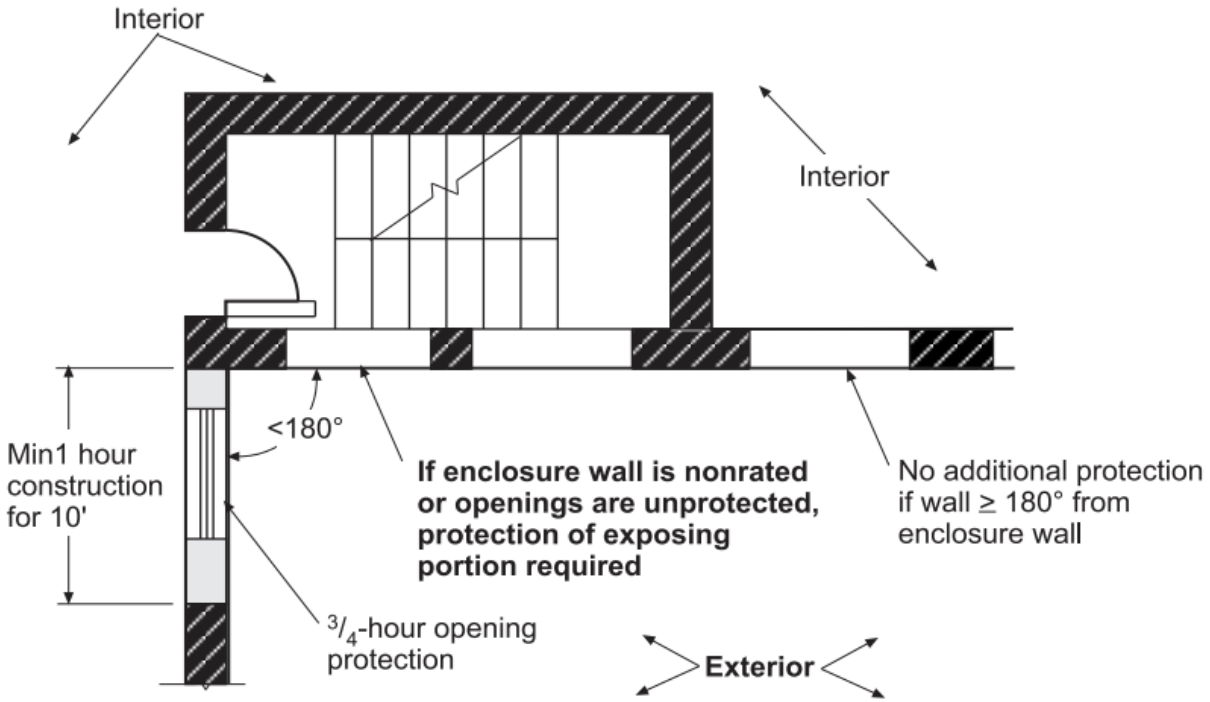
Topic: Construction
Reference: IBC 1023.2

Category: Means of Egress
Subject: Interior Exit Stairways and Ramps

Interior exit stairways and ramps must always be enclosed with fire-resistance-rated construction. Allowances for unenclosed stairways within the means of egress are established in Section 1019 under the provisions for exit access stairways.

Source: 2021 IBC

Topic: Interior Stairway Exterior Walls | **Category:** Means of Egress
Reference: IBC 1023.7 | **Subject:** Interior Exit Stairways and Ramps



For SI: 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

An alternative to the protection of exterior walls adjacent to an interior exit stairway or ramp is the protection of the exterior wall of the enclosure itself. Should a fire breach an adjacent exterior wall, its penetration of the stairway or ramp enclosure would be halted for an acceptable time period.

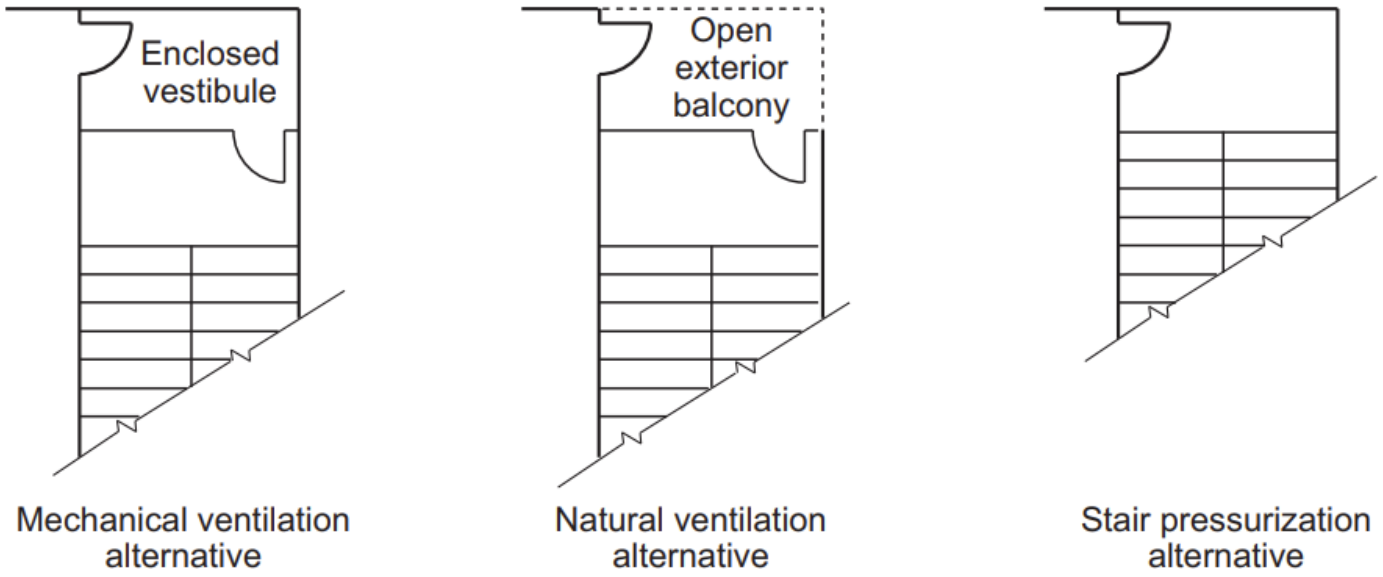
Source: 2021 IBC

Topic: Smokeproof Enclosures
Reference: IBC 1023.12, 1023.12.2

Category: Means of Egress
Subject: Interior Exit Stairways and Ramps

How Mechanical Smoke Ventilation Systems Work - YouTube

Smokeproof enclosures



Mechanical ventilation alternative

Natural ventilation alternative

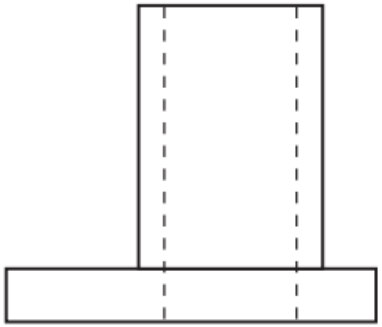
Stair pressurization alternative

If a smokeproof enclosure does not exit directly to a yard, court or public way, then an exit passageway must be provided to extend protected travel to the exterior. The exit passageway may have no other openings unless it is protected in the same manner as the vertical enclosure.

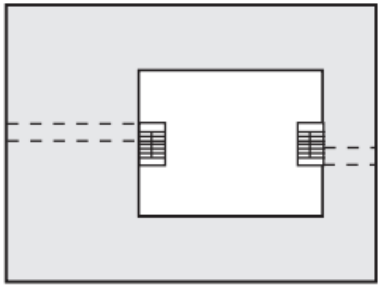
Source: 2021 IBC

Topic: Openings and Penetrations
Reference: IBC 1023.4, 1024.5

Category: Means of Egress
Subject: Exits



Elevation



Plan

Enclosure construction:

- Four or more stories—2-hour fire resistance
- Less than four stories—1-hour fire resistance

Openings and penetrations:

- Permitted exterior openings (705)
- Egress from normally occupied spaces
- Egress from enclosure
- Fire protection systems
- Ductwork for independent pressurization
- Limited electrical conduit
- Security systems
- Two-way communication systems
- Structural elements supporting stairway or enclosure

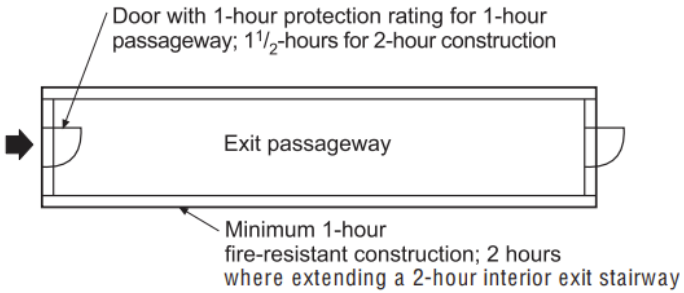
Doors: (716)

- Self-closing or automatic closing
- 1-hour rating in 1-hour construction
- $1^1/_2$-hour rating in 2-hour construction
- Temperature rise limit of 450°F above ambient

Several methods are set forth in the code to provide for ventilation of an exit enclosure. In general, penetrations for ductwork must enter directly from the building's exterior or from an interior space separated from the remainder of the building by a shaft enclosure.

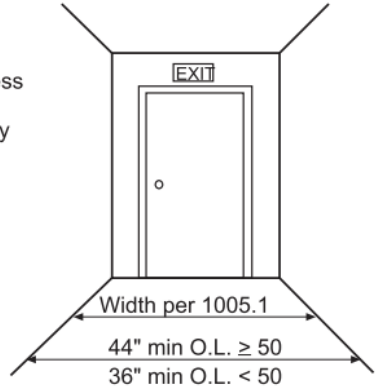
Source: 2021 IBC

Topic: Construction | **Category:** Means of Egress
Reference: IBC 1024.1, 1024.3 | **Subject:** Exit Passageways



- Openings limited to those necessary for egress
- Elevators shall not open into exit passageway
- Penetrations not permitted except for those serving the exit passageway

For SI: 1 inch = 25.4 mm.



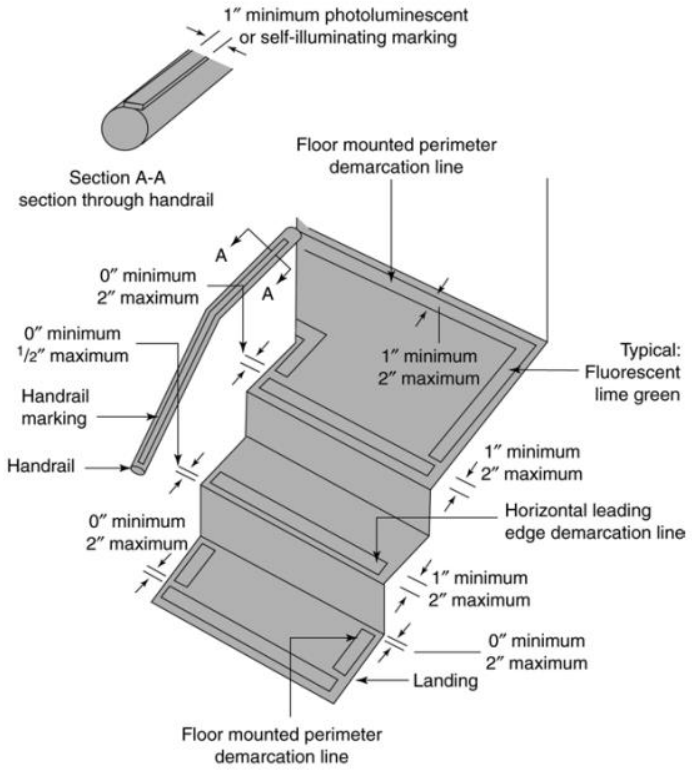
[AC 049 - Corridors Vs. Exit Passageways (with corrected audio) - YouTube]

Once in an exit passageway, the building occupant is considered to be in a relatively safe location; thus, travel distances within the exit passageway are unregulated. Simply put, an exit passageway is a horizontal exit enclosure, with conditions and limitations similar to those required for an interior exit stairway.

Source: 2021 IBC

Topic: General Provisions
Reference: IBC 1025.1

Category: Means of Egress
Subject: Luminous Egress Path Markings

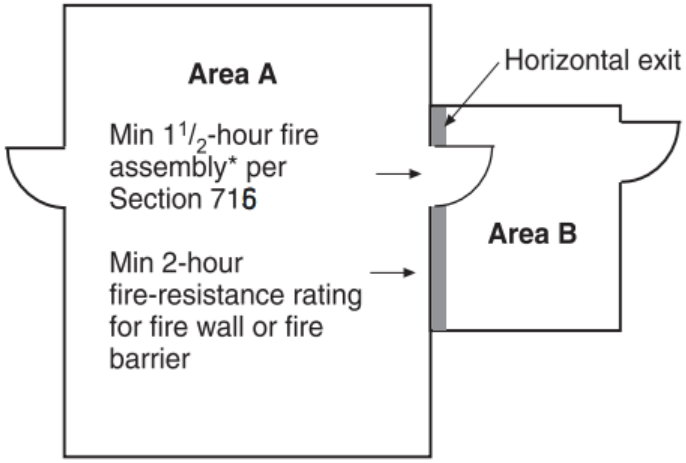


Note: The width of demarcation lines at horizontal leading edges of stairs, perimeter demarcation line and handrails may be less than 1″ width when listed in accordance UL 1944.

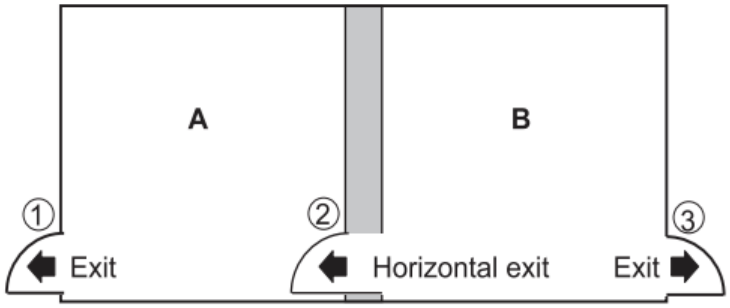
Analogous to rechargeable batteries, many photoluminescent and self-illuminating egress path markings require exposure to light to perform properly. Thus, such markings must be exposed to a minimum of 1 foot-candle of light energy at the walking surface for at least 60 minutes prior to the building being occupied.

Ecoglo Photoluminescent Safety Products - YouTube

Source: 2021 IBC



* must be self-closing or automatic closing upon activation of a smoke detector



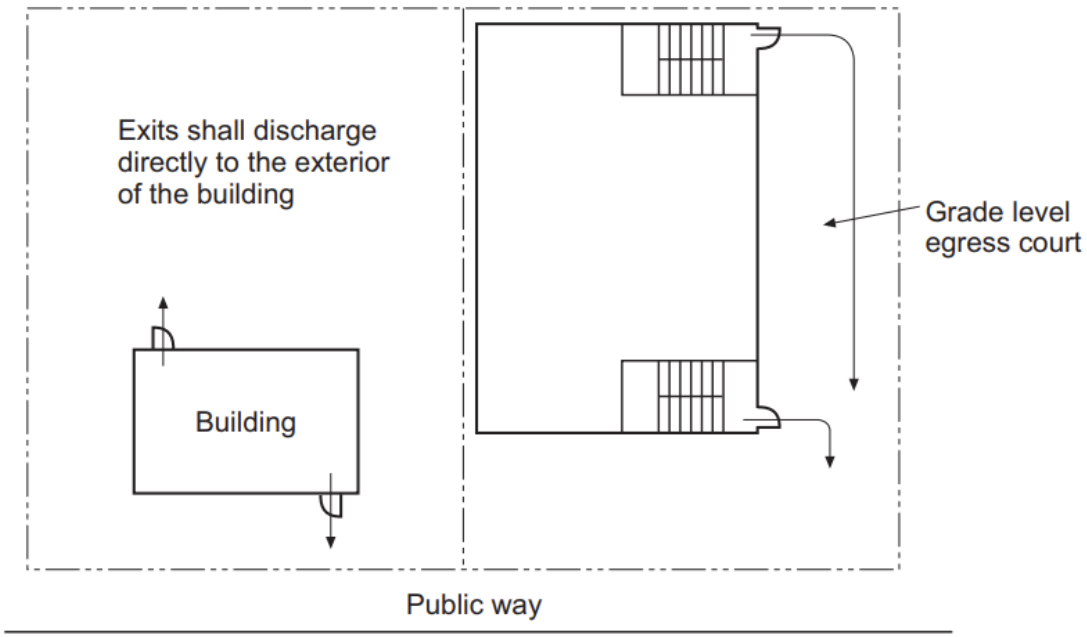
NOTE: Exit for "A" adequate to meet the provisions of Chapter 10 but need not include added capacity imposed by occupants entering through horizontal exit from "B."

Horizontal exits must extend vertically through all levels of the building, unless minimum 2-hour floor assemblies with no unprotected openings are provided. The horizontal exit walls are to extend continuously from exterior wall to exterior wall in order to completely divide the floor.

Source: 2021 IBC

Topic: Definition and Scope
Reference: IBC 1028.2, 1028.4, 202

Category: Means of Egress
Subject: Exit Discharge



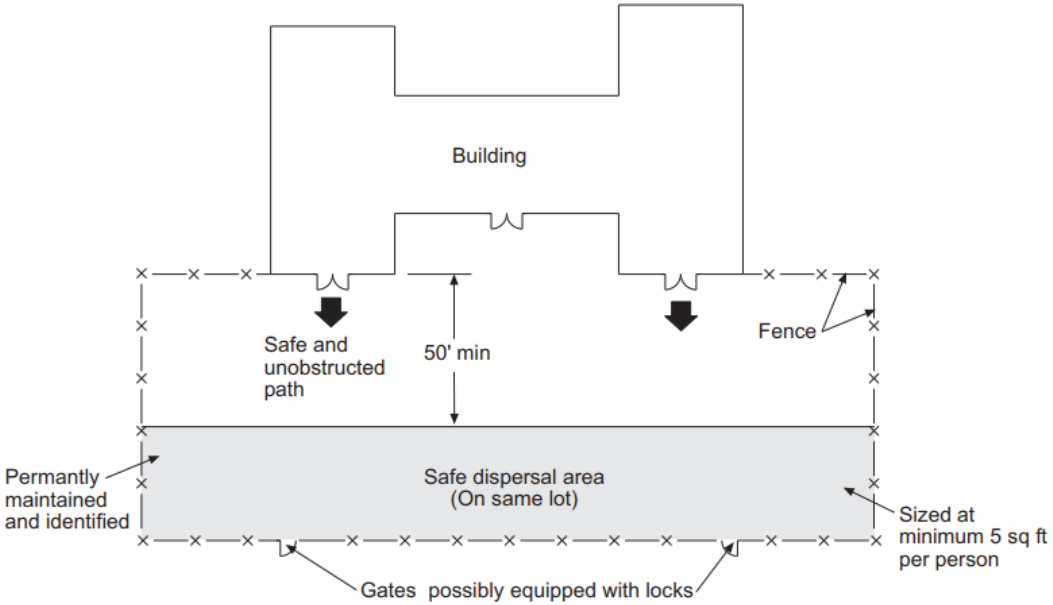
Number of exits maintained until arrival at grade or public way

When specific conditions are met, up to 50 percent of the number and capacity of interior exit stairways may exit through a vestibule or an area on the discharge level, provided all the stated conditions have been met.

Source: 2021 IBC

Topic: Access to a Public Way
Reference: IBC 1028.5

Category: Means of Egress
Subject: Exit Discharge



For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

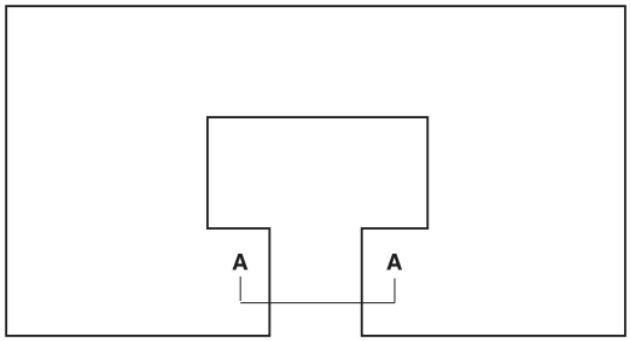
Safe dispersal areas

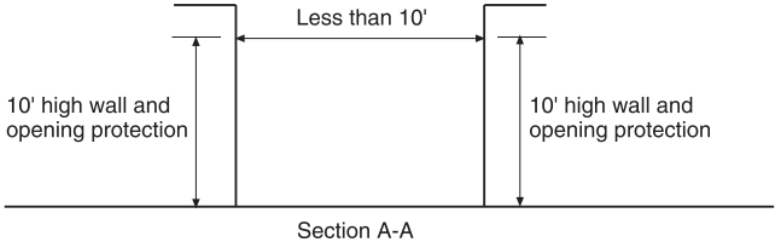
Occasionally it is impractical, and at times impossible, to provide a fully complying means of egress the entire distance to the public way. A safe dispersal area can be utilized where such conditions exist, such as on large industrial or educational campus sites.

Source: 2021 IBC

Topic: Egress Courts
Reference: IBC 1029.3

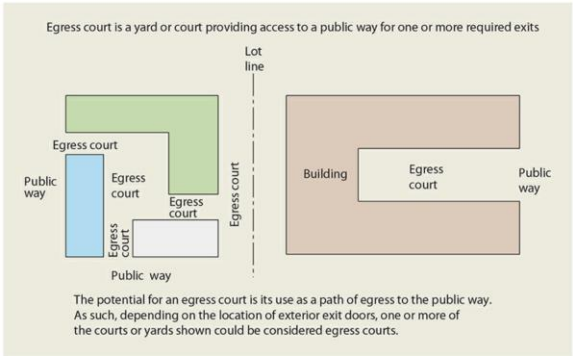
Category: Means of Egress
Subject: Exit Discharge





Section A-A

For SI: 1 foot = 304.8 mm

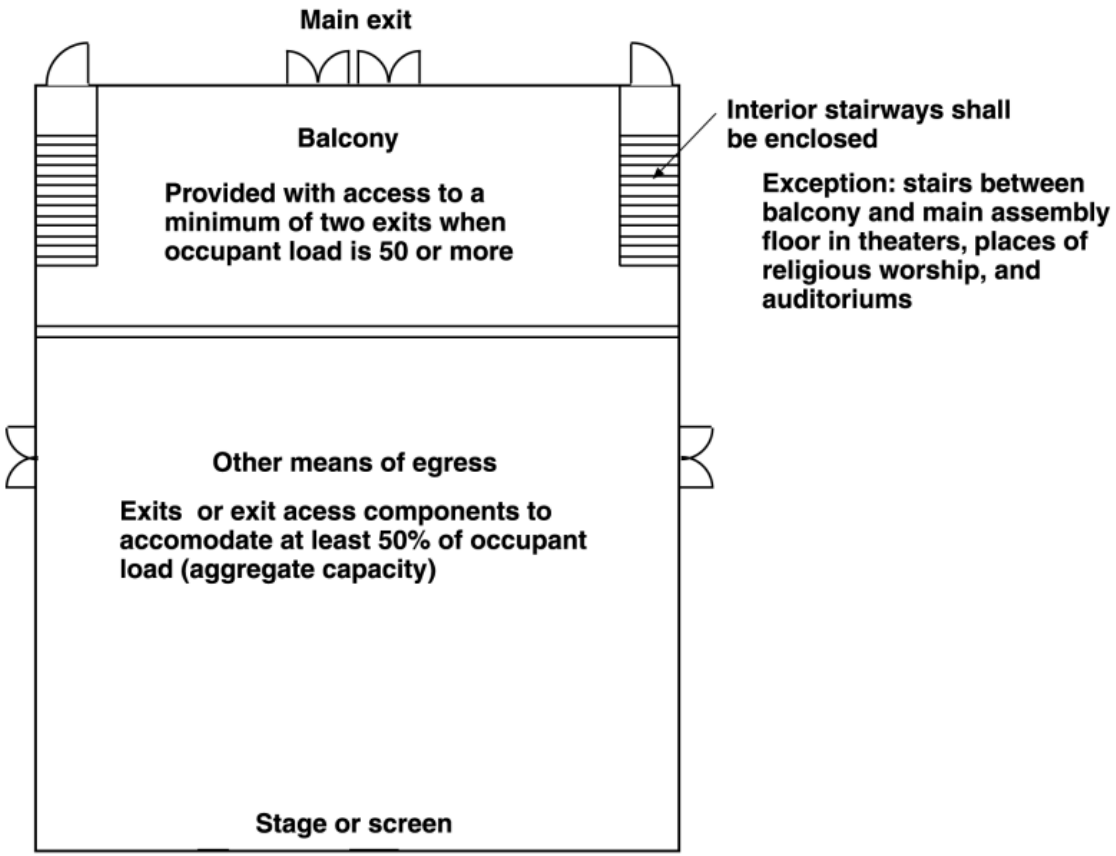


The minimum required width of an egress court is addressed in a manner similar to that of aisles, corridors and stairways. The width must accommodate the calculated capacity, based on occupant load served; however, in no case may it be less than a specified width of 44" (36" in Group R-3).

Source: 2021 IBC

Topic: Assembly Main Exit
Category: Means of Egress
Reference: IBC 1030.2
Subject: Assembly Seating

Main exit to accommodate at least 50% of occupant load (not less than total required capacity of all egress components leading to exit)

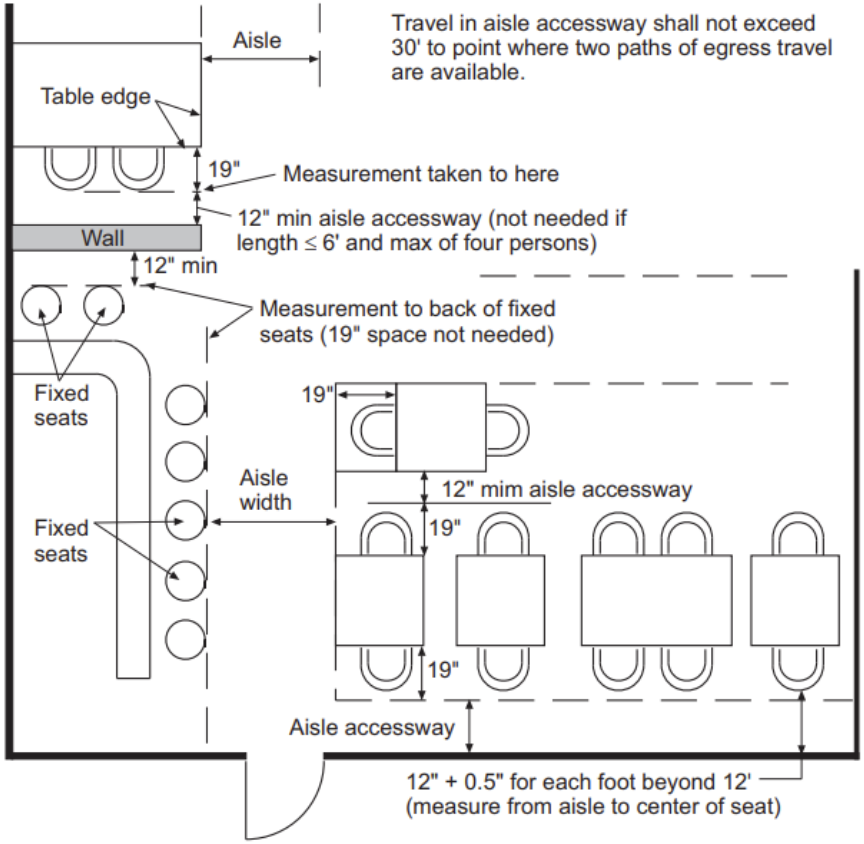


To better define and maintain the egress path through a lobby or foyer to the main entrance/exit in a Group A-1 occupancy, the code mandates that the waiting area not encroach upon the required clear egress width.

Source: 2021 IBC

Topic: Seating at Tables
Reference: IBC 1030.13.1.1, 1030.13.1.2

Category: Means of Egress
Subject: Exit Access



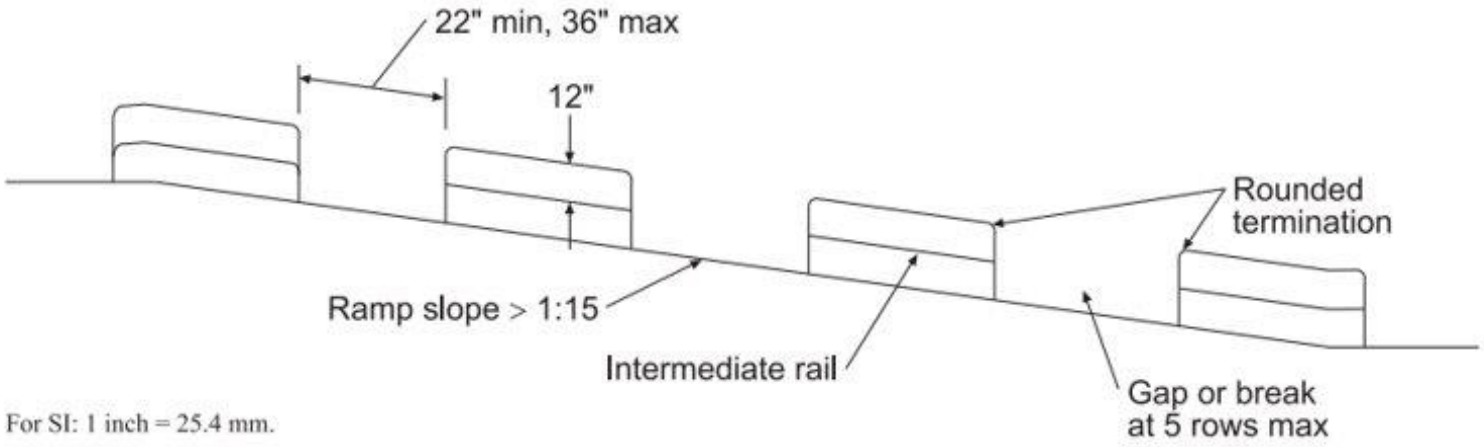
For SI: 1 inch = 25.4 mm.

The method of determining the clear width differs based on the type of seating that is provided. For fixed seats, the measurement is made from the back of the seats. Otherwise, the clear width is measured to a line 19 inches from the edge of the table or counter.

Source: 2021 IBC

Topic: Handrails
Reference: IBC 1030.16

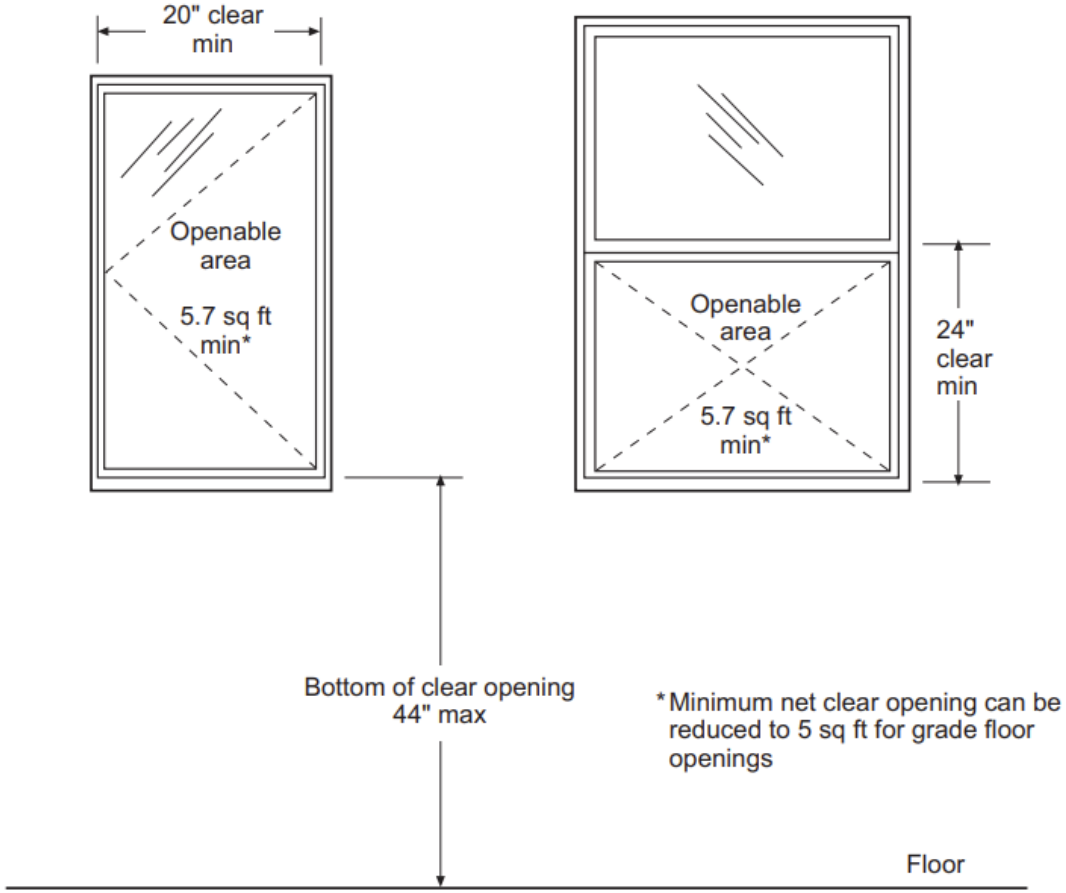
Category: Means of Egress
Subject: Assembly Seating



Where discontinuous handrails are provided, an intermediate handrail located 12 inches below the main handrail is required to prevent users from ducking under the handrail and hindering flow. It also provides a handrail for toddlers who may be using the aisle.

Source: 2021 IBC

Topic: Required Openings
Category: Means of Egress
Reference: IBC 1031
Subject: Emergency Escape and Rescue



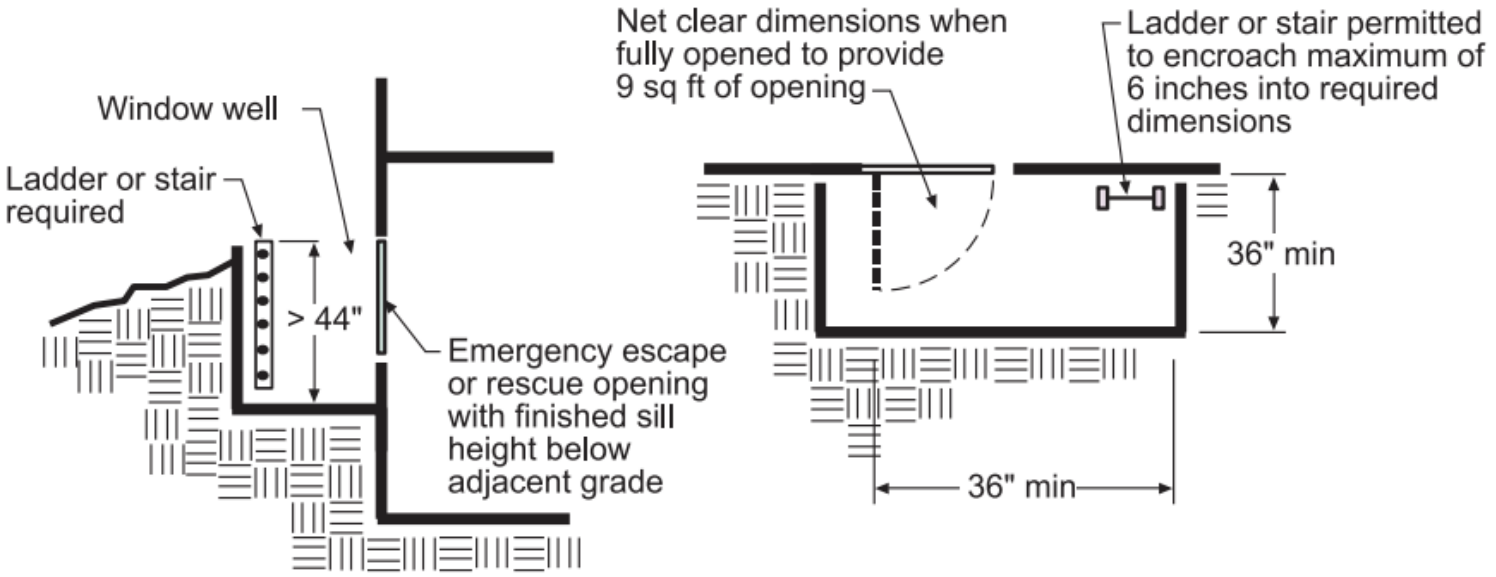
For SI: 1 square foot = 0.093 m^2, 1 inch = 25.4 mm.

[Egress Windows For Fire Safety | What Are They? Where Are They Needed? - YouTube]

When operable windows are used for egress or rescue purposes, the intent is that they be double-hung, horizontal sliding or casement styles operated by a simple operation. Special types other than those listed must be evaluated for compliance with the operational constraint limitations.

Source: 2021 IBC

Topic: Window Wells
Category: Means of Egress
Reference: IBC 1031.4
Subject: Emergency Escape and Rescue



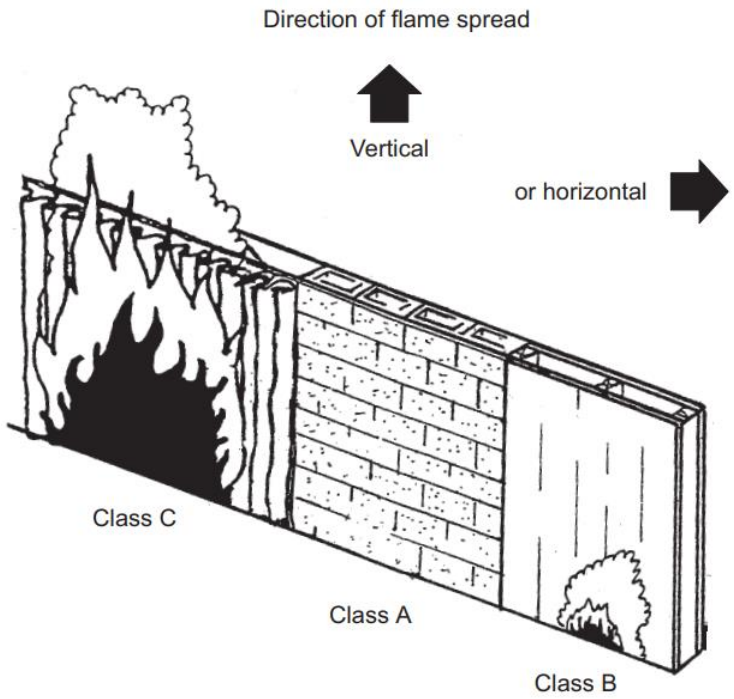
For SI: 1 inch = 25.4 mm, 1 square foot = 0.093 m^2.

Window well ladders must have a minimum clear rung width of 12 inches with the rungs spaced at maximum 18-inch intervals vertically. The ladder or steps cannot encroach into the required dimensions of the window well more than 6 inches.

Source: 2021 IBC

Topic: Definition and Classifications
Reference: IBC 802.1, 202

Category: Interior Finishes
Subject: Wall and Ceiling Finishes



Vertical spread is rapid
Horizontal spread is less rapid

The classification of interior wall and ceiling finishes is based primarily on their flame spread index. Class A has an index of 0 to 25, Class B of 26 to 75, and Class C of 76 to 200. The smoke-developed index for all three classifications is limited to 450.

urce: 2021 IBC

Topic: Flame-Spread Classification **Category:** Interior Finishes

Reference: IBC 803.13 **Subject:** Finish Requirements by Occupancy

TABLE 803.13
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY[k]

GROUP	SPRINKLERED[l]			NONSPRINKLERED		
	Interior exit stairways and ramps and exit passageways[a, b]	Corridors and enclosure for exit access stairways and ramps	Rooms and enclosed spaces[c]	Interior exit stairways and ramps and exit passageways[a, b]	Corridors and enclosure for exit access stairways and ramps	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[m]	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		

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m^2.

a. Class C interior finish materials shall be permitted for wainscotting or paneling of not more than 1,000 square feet of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fireblocked as required by Section 803.15.1.

b. In other than Group I-3 occupancies in buildings less than three stories above grade plane, Class B interior finish for nonsprinklered buildings and Class C interior finish for sprinklered buildings shall be permitted in interior exit stairways and ramps.

c. Requirements for rooms and enclosed spaces shall be based on spaces enclosed by partitions. Where a fire-resistance rating is required for structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions that do not comply with this shall be considered to be enclosing spaces and the rooms or spaces on both sides shall be considered to be one room or space. In determining the applicable requirements for rooms and enclosed spaces, the specific occupancy thereof shall be the governing factor regardless of the group classification of the building or structure.

d. Lobby areas in Group A-1, A-2 and A-3 occupancies shall be not less than Class B materials.

e. Class C interior finish materials shall be permitted in places of assembly with an occupant load of 300 persons or less.

f. For places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be permitted.

g. Class B material is required where the building exceeds two stories.

h. Class C interior finish materials shall be permitted in administrative spaces.

i. Class C interior finish materials shall be permitted in rooms with a capacity of four persons or less.

j. Class B materials shall be permitted as wainscotting extending not more than 48 inches above the finished floor in corridors and exit access stairways and ramps.

k. Finish materials as provided for in other sections of this code.

l. Applies when protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

m. Corridors in ambulatory care facilities shall be provided with Class A or B materials.

[Ceiling Tiles & Panels | Rockfon]

Textile materials, where applied to walls or ceilings, must meet additional criteria prior to approval. Finishes that have napped, tufted, looped, nonwoven, woven or similar surface characteristics present a unique hazard on account of their contribution to extremely rapid fire spread.

Source: 2021 IBC

Topic: Floor Finish Requirements | **Category:** Interior Finishes

Reference: IBC 804.4.2 | **Subject:** Interior Floor Finish

Types of classifications: *(in terms of heat flux, Sec. 804.2)*

- Class I: Minimum 0.45 watts/cm^2 per NFPA 253 or ASTM E648
- Class II: Minimum 0.22 watts/cm^2 per NFPA 253 or ASTM E648
- DOC FF-1: Minimum 0.04 watts/cm^2

Required classifications:*(Sec. 804.4)*

	Nonsprinklered[a]		**Sprinklered** (NFPA 13 only)	
	Exit/Corr.[b]	Other Areas	Exit/Corr.[b]	Other Areas
Groups I-1, I-2 and I-3	Class I	DOC FF-1[c]	Class II	DOC FF-1[c]
Groups F, R-3, R-4 and U	DOC FF-1[c]	DOC FF-1[c]	DOC FF-1[c]	DOC FF-1[c]
Other Groups	Class II	DOC FF-1[c]	DOC FF-1[c]	DOC FF-1[c]

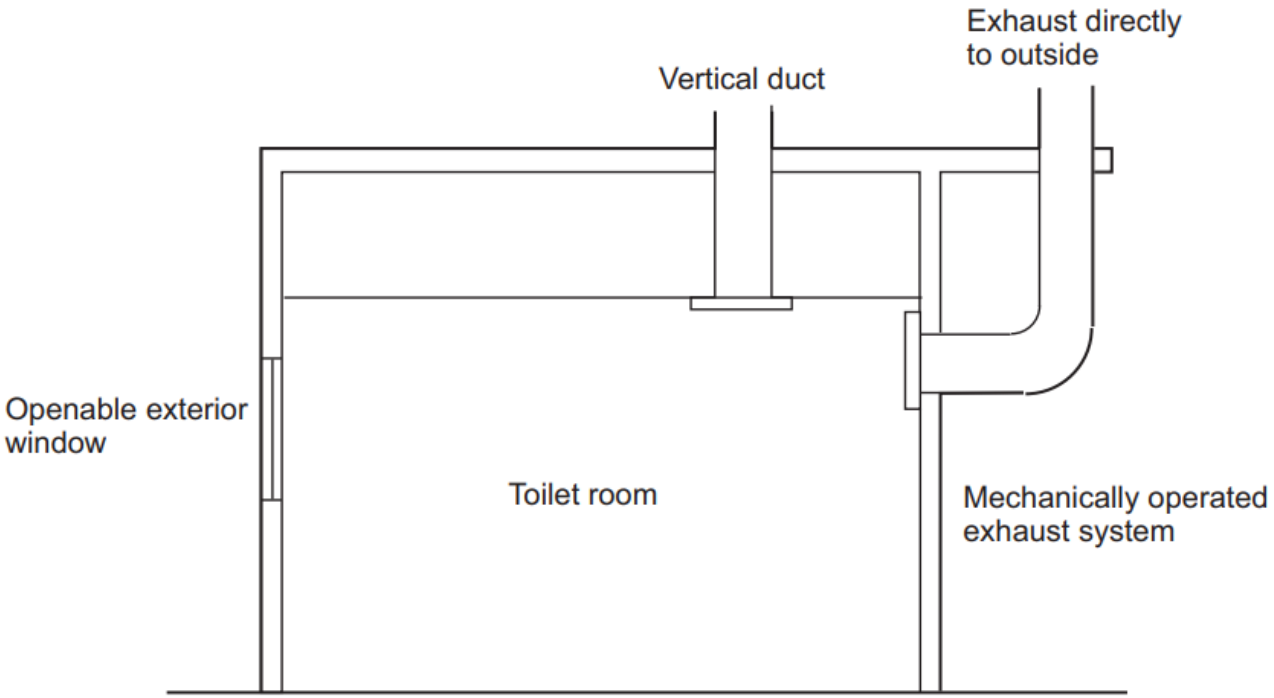
Note: [a]Section 903.2 requires sprinklers in various occupancies

[b]Includes enclosures for stairways and ramps, exit passageways, corridors and rooms or spaces not separated from corridors by full-height partitions.

[c]Compliance with ASTM D2859 also permitted

DOC FF-1, often referred to as the Methenamine Pill Test, essentially evaluates the floor covering when subjected to a cigarette-type ignition by using a small methenamine tablet. All carpeting sold in the United States is required by federal law to pass this test procedure.

Source: 2021 IBC



Ventilation regulated by *International Mechanical Code*

The *International Mechanical Code* regulates ventilation of bathrooms, toilet rooms, shower rooms and similar spaces containing bathtubs, showers and spas. The *International Fire Code*, in addition to the IMC, addresses ventilation and exhaust systems where flammable and combustible hazards are present.

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

1202.4.1 Ventilation openings. Ventilation openings through foundation walls shall be provided. The openings shall be placed so as to provide cross ventilation of the under-floor space. The net area of ventilation openings shall be in accordance with Section 1202.4.1.1 or 1202.4.1.2. Ventilation openings shall be covered for their height and width with any of the following materials, provided that the least dimension of the covering shall be not greater than $^1/_4$ inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grilles or gratings.
4. Extruded load-bearing vents.
5. Hardware cloth of 0.035-inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension not greater than $^1/_8$ inch (3.2 mm).
7. Operable louvres, where ventilation is provided in accordance with Section 1202.4.1.2.

An example of a ventilation well outside of a building

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

- Crawl spaces that are intended to be naturally ventilated to the outdoors must comply with this section and Section 1202.4.1.1, where the crawl space has open earth floors, or with this section and Section 1202.4.1.2, where the crawl space has covered floors.

  The requirement for covering the openings with perforated plates, corrosion-resistant wire mesh or other covering is to keep small animals out. Seven alternatives are given for this covering, and they all must have openings that have no dimension exceeding $^{1}/_{4}$ inch (6.4 mm).

An example of a ventilation well as viewed from inside a commercial crawlspace

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

1202.4.2 Ventilation in cold climates. In extremely cold climates, where a ventilation opening will cause a detrimental loss of energy, ventilation openings to the interior of the structure shall be provided.

- Where warranted by extremely cold climates, this section provides for ventilating the crawl space to the interior conditioned space of the building, which is heated and can accept moisture from the underground space without detrimental effects on the building structure.

If this method of ventilation is proposed, make sure your mechanical engineer is aware of the potential of additional temperature and humidity loads that will be imposed on the building's HVAC system. Consider providing additional conditioning capacity to handle the underfloor space.

Ducts and grilles similar to this one can be used to connect the interior air to the underfloor space air.

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

1202.4.3 Mechanical ventilation. Mechanical ventilation shall be provided to crawl spaces where the ground surface is covered with a Class I vapor retarder. Ventilation shall be in accordance with Section 1202.4.3.1 or 1202.4.3.2.

1202.4.3.1 Continuous mechanical ventilation. Continuously operated mechanical ventilation shall be provided at a rate of 1.0 cubic foot per minute (cfm) for each 50 square feet (1.02 L/s for each 10 m^2) of crawl space ground surface area and the ground surface shall be covered with a Class I vapor retarder.

1202.4.3.2 Conditioned space. The crawl space shall be conditioned in accordance with the *International Mechanical Code* and the walls of the crawl space shall be insulated in accordance with the *International Energy Conservation Code*.

Make sure you understand the difference between mechanical ventilation and mechanical conditioning! Note: a vapor retarder is required when these ventilation options are proposed!

A vapor retarder keeps the moisture from being drawn into the space, helping to keep the underfloor space dry.

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

Condensation on the underside of the concrete floor

Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

A wet underfloor space can result in damage to the floor finish above.

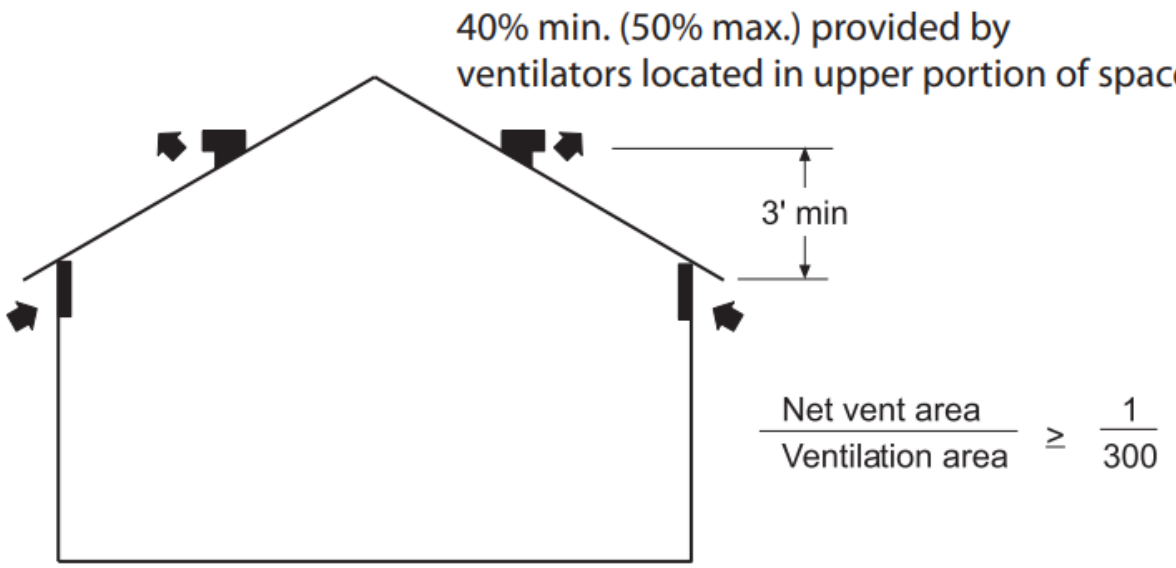
Source: 2021 IBC

Topic: Attic and Under-Floor Ventilation
Reference: IBC 1202.2, 1202.4

Category: Interior Environment
Subject: Ventilation

Biological growth and rot on the cardboard void forms

Source: 2021 IBC

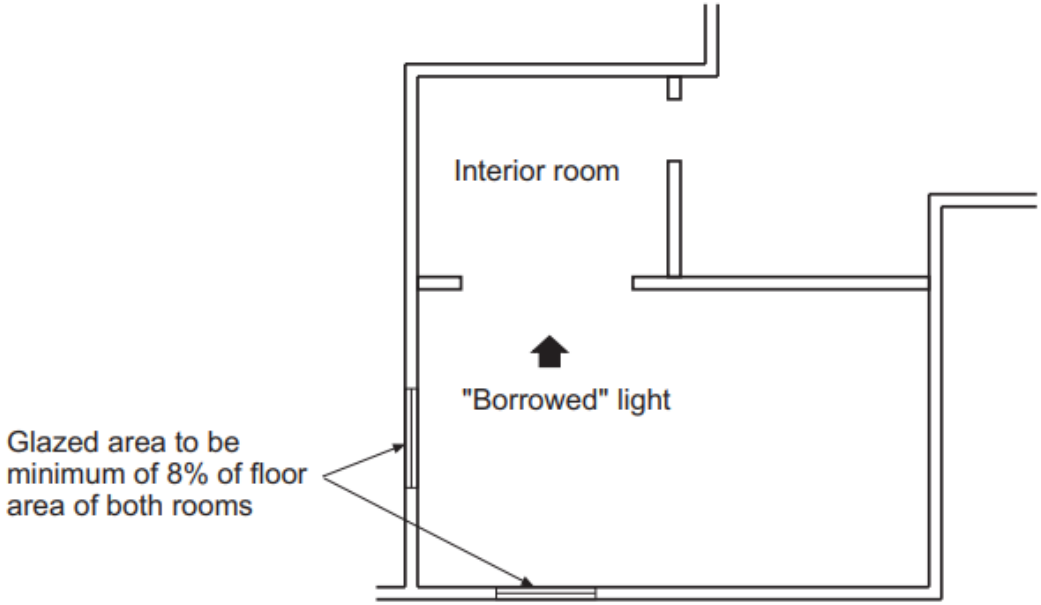


Attic ventilation - calculations

For SI: 1 foot = 304.8 mm.

The general requirement for under-floor ventilation mandates a minimum net area of ventilation openings of $^{1}/_{150}$ of the area of the space ventilated. In addition, all openings to the exterior must be screened to prevent the entry of birds, rodents and similar creatures.

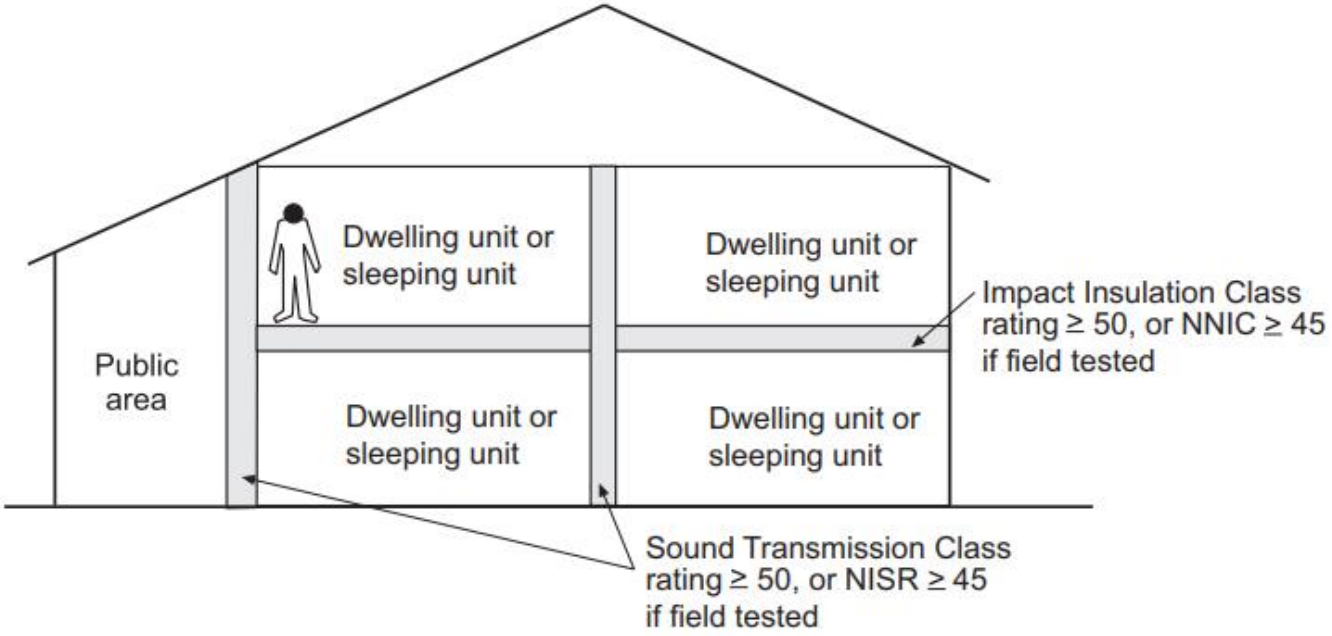
Source: 2021 IBC



For SI: 1 square foot = 0.093 m^2.

Where natural light is used to satisfy the provisions of the IBC, it can be shared by two rooms. The common wall between the rooms must be adequately open, and the total floor area of both rooms shall be used to calculate the minimum glazed area.

Source: 2021 IBC



To maintain the required ratings, it is necessary to seal, line, insulate or otherwise treat penetrations through the sound transmission assemblies. The code exempts unit entrance doors from sound transmission limits, provided that they are tight fitting to the frame and sill.

Source: 2021 IBC

Two Types of Sound Control Required

STC – Sound Transmission Class
-Measures Airborne Sound (Such as: music, talking, laughing, TV, etc.)

IIC – Impact Insulation Class
-Measures Structure-borne Sound (Such as: stomping your feet, dropping something on the floor, moving furniture, etc.)

Minimum Standard vs. Acceptable or Preferred

From ICC G2-2010 - Guideline for Acoustics

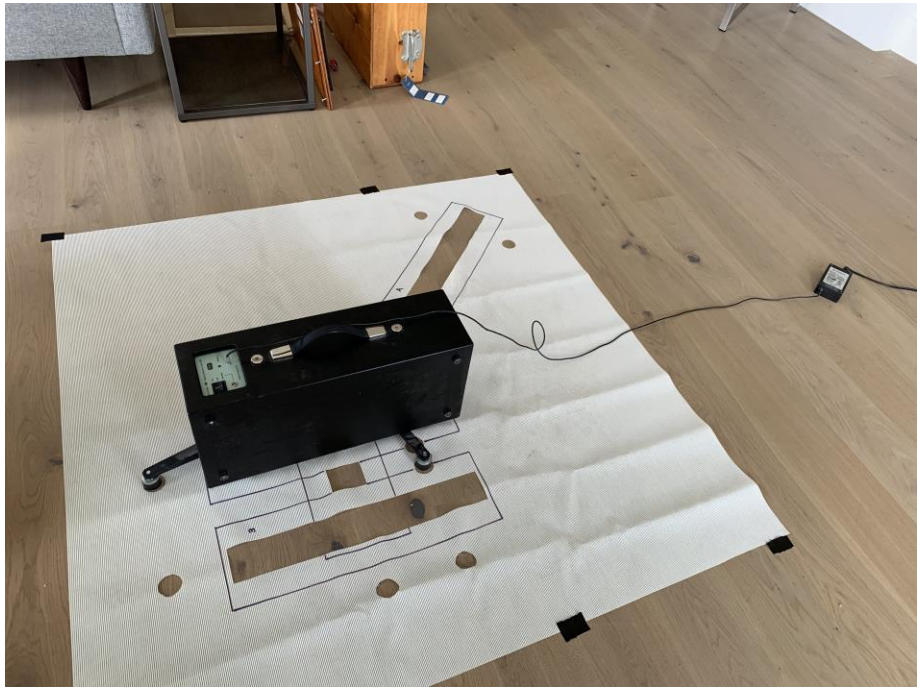
Table 2: Grades of Laboratory Acoustical Performance

Laboratory Sound Rating	Acceptable Performance (Grade B Performance)	Preferred Performance (Grade A Performance)
Airborne Sound (STC per ASTM E 90)	55	60
Impact Sound (IIC per ASTM E 492)	55	60

Minimum: 50; Acceptable: 55; Preferred: 60

[Presentation - Testing Standards : Airborne Sound Transmission - YouTube]

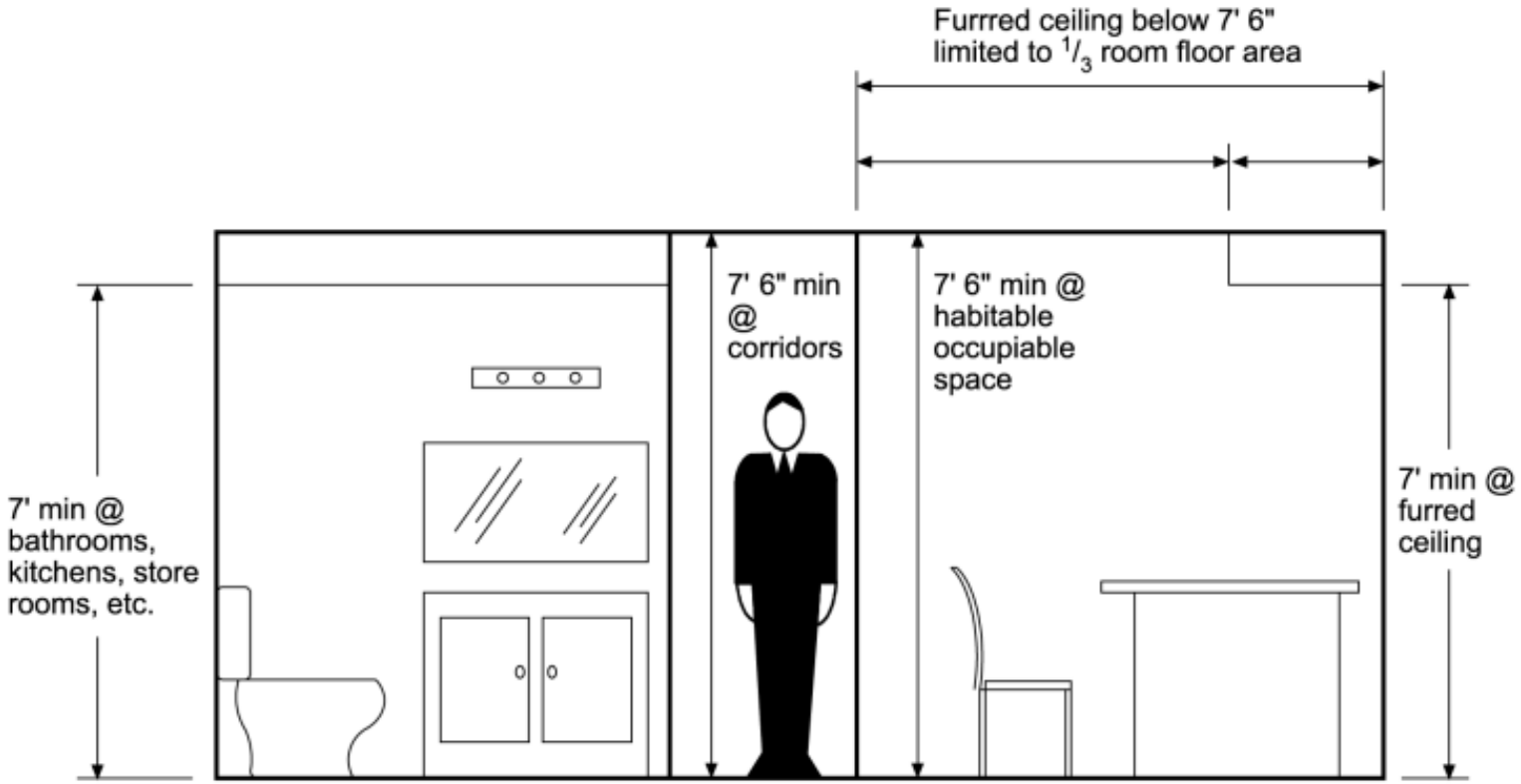
Example of a Tapping Machine



Tapping machine is set up on the floor above, microphones below to capture the sound transmission.

Class 12: Chapters 8, 12, 25 and 30— Interior Finishes, Interior Environment, Gypsum Board and Elevators

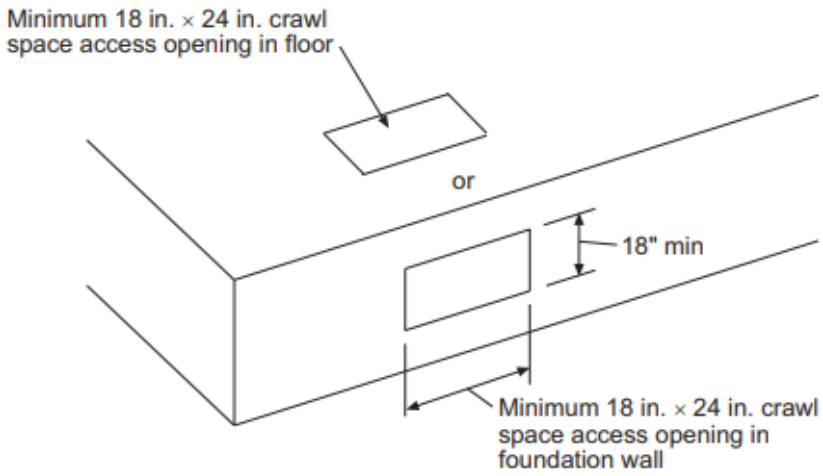
Source: 2021 IBC



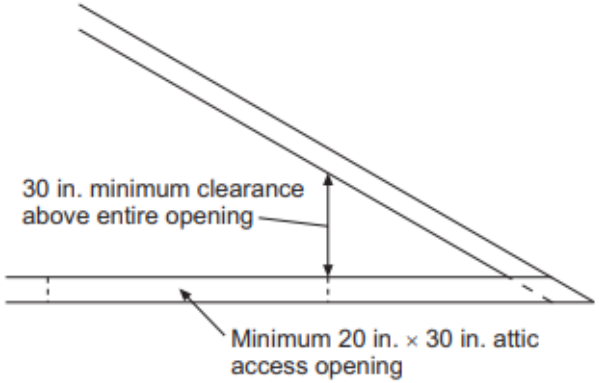
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Efficiency dwelling units, often referred to as studio apartments, typically consist of a single room used as a combination living/sleeping/dining/cooking area, and a bathroom. The code regulates living room size at a minimum of 190 square feet, and also addresses the closet, bathroom and kitchen spaces.

Source: 2021 IBC



Crawl space access opening



Attic access opening

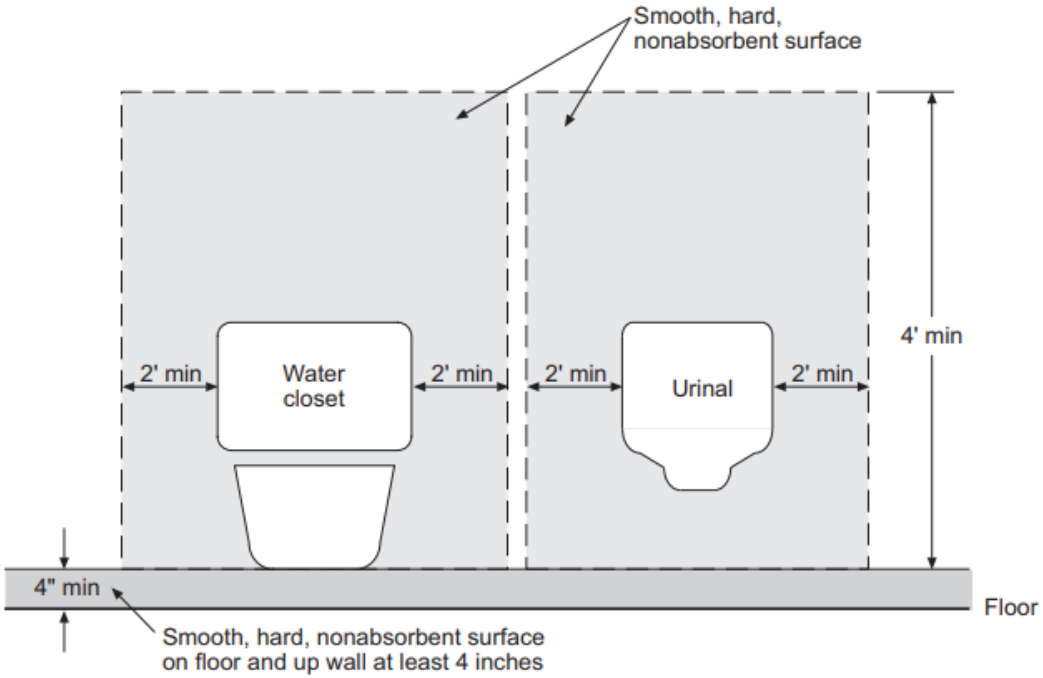
For SI: 1 inch = 25.4 mm.

The *International Mechanical Code* regulates access to both underfloor and attic spaces for the inspection, service, repair or replacement of any mechanical equipment. In addition to the access opening, the passageway and service area sizes are also addressed.

Source: 2021 IBC

Topic: Wall and Floor Finishes
Reference: IBC 1210

Category: Interior Environment
Subject: Surrounding Materials



Surrounding materials

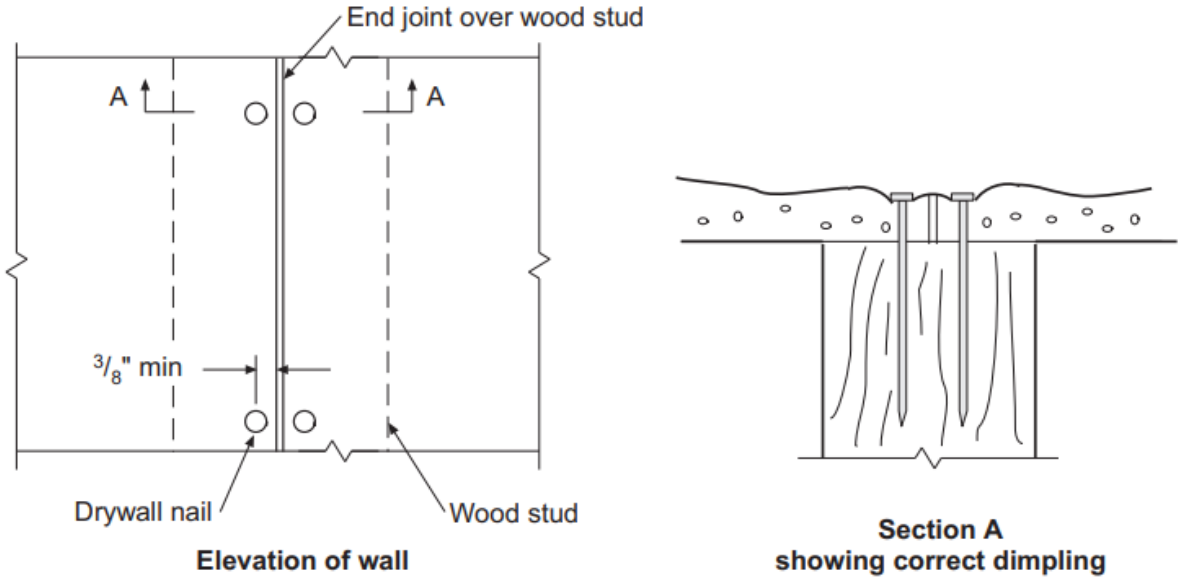
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Shower stalls and compartments must be enclosed with smooth, hard, nonabsorbent surfaces to a minimum height of 72 inches above the drain inlet. This requirement is also applicable to those bathtubs that are provided with shower heads.

Source: 2021 IBC

Topic: Installation
Reference: IBC 2508.2, 2508.3

Category: Gypsum Board and Plaster
Subject: Gypsum Construction



Elevation of wall

Section A showing correct dimpling

Gypsum wallboard nailing

For SI: 1 inch = 25.4 mm.

For appearance purposes in exposed locations, edges and ends of gypsum wallboard and gypsum panel products must be in moderate contact. In concealed areas, such contact is not necessary unless fire-resistance-rated construction, shear resistance or diaphragm action is required.

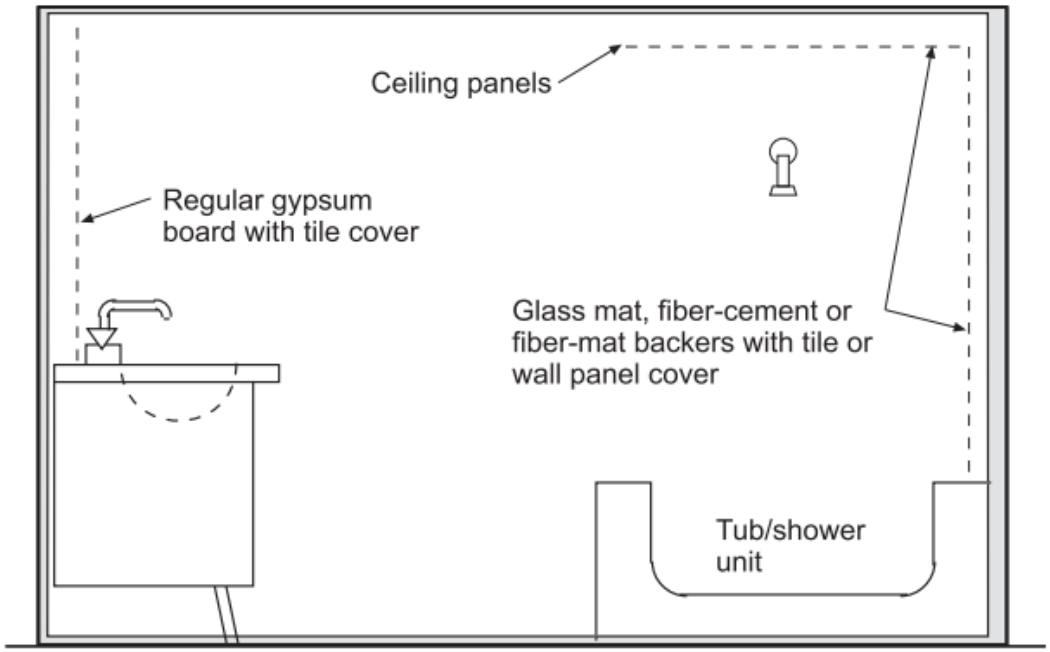
[Gypsum board installation - YouTube]

Source: 2021 IBC

Topic: Base for Tile
Reference: IBC 2509.2

Category: Gypsum Board and Plaster
Subject: Gypsum Board in Showers

How To Install Drywall in Your Shower - YouTube



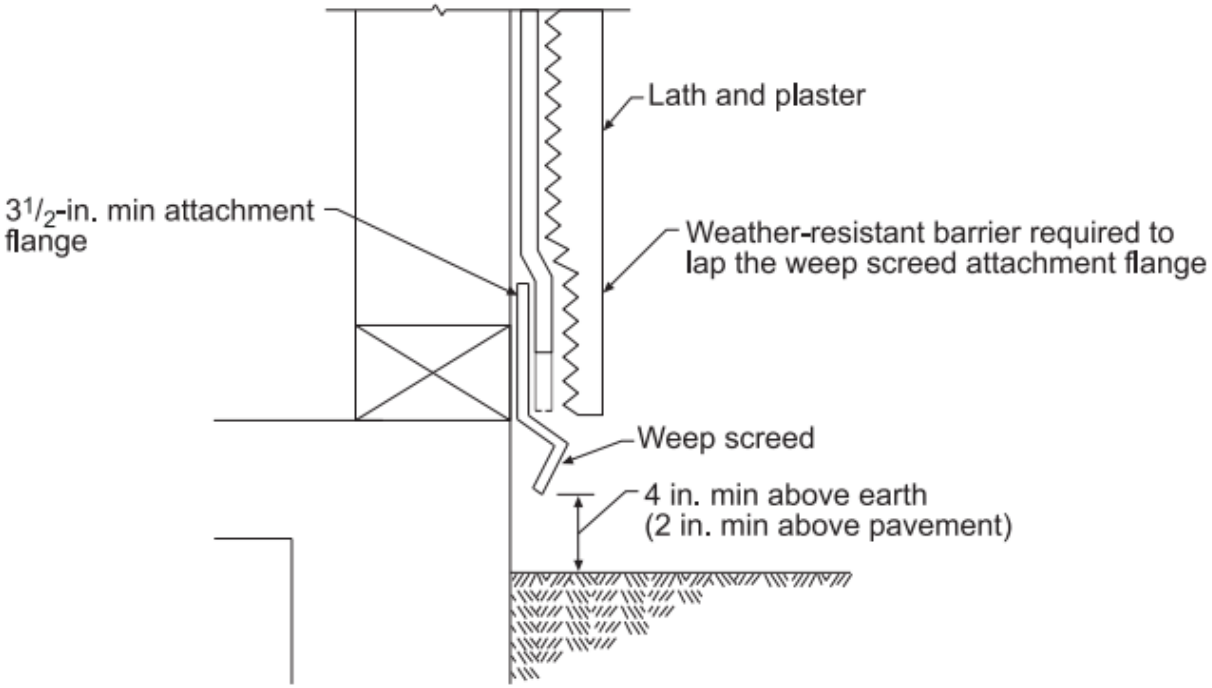
For SI: 1 inch = 25.4 mm.

Water-resistant gypsum backing board is prohibited where either one of two general conditions exist: (1) over a vapor retarder in shower or bathtub compartments, or (2) where there will be direct exposure to water or in areas subject to continuous high humidity.

Source: 2021 IBC

Topic: Weep Screeds
Reference: IBC 2512.1.2

Category: Gypsum Board and Plaster
Subject: Exterior Plaster



For SI: 1 inch = 25.4 mm.

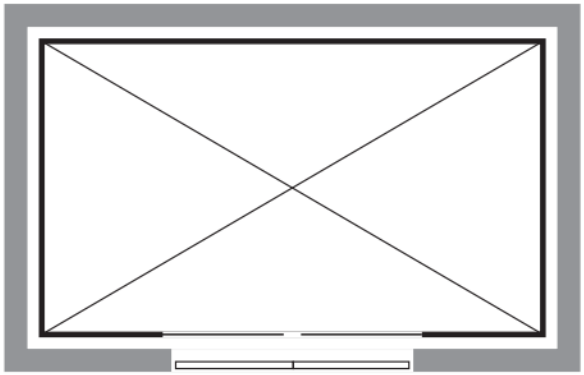
AMICO Drain Screed • AMICO Products • Weep Screeds in Stucco (amicoglobal.com)

To allow the water to escape away from the building, the required water-resistive barrier in the wall assembly must lap the attachment flange of the weep screed. In addition, the exterior lath shall cover and terminate on the attachment flange.

Source: 2021 IBC

Topic: Protection
Reference: IBC 3002.1, 3002.6

Category: Elevators and Conveying Systems
Subject: Hoistways Enclosures



Number of stories connected	Minimum rating of elevator enclosure
Four or more	2 hours
Three or less	1 hour

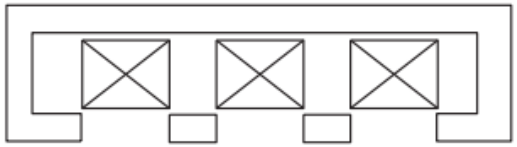
Dennis W. Olson, C.E.I. | Elevator & Escalator Expert (robsonforensic.com)

In many buildings, an elevator lobby is provided adjacent to the elevator. To help ensure that an individual does not become trapped within such a lobby, the lobby door must be openable without the use of a key.

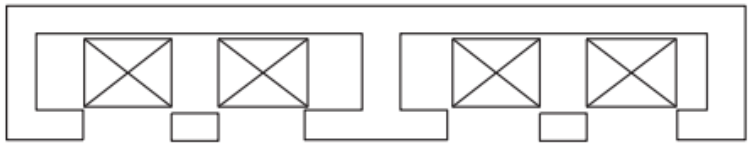
Source: 2021 IBC

Topic: Number of Cars in Hoistway
Reference: IBC 3002.2, 3002.7

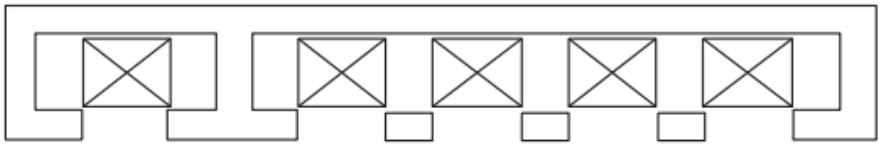
Category: Elevators and Conveying Systems
Subject: Hoistway Enclosures



3 or fewer



4 cars



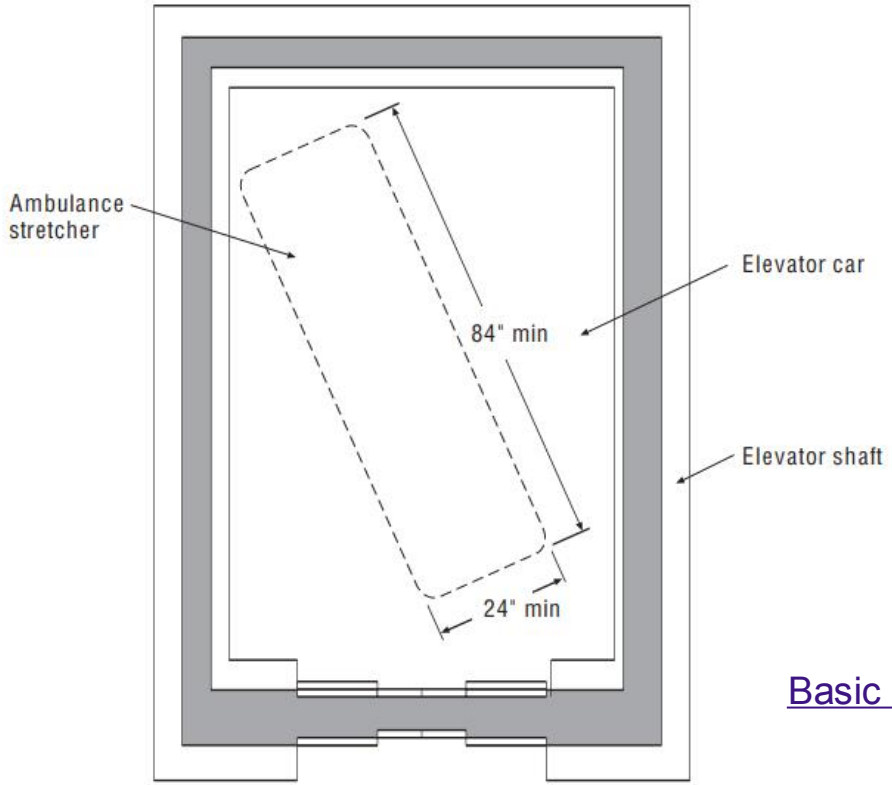
5 or more

Other than for those elevators that are a part of an accessible means of egress or used for occupant self-evacuation in accordance with Section 3008, an approved pictorial sign must be provided adjacent to each elevator call station on all floors.

Source: 2021 IBC

Topic: Fire Department Emergency Access **Category:** Elevators and Conveying Systems

Reference: IBC 3002.4 **Subject:** Hoistway Enclosures



Elevator used for fire department emergency access

For SI: 1 inch = 24.5 mm.

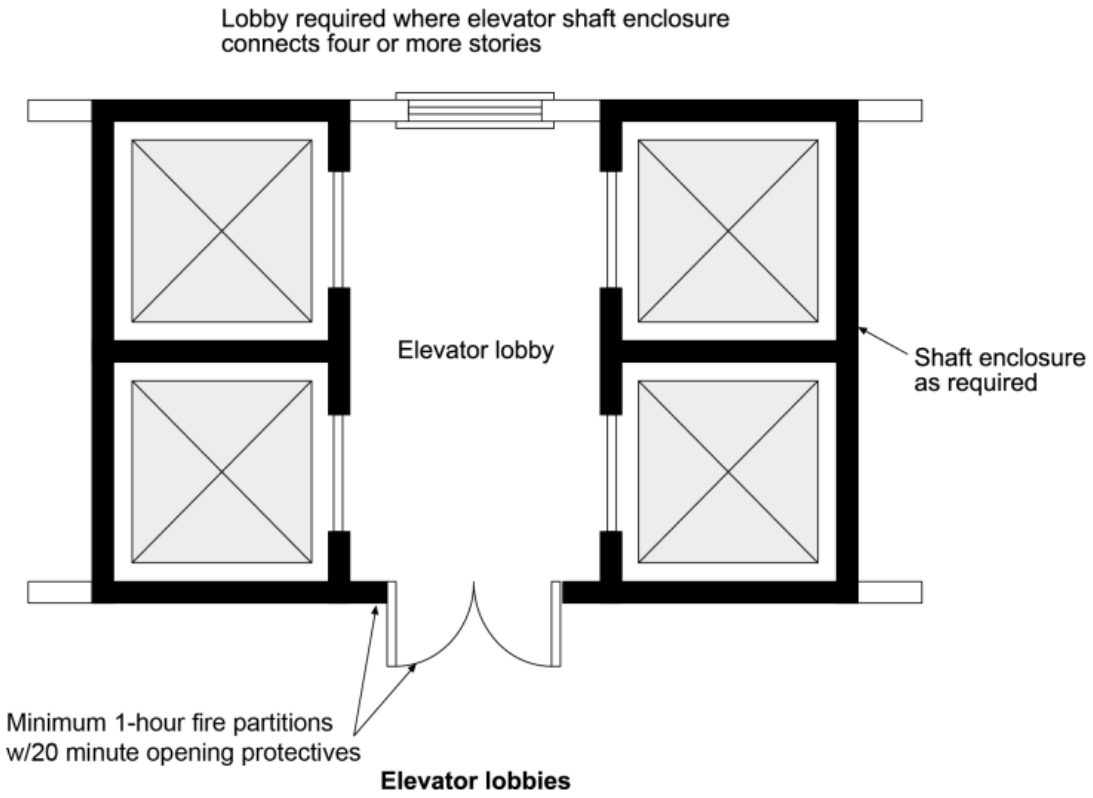
[Basic Elevator Rescue - YouTube]

The elevator car sized in a manner to accommodate the required size ambulance stretcher must be identified by the international symbol for emergency medical services (star of life). The symbol is required to be a minimum of 3 inches in height and is to be placed on both sides of the hoistway door frame.

Source: 2021 IBC

Topic: Hoistway Opening Protection
Reference: IBC 3006.2

Category: Elevators and Conveying Systems
Subject: Elevator Lobbies



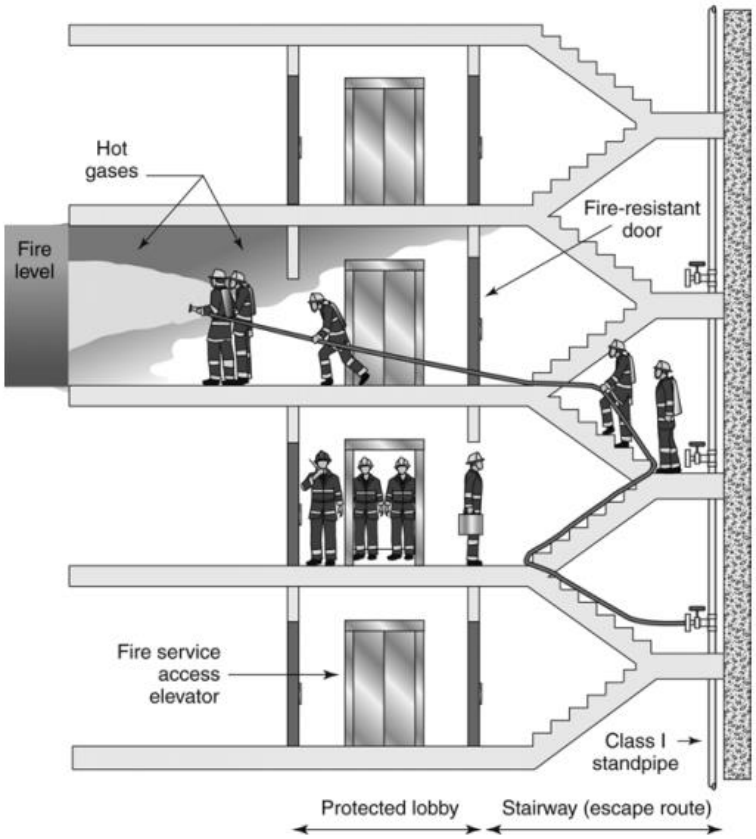
Elevator lobbies

In those cases where a fire-resistance-rated corridor is required by Section 1020.2 and an elevator hoistway opening opens directly into the corridor, the opening must be protected by either an elevator lobby, an additional door or hoistway pressurization.

Source: 2021 IBC

Topic: General Provisions
Reference: IBC 3007

Category: Elevators and Conveying Systems
Subject: Fire Service Access Elevator



[Basic Elevator Rescue - YouTube]

Another specific type of elevator, an "occupant evacuation" elevator, is also addressed in Chapter 30. Public-use passenger elevators are specifically allowed to be used for the self-evacuation of occupants in high-rise buildings. The installation of such elevators is voluntary; however, they can be installed as an alternative to the additional exit stairway mandated by Section 403.5.2.

Source: 2021 IBC

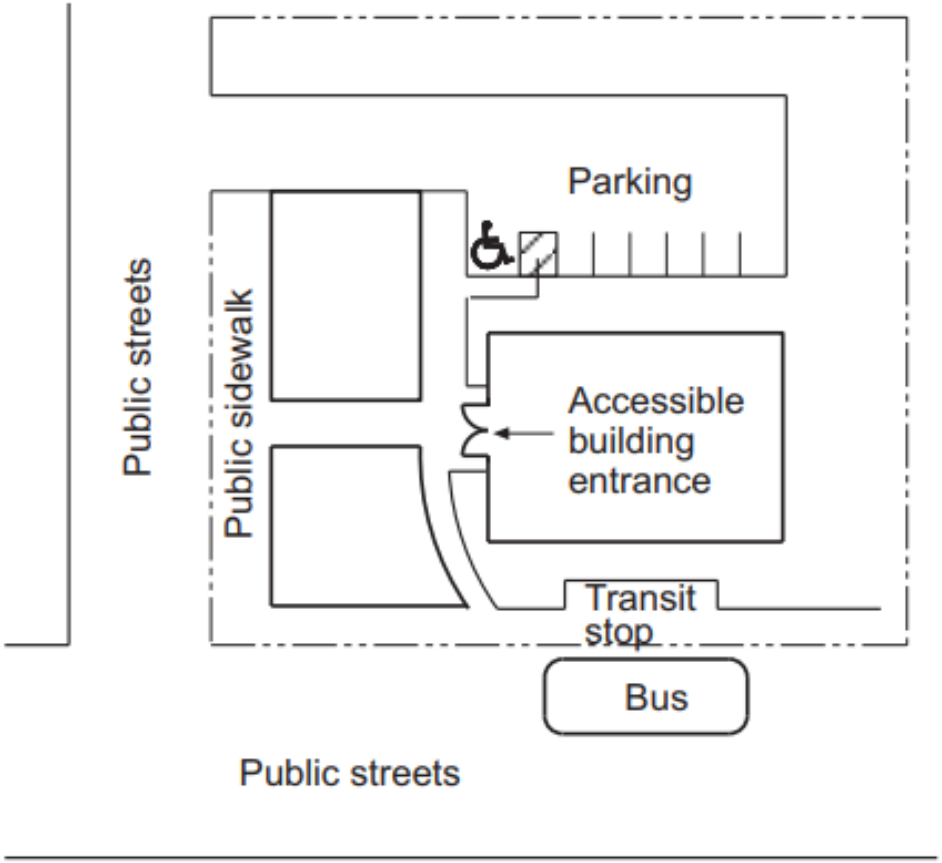
Class 13: Chapters 11 Accessibility

Source: 2021 IBC

Topic: Connected Spaces
Reference: IBC 1104.3

Category: Accessibility
Subject: Accessible Route

[AC 020 - The Best Video on Accessibility Requirements for Restrooms - CALIFORNIA EDITION!!! - YouTube]



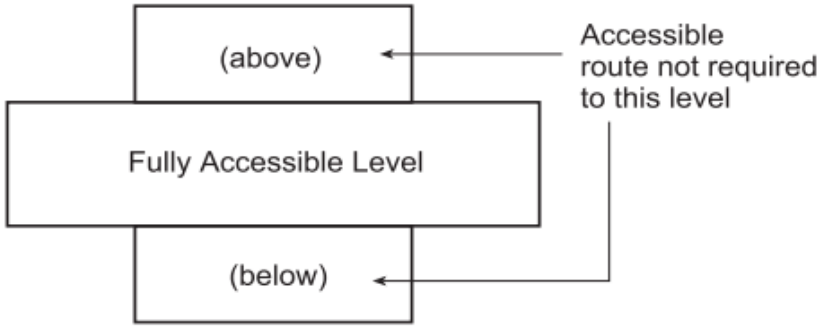
Site arrival points and exterior elements on the site must also be provided with an accessible route to an accessible building entrance. The elements addressed may include public transportation stops, accessible passenger loading zones and accessible parking spaces.

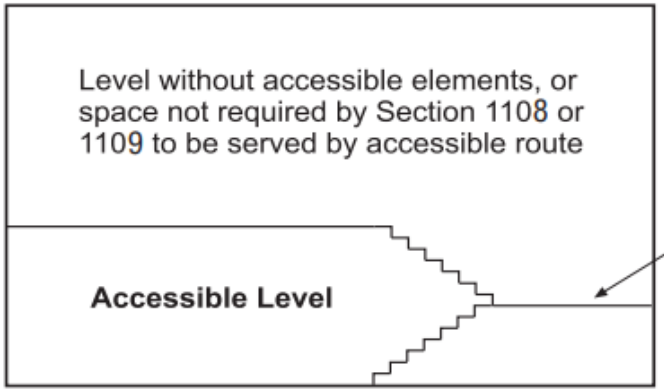
Source: 2021 IBC

Topic: Multilevel Buildings
Reference: IBC 1104.4

Category: Accessibility
Subject: Accessible Route

Exception 1:
Accessible route not required to floors above and below if aggregate area ≤ 3,000 sq ft and does not contain offices of health care providers, passenger transportation facilities and airports, or multiple tenant (≥ 5) facilities of Group M. Also not applicable to government buildings and structures with ≥4 dwelling units.





Exception 2:
Levels that do not contain accessible elements or other spaces as determined by Section 1108 or 1109 need not be served by an accessible route from an accessible level.

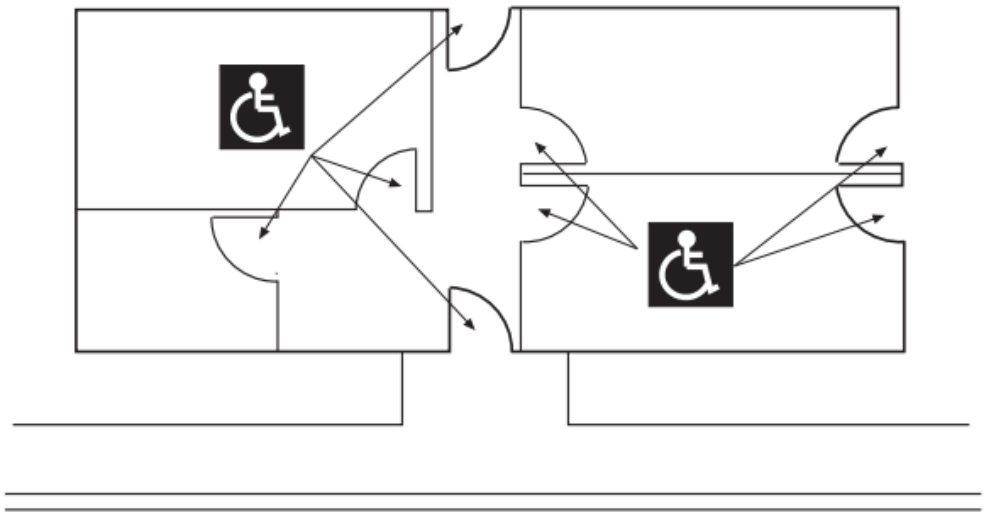
Accessible route between levels is not required per Section 1108 or 1109.

[AC 007 - UPDATED!!! - ADA Size and Clearance Requirements for Doors - YouTube]

Where a multilevel building is provided with an interior circulation path between levels, the required accessible route must also be interior. In such situations, it is inappropriate to use an exterior route, such as a series of ramps, as the only accessible means between floor levels.

Topic: Where Required
Reference: IBC 1105.1

Category: Accessibility
Subject: Accessible Entrances



When a building has entrances that normally serve accessible parking facilities, passenger loading zones, public sidewalks and other site elements, then at least one of the entrances serving each of the functions shall comply with the accessible route provisions.

Source: 2021 IBC

Topic: General Provisions
Reference: IBC 1106

Category: Accessibility
Subject: Parking Facilities

TABLE 1106.2
ACCESSIBLE PARKING SPACES

TOTAL PARKING SPACES PROVIDED IN PARKING FACILITIES	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
1,001 and over	20, plus one for each 100, or fraction thereof, over 1,000

Where parking is provided, accessible parking spaces shall be provided in compliance with Table 1106.2.

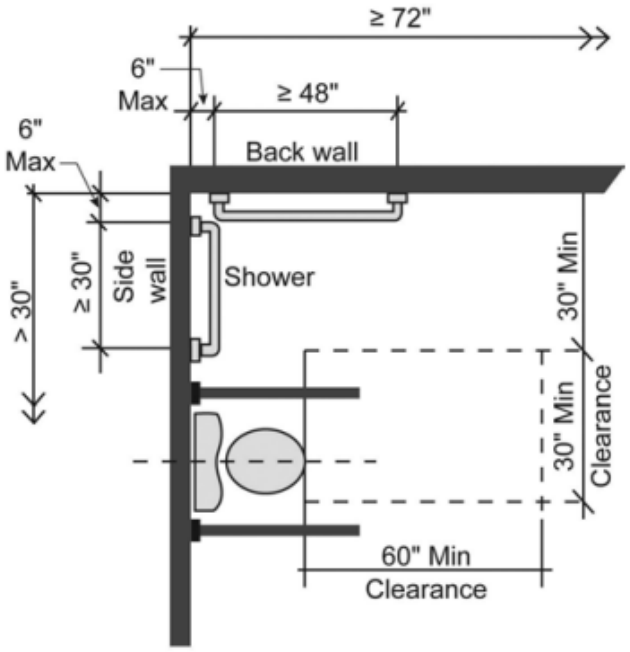
Exceptions:

1. Where Group R-2, R-3 and R-4 occupancies are required to have accessible dwelling units, 2% of the parking spaces shall be accessible. (Sec. 1106.3)
2. Where parking is provided within or beneath a building, accessible parking spaces shall also be provided within or beneath the building.
3. Where care recipient and visitor parking spaces serve hospital outpatient facilities, 10% of the spaces shall be accessible. (Sec. 1106.4)
4. At rehabilitation facilities and outpatient physical therapy facilities, 20% of care recipient and visitor parking spaces shall be accessible.

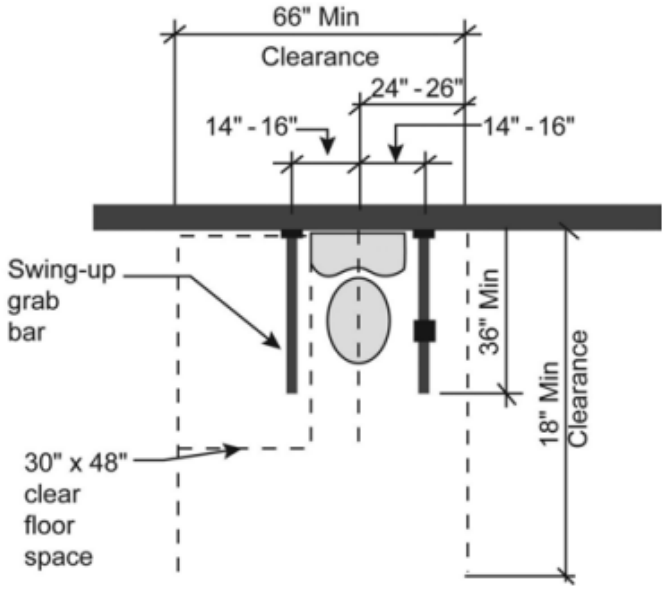
Every parking facility with at least one accessible parking space must provide for accessible van parking. Based on a percentage of the total number of accessible spaces, the van space or spaces must have a vertical clearance of at least 98 inches and a minimum 8-foot access aisle.

Topic: Group I Occupancies
Reference: IBC 1108.5

Category: Accessibility
Subject: Dwelling Units and Sleeping Units



Assisted bathing using roll-in shower



Clearances for assisted toileting

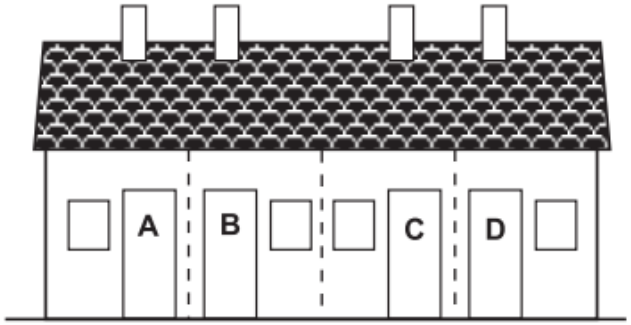
[AC 035 - "Accessible Units", "Type A Units" & "Type B Units". - YouTube]

Allowances for assisted toileting and bathing are established to accommodate occupants residing in accessible housing units in Group I-1 and I-2 assisted living facilities, nursing homes and rehabilitation facilities.

Source: 2021 IBC

Topic: Group R Occupancies
Reference: IBC 1108.6

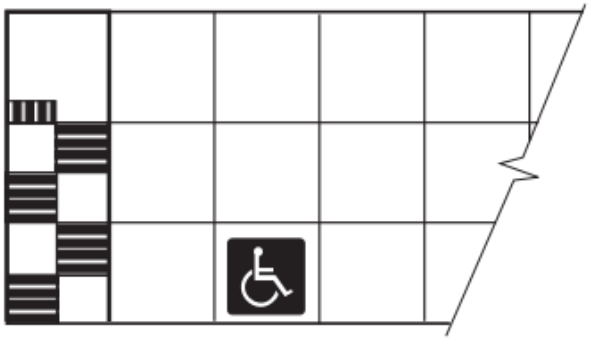
Category: Accessibility
Subject: Dwelling Units and Sleeping Units



In R-2 and R-3 occupancies where there are ≥ 4 dwelling units in a single structure, every unit shall be a Type B dwelling unit. (Type A units may be substituted for Type B.)

In R-2 occupancies containing > 20 dwelling units, at least 2 percent but not less than 1 shall be a Type A dwelling unit.

The general exceptions of Section 1108.7 selectively permit the required number of Type A units and Type B units to be reduced.



Where Group R-2 and R-3 occupancies contain public or common-use areas, such areas must be accessible if they serve accessible dwelling units. Any recreational facilities serving these occupancies must also must be accessible to a limited degree.

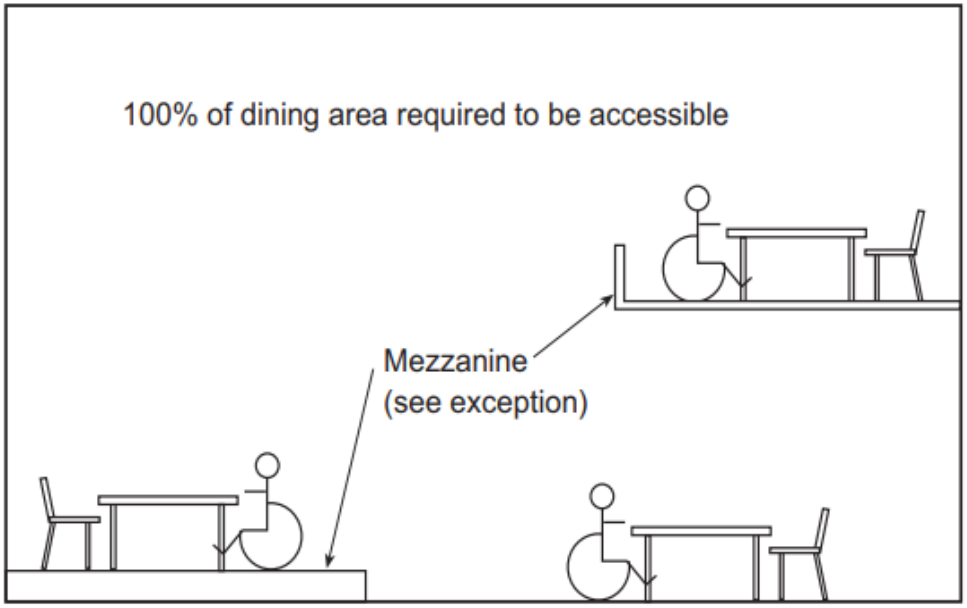
Source: 2021 IBC

Topic: Assembly Area Seating
Reference: IBC 1109.2

Category: Accessibility
Subject: Special Occupancies

In dining areas, the total floor area allotted for seating and tables shall be accessible.

Exception: An accessible route to a mezzanine seating area is not required, provided that the mezzanine contains less than 25 percent of the total area and the same services are provided in the accessible area.



Under limited conditions, a dining area may have a mezzanine level that is not served by an accessible route. The mezzanine must be limited in size to 25 percent of the total floor area, and the services provided on the mezzanine must be available on the accessible level.

Topic: Assistive Listening Systems
Reference: IBC 1109.2.7

Category: Accessibility
Subject: Special Occupancies

International symbol of access for hearing loss

[What Are Assistive Listening Systems? - YouTube]

TABLE 1109.2.7.1
RECEIVERS FOR ASSISTIVE LISTENING SYSTEMS

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF RECEIVERS	MINIMUM NUMBER OF RECEIVERS TO BE HEARING-AID COMPATIBLE
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats*	2
201 to 500	2, plus 1 per 25 seats over 50 seats*	1 per 4 receivers*
501 to 1,000	20, plus 1 per 33 seats over 500 seats*	1 per 4 receivers*
1,001 to 2,000	35, plus 1 per 50 seats over 1,000 seats*	1 per 4 receivers*
Over 2,000	55, plus 1 per 100 seats over 2,000 seats*	1 per 4 receivers*

Note: * = or fraction thereof

There are four primary types of listening systems available: induction loop, FM, sound field and infrared. Each type of system has certain advantages and disadvantages that should be taken into consideration when choosing the system that is most appropriate for the intended application.

: 2021 IBC

Topic: General Provisions | **Category:** Accessibility

Reference: IBC 1110 | **Subject:** Features and Facilities

In other than Type A and Type B dwelling units, accessible building features and facilities shall be provided as required in Section 1110. This includes:

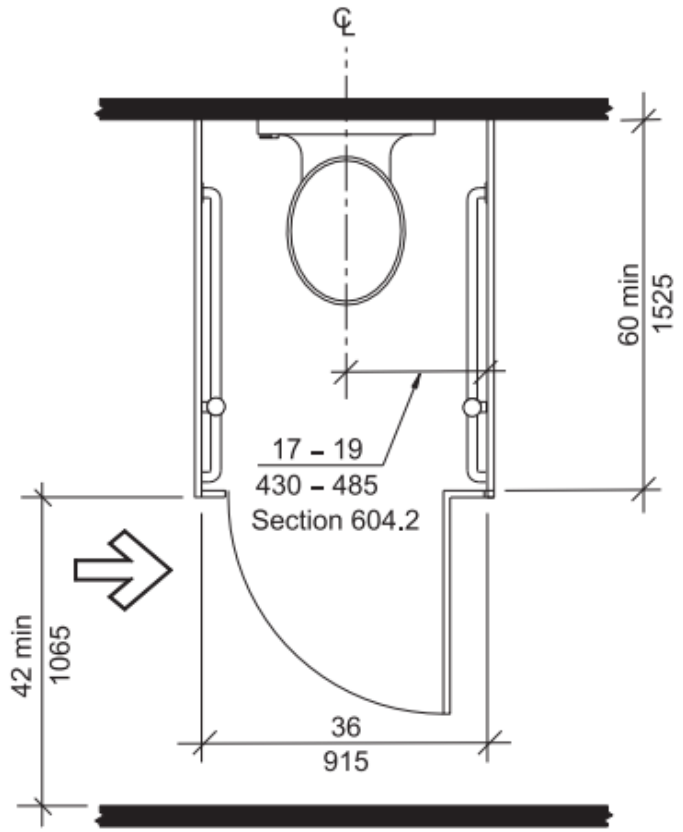
- Toilet and bathing facilities
- Sinks
- Kitchens and kitchenettes
- Drinking fountains
- Bottle-filling stations
- Saunas and steam rooms
- Elevators
- Lifts
- Storage
- Detectable warnings
- Seating at tables, counters and work surfaces
- Service facilities
- Controls, operating mechanisms and hardware
- Fuel-dispensing systems
- Gaming machines and gaming tables

Certain elements addressed in ICC A117.1, including telephones and automatic teller machines, have not been included in the scoping provisions of Chapter 11. However, scoping requirements for such features are set forth in Appendix E of the IBC.

Source: 2021 IBC

Topic: Toilet and Bathing Facilities
Reference: IBC 1110.2

Category: Accessibility
Subject: Features and Facilities



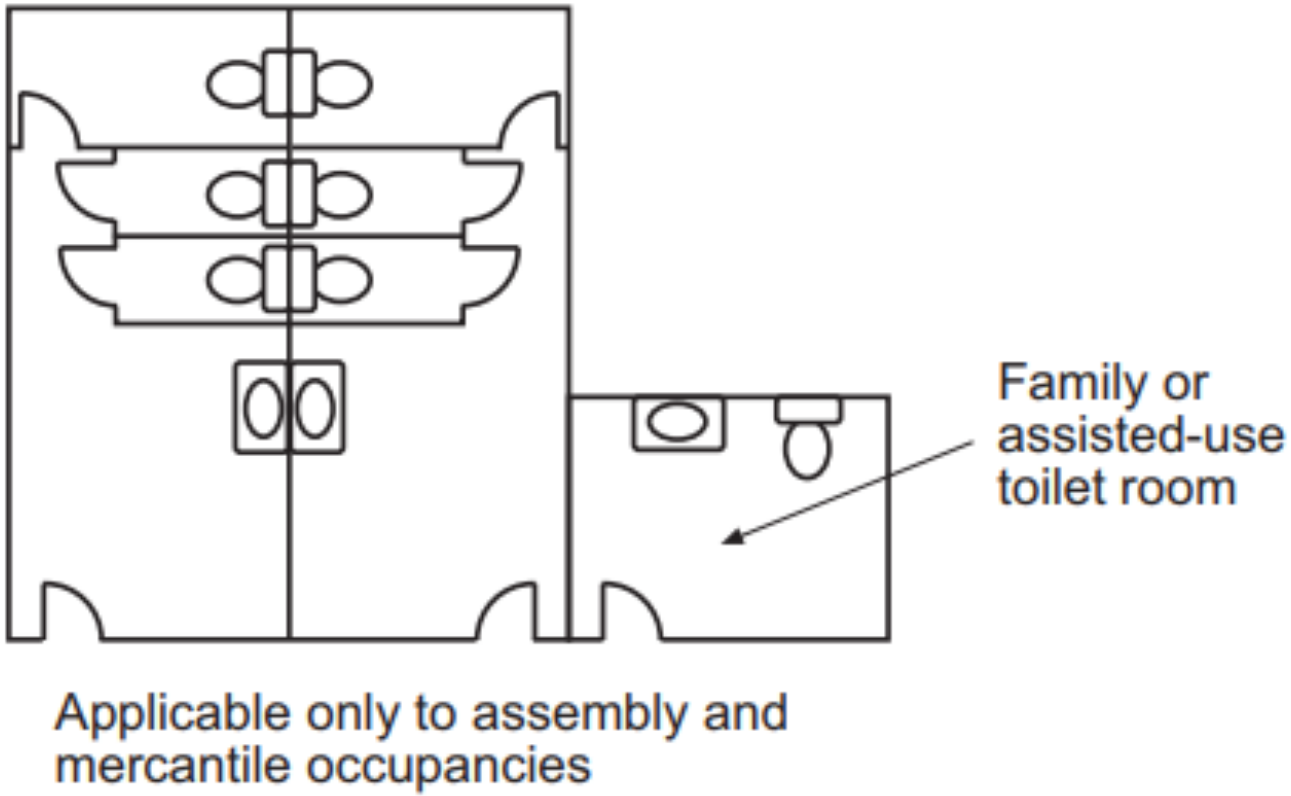
Ambulatory accessible compartment

[Accessible Bathing Facilities - YouTube]

In those toilet rooms and bathing facilities where water closet compartments are provided, a minimum of 5 percent of the compartments must be wheelchair-accessible. If the total number of water closet compartments and urinals provided is six or more, a minimum of 5 percent of compartments must also be ambulatory-accessible water closet compartments.

Topic: Family or Assisted-Use Toilet Rooms **Category:** Accessibility

Reference: IBC 1110.2.1 **Subject:** Features and Facilities



Family or assisted-use toilet rooms shall include only one water closet and one lavatory. A urinal is also permitted but not required. Doors to family or assisted-use toilet and bathing rooms must be securable from within the room.

Source: 2021 IBC

Topic: Accessible Recreational Features
Reference: IBC 1111

Category: Accessibility
Subject: Recreation Facilities

Specific provisions are established for recreational facilities that serve residential Group R-2, R-3 and R-4 occupancies. The required number of accessible facilities varies based upon the type of accessible units provided (Accessible, Type A, Type B), as well as the number of residential buildings on the site.

Source: 2021 IBC

Topic: Signs
Reference: IBC 1112

Category: Accessibility
Subject: Signage

International Symbol of Accessibility

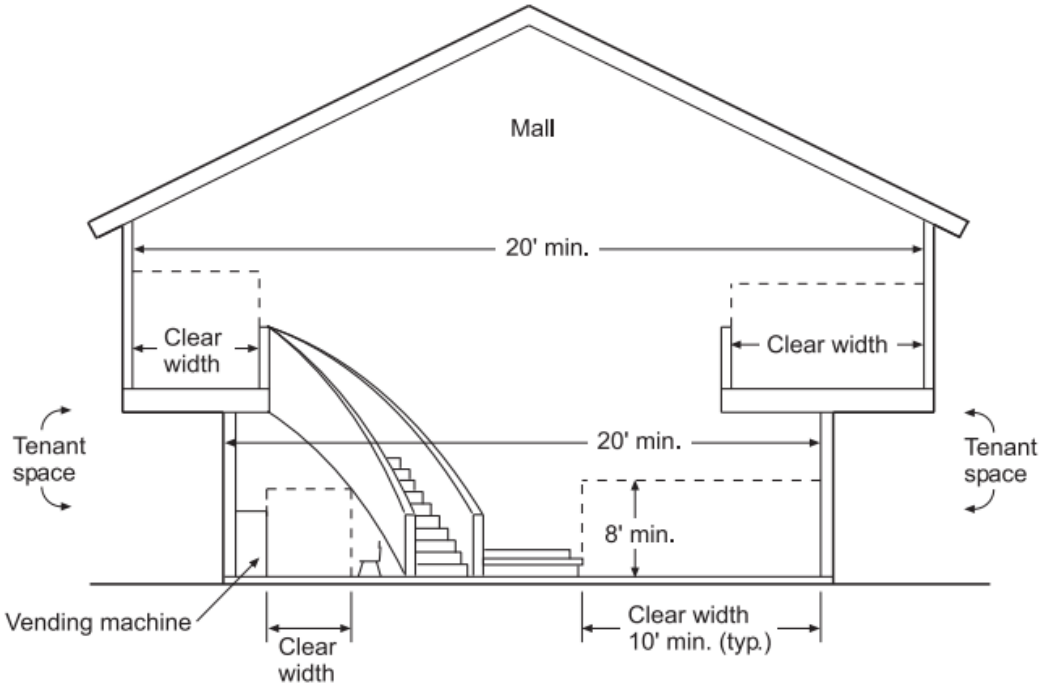
[AC 009 - ADA requirements for signage installation - YouTube]

Where building entrances are not accessible, directional signage must be installed indicating the travel route to the nearest accessible entrance. Signs must also be provided at inaccessible public toilets directing occupants to the nearest accessible toilet facilities.

Source: 2021 IBC

Topic: General Requirements
Reference: IBC 402

Category: Detailed Use Requirements
Subject: Covered Mall and Open Mall Buildings



For SI: 1 foot = 304.8 mm

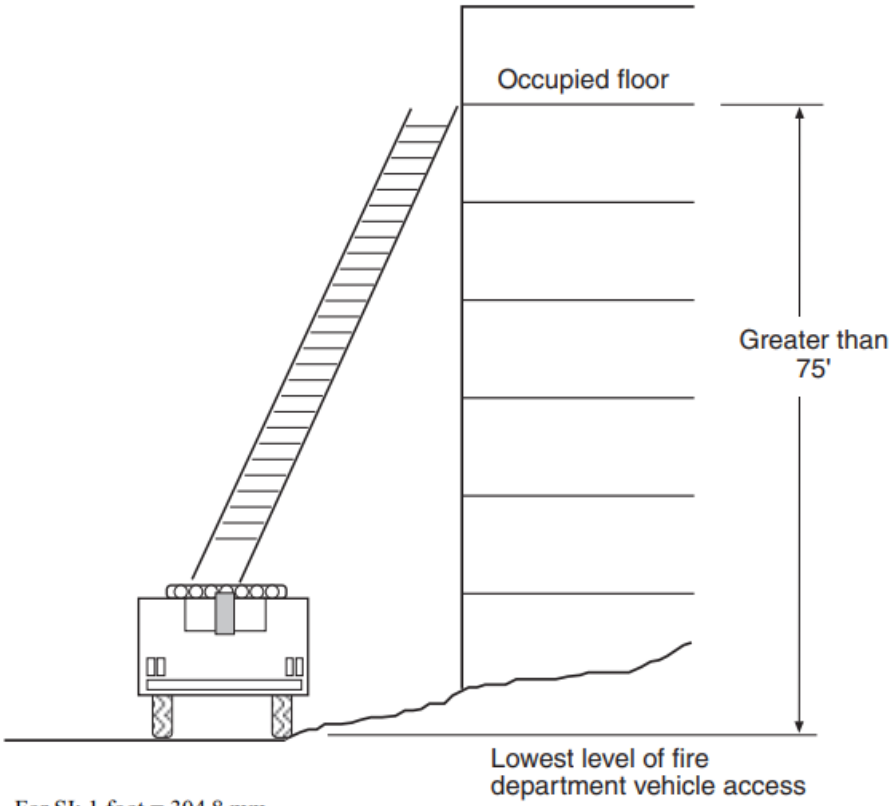
Mall width requirements

The provisions for covered mall and open mall buildings and their associated anchor buildings and parking structures allow for an alternative method of design for structures that have these specific features. Where compliant with the provisions of Section 402, similar requirements found elsewhere in the code can be superseded.

Source: 2021 IBC

Topic: General Requirements
Reference: IBC 403, 202

Category: Detailed Use Requirements
Subject: High-Rise Buildings



For SI: 1 foot = 304.8 mm

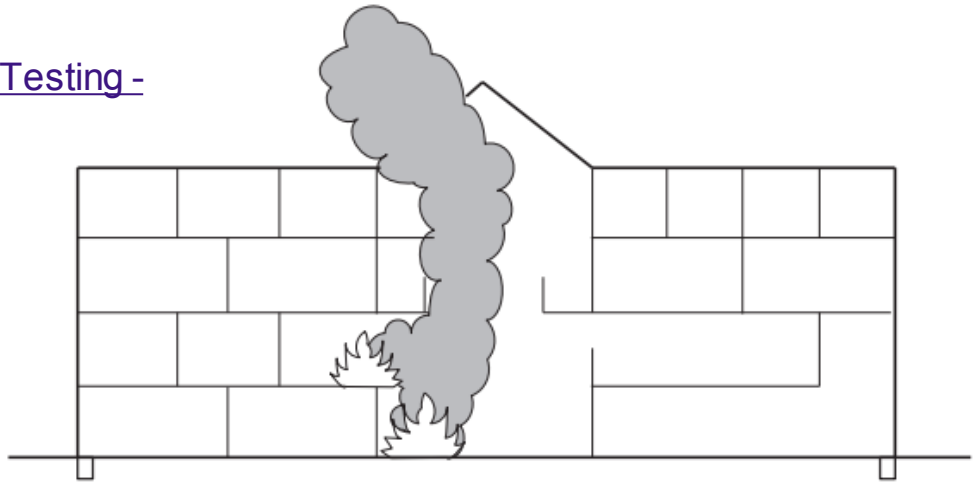
Additional provisions for a high-rise building include the installation of a smoke detection system, emergency voice/alarm and fire department communications systems, a fire command center for use by fire department personnel, smokeproof exit stairway enclosures, luminous egress path markings, and standby power, light and emergency systems.

Topic: General Requirements
Category: Detailed Use Requirements
Reference: IBC 404, 202
Subject: Atriums

Sprinkler system throughout—prevents spread of fire.

Smoke-control system—keeps building and atrium clear of smoke so that safe exiting may be accomplished through the atrium.

[Atrium Smoke Control Testing - YouTube]

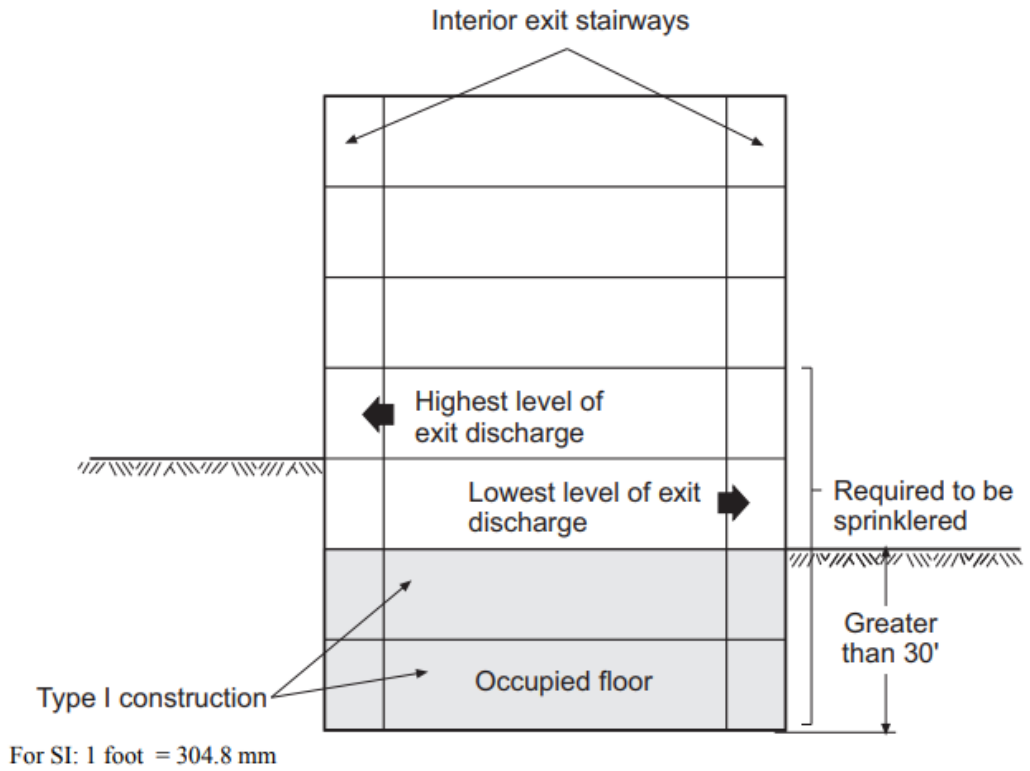


Atrium concept

Atriums are permitted based on alternative methods of protecting the building from vertical spread of fire, smoke and toxic gases. Additional protection is provided through (1) limited travel distance, (2) standby power, (3) smoke detection and (4) interior finish regulation.

Source: 2021 IBC

Topic: General Requirements
Category: Detailed Use Requirements
Reference: IBC 405
Subject: Underground Buildings

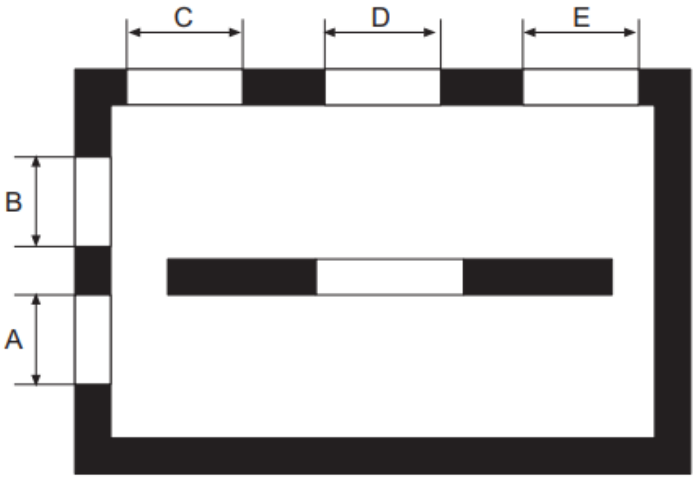


Additional protection must be provided where an underground building has a floor level more than 60 feet below the finished floor of the lowest level of exit discharge. The required creation of multiple compartments assists in both occupant egress and fire department operations.

Topic: General Requirements
Category: Detailed Use Requirements
Reference: IBC 406.1
Subject: Motor-Vehicle-Related Occupancies

Exterior walls must have uniformly distributed openings on two or more sides.

Interior wall and column lines shall be at least 20 percent open (area) with uniformly distributed openings.



General case

1. Area: A + B + C + D + E ≥ 20% total perimeter area of each tier
2. Length: A + B + C + D + E ≥ 40% total perimeter area of each tier

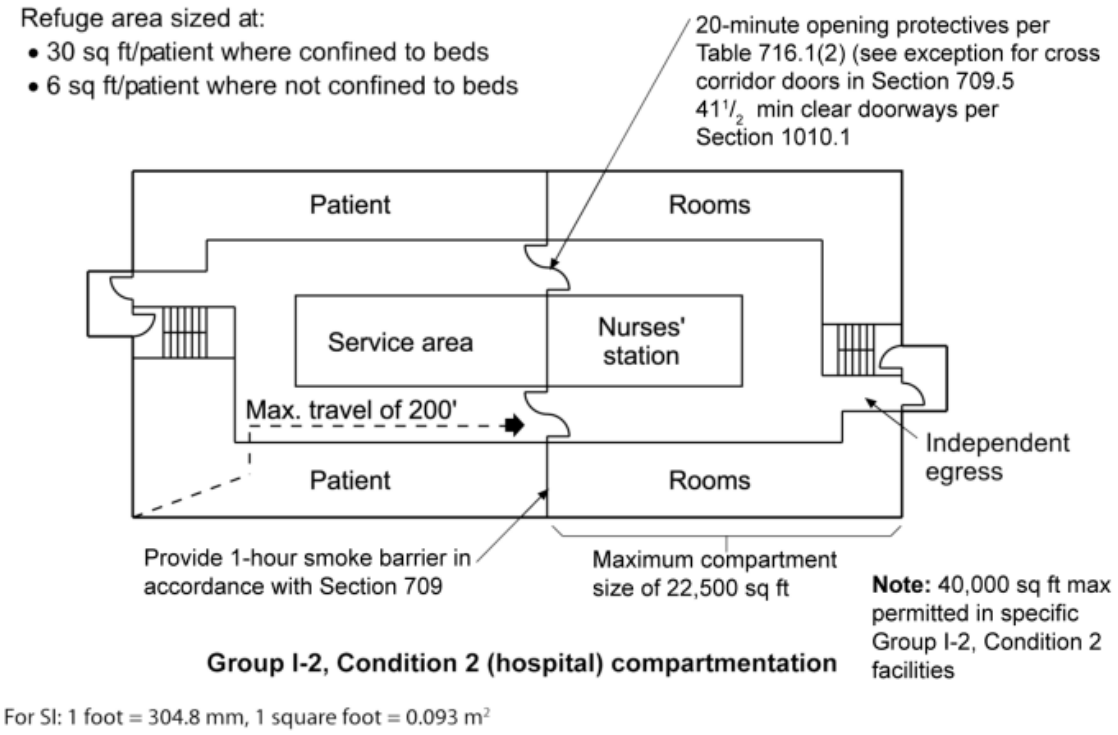
Open parking garages

Private garages classified as Group U occupancies are limited to 1,000 square feet in floor area. However, such structures are permitted to be increased in floor area to that allowed by Section 506 provided the garages are separated from each other by minimum 1-hour fire barriers.

Source: 2021 IBC

Topic: Smoke Barriers
Reference: IBC 407.5

Category: Detailed Use Requirements
Subject: Group I-2 Occupancies



Group I-2, Condition 2 (hospital) compartmentation

For SI: 1 foot = 304.8 mm, 1 square foot = 0.093 m^2

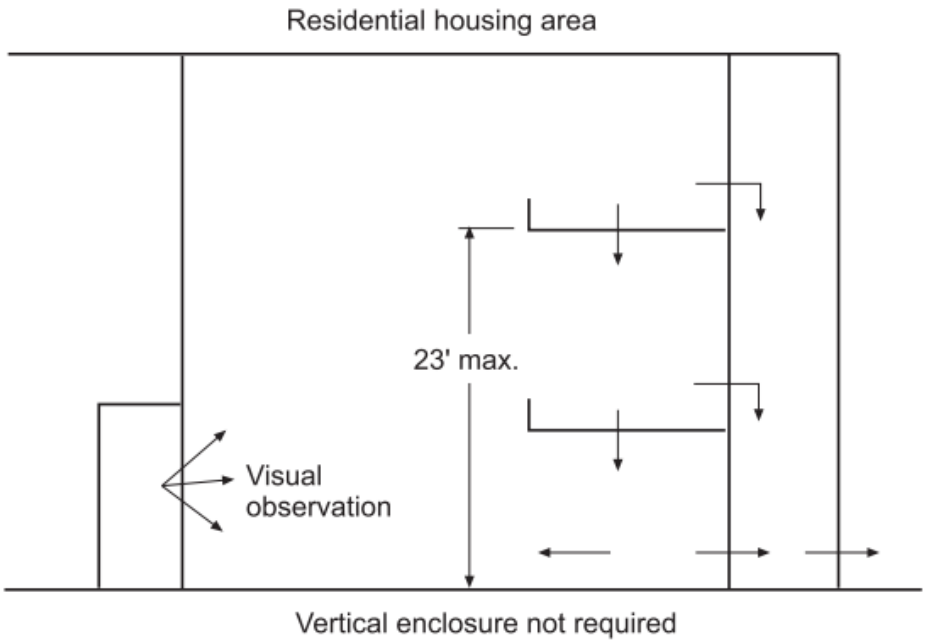
An automatic sprinkler system is required throughout all smoke compartments containing sleeping rooms. To provide for a more immediate response, the use of approved quick-response or residential sprinklers is mandated throughout the smoke compartments containing care recipient sleeping units.

Smoke barriers (Stoebich fire protection) - YouTube

Source: 2021 IBC

Topic: General Requirements
Reference: IBC 408.4

Category: Detailed Use Requirements
Subject: Group I-3 Occupancies



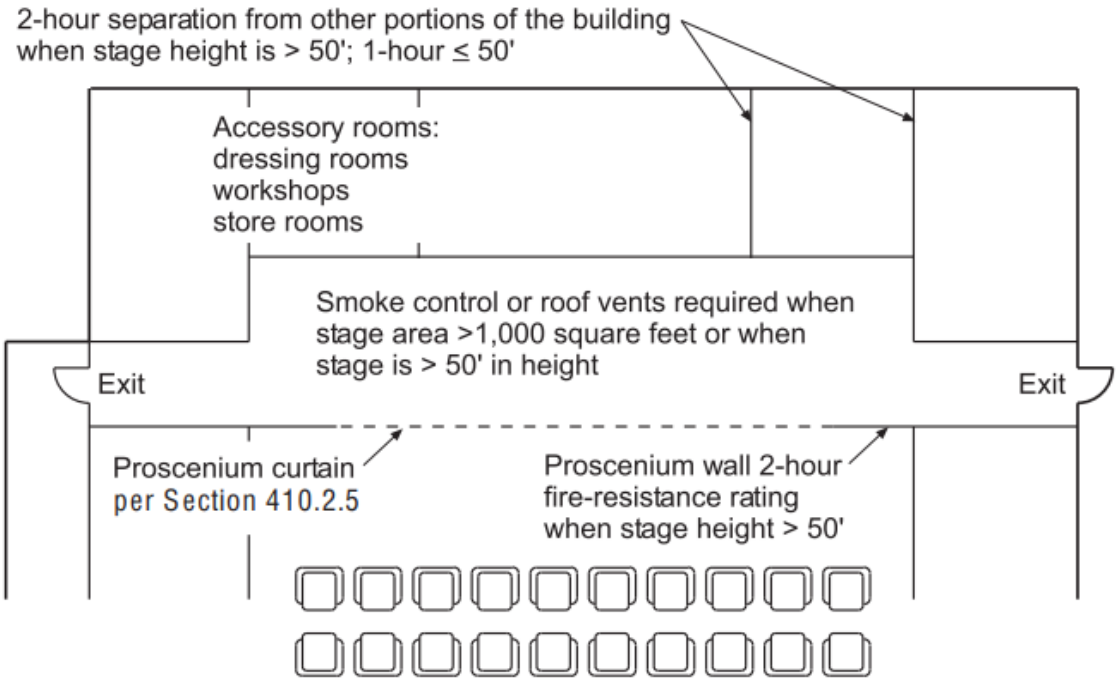
For SI: 1 foot = 304.8 mm

It is often important to ensure that several resident detention areas can be observed from a single location. The code permits the design of a vertical arrangement where several tiers of resident housing areas can be open to each other and to the supervisory area.

Source: 2021 IBC

Topic: Stages
Reference: IBC 410.2, 202

Category: Detailed Use Requirements
Subject: Stages and Platforms

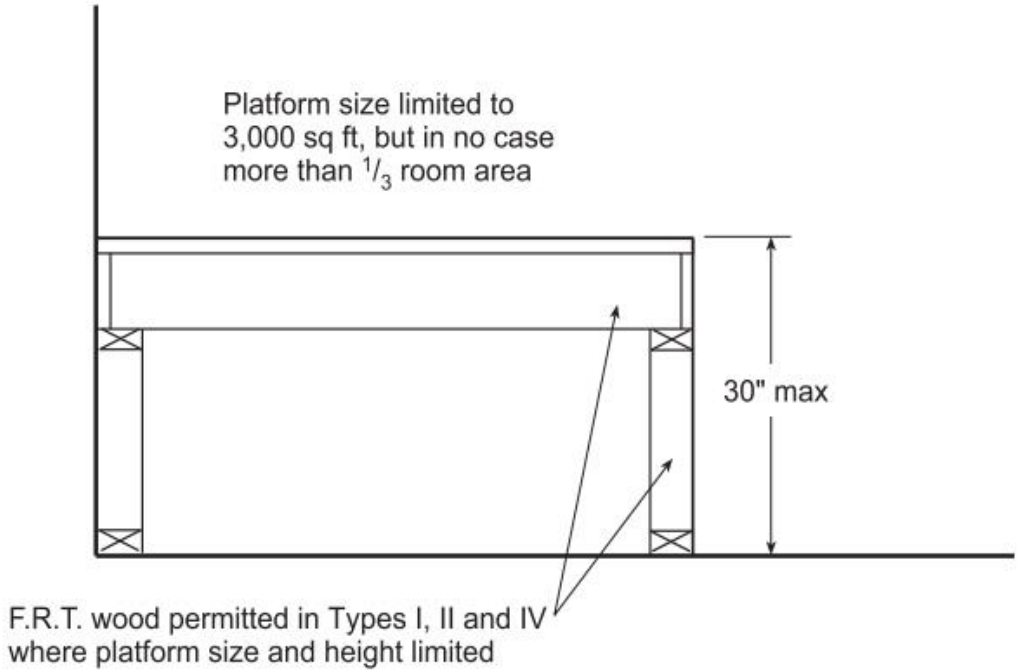


For SI: 1 foot = 304.8 mm, 1 square foot = 0.093 m^2.

A stage differs from a platform in that it usually has curtains, drops, stage effects and/or scenery. Where the stage is of a considerable height, it is possible to provide large amounts of such stage elements overhead and out of sight. This condition creates the potential for a high fire load.

Topic: Platforms
Reference: IBC 410.3, 202

Category: Detailed Use Requirements
Subject: Stages and Platforms



For SI: 1 inch = 25.4 mm, 1 square foot = 0.093 m^2

Temporary platforms are those platforms used within an area for a period not to exceed 30 days. They may be constructed of any materials; however, the space between the floor and the platform cannot be used for any purpose other than wiring or plumbing for platform equipment.

Source: 2021 IBC

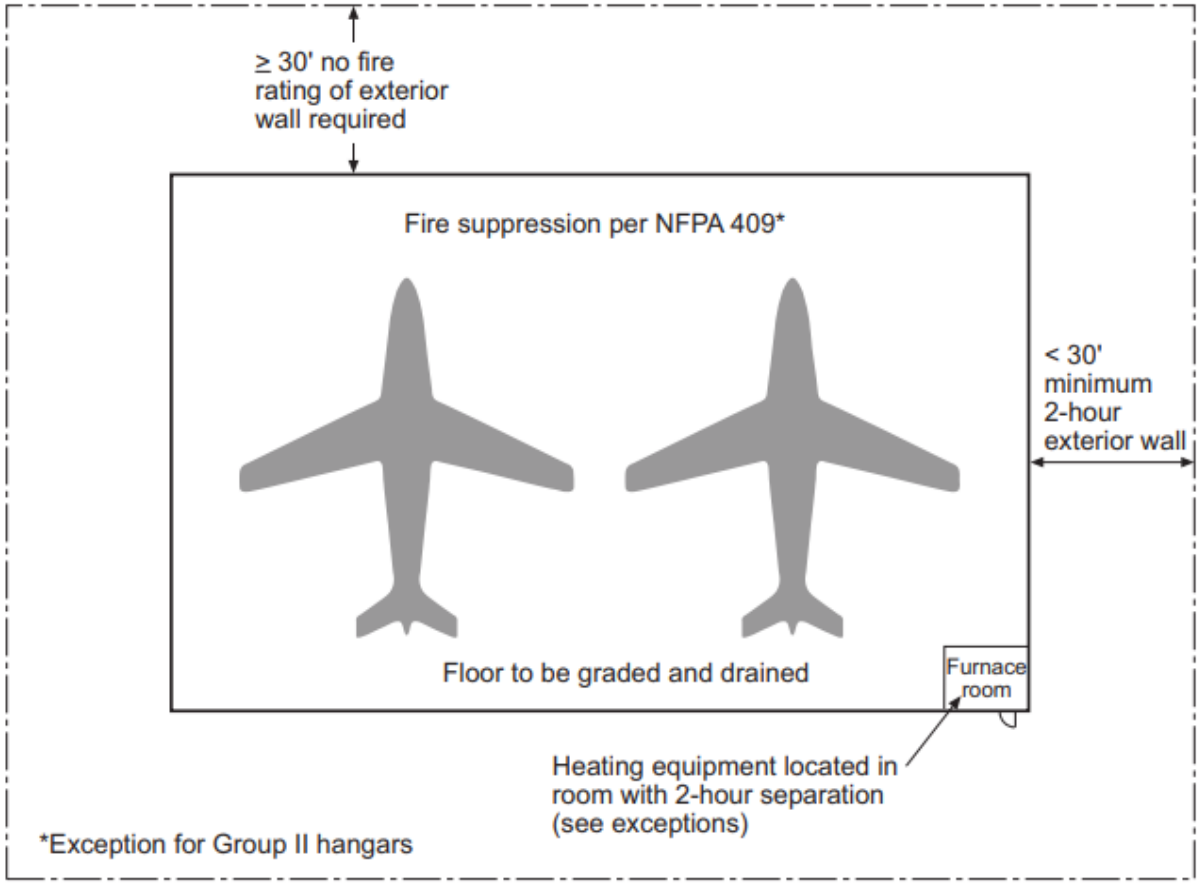
Topic: General Requirements
Reference: IBC 411, 202

Category: Detailed Use Requirements
Subject: Special Amusement Areas

Rapid detection and notification of a fire condition, as well as the discernment of the exit path, are critical in an amusement building. Actuation of either the sprinkler system or the fire detection system shall automatically activate the approved egress directional markings.

Topic: Aircraft Hangars
Reference: IBC 412.3

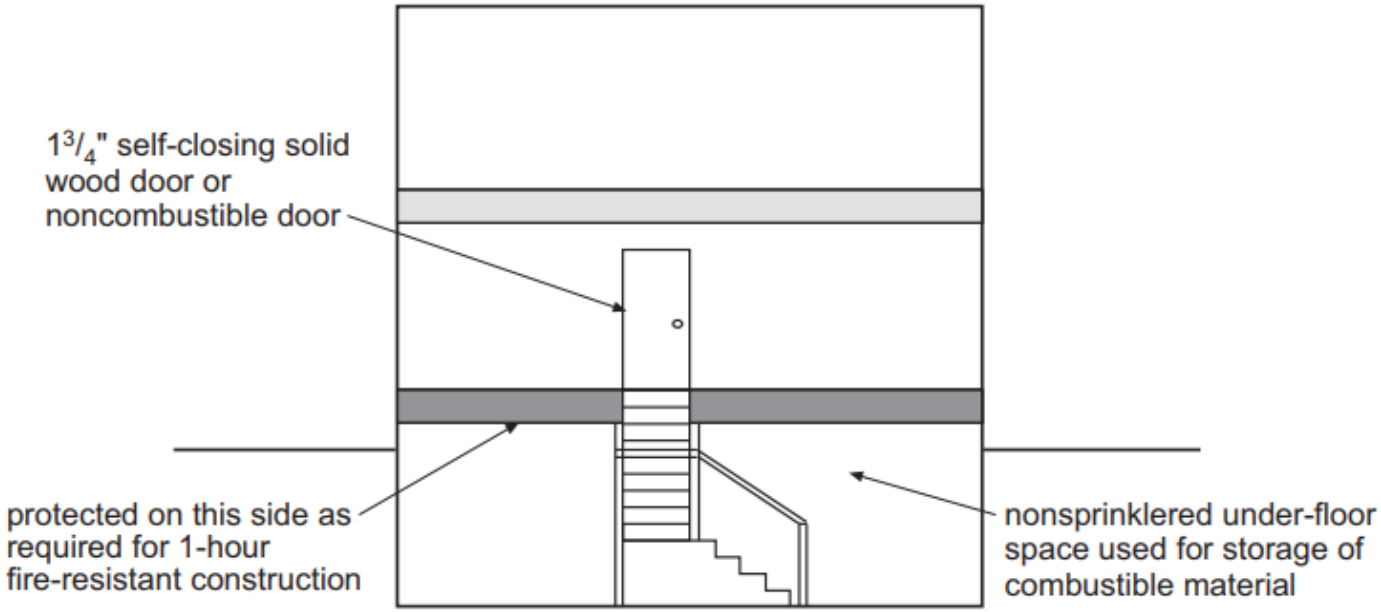
Category: Detailed Use Requirements
Subject: Aircraft-Related Occupancies



Aircraft hangars

Table 412.3.6 provides the fire suppression requirements for aircraft hangars based upon the fire area size and construction type. Maximum single fire areas are to be separated by minimum 2-hour fire walls.

Topic: Attic and Under-Floor Spaces
Category: Detailed Use Requirements
Reference: IBC 413.2
Subject: Combustible Storage



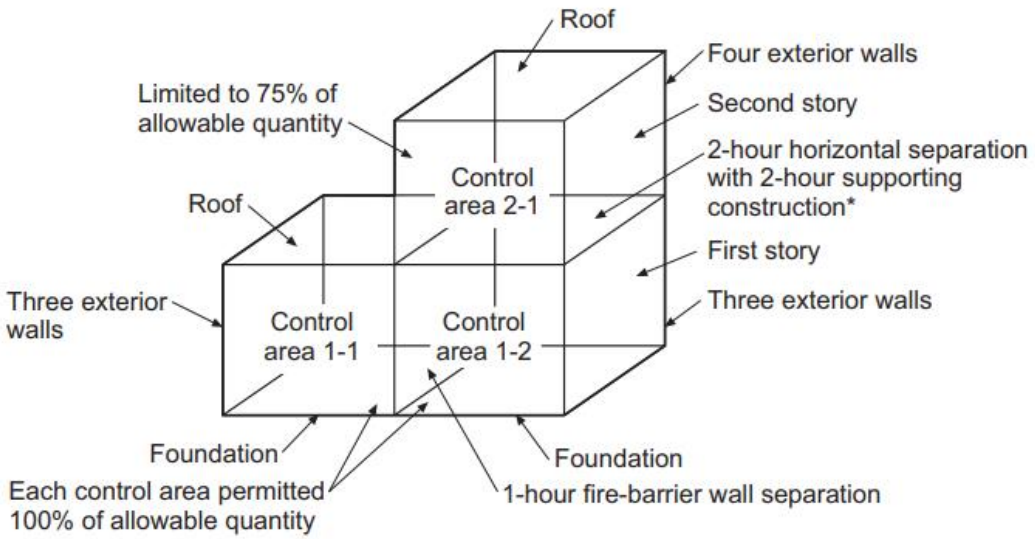
For SI: 1 inch = 25.4 mm.

The code does not mandate a full 1-hour fire-resistance-rated assembly to isolate the combustible storage area from the unoccupied space. Because the hazard presumably exists only on the inside of the storage space, that is the only side where the protection is required.

Source: 2021 IBC

Topic: Control Areas
Reference: IBC 414.2.1, 202

Category: Detailed Use Requirements
Subject: Hazardous Materials



*Exception allows for 1-hour in fully sprinklered Type IIA, IIIA and VA buildings no more than three stories in height.

Multistory control areas

The maximum quantities of hazardous materials within a given control area cannot exceed the quantities for a given material listed in either Table 307.1(1) for physical hazards and Table 307.1(2) for health hazards, as modified by Table 414.2.2 for location within the building.

Source: 2021 IBC

Topic: Control Areas
Category: Detailed Use Requirements
Reference: IBC 414.2.2–414.2.4
Subject: Hazardous Materials

[F] TABLE 414.2.2
DESIGN AND NUMBER OF CONTROL AREAS

STORY		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA[a]	NUMBER OF CONTROL AREAS PER STORY	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

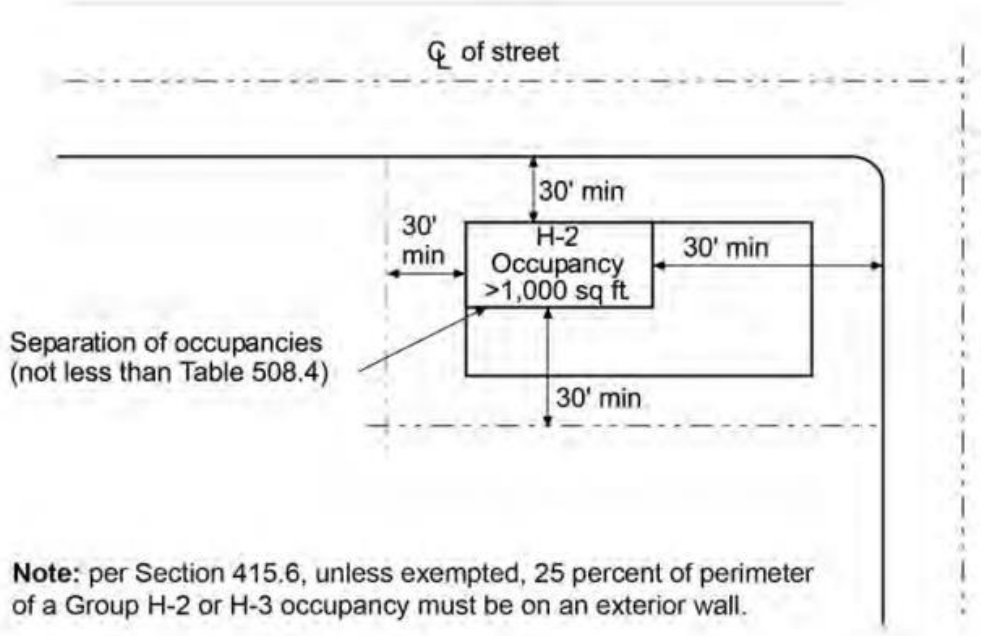
a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the notes to those tables.
b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

The purpose of a control area is to allow the building to be classified according to its general occupancy instead of being classified as a Group H occupancy. A building may comprise a single control area where the amount of hazardous materials in the entire structure is compliant.

Source: 2021 IBC

Topic: Distance to Lot Lines
Reference: IBC 415.6.4

Category: Detailed Use Requirements
Subject: Group H Occupancies



Location on lot for mixed occupancies that include a Group H-2 Occupancy

For SI: 1 foot = 304.8 mm, 1 square foot = 0.093 m²

Note that the measurement is made to the lot line adjacent to a public way, not the centerline as utilized in Table 705.5. In addition, the distance is measured from the walls enclosing the Group H occupancy, which may not necessarily be the exterior wall lines.

[F] TABLE 415.6.5
DETACHED BUILDING REQUIRED

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT SPECIFIED HEREIN			
Material	**Class**	**Solids and Liquids (tons)[a, b]**	**Gases (cubic feet)[a, b]**
Explosives	Division 1.1	Maximum Allowable Quantity	Not Applicable
	Division 1.2	Maximum Allowable Quantity	
	Division 1.3	Maximum Allowable Quantity	
	Division 1.4	Maximum Allowable Quantity	
	Division 1.4[c]	1	
	Division 1.5	Maximum Allowable Quantity	
	Division 1.6	Maximum Allowable Quantity	
Oxidizers	Class 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Unstable (reactives) detonable	Class 3 or 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Oxidizer, liquids and solids	Class 3	1,200	Not Applicable
	Class 2	2,000	Not Applicable
Organic peroxides	Detonable	Maximum Allowable Quantity	Not Applicable
	Class I	Maximum Allowable Quantity	Not Applicable
	Class II	25	Not Applicable
	Class III	50	Not Applicable
Unstable (reactives) nondetonable	Class 3	1	2,000
	Class 2	25	10,000
Water reactives	Class 3	1	Not Applicable
	Class 2	25	Not Applicable
Pyrophoric gases[d]	Not Applicable	Not Applicable	2,000

For SI: 1 ton = 906 kg, 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg.

a. For materials that are detonable, the distance to other buildings or lot lines shall be in accordance with Section 415.6 of this code or Chapter 56 of the *International Fire Code* based on trinitrotoluene (TNT) equivalence of the material, whichever is greater.

b. "Maximum Allowable Quantity" means the maximum allowable quantity per control area set forth in Table 307.1(1).

c. Limited to Division 1.4 materials and articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco, Firearms and Explosives (BATF) regulations or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles, provided that the net explosive weight of individual articles does not exceed 1 pound.

d. Detached buildings are not required, for gases in gas rooms that support H-5 fabrication facilities where the gas room is separated from other areas by a fire barrier with a fire-resistance rating of not less than 2 hours and the gas is located in a gas cabinet that is internally sprinklered, equipped with continuous leak detection, automatic shutdown and is not manifolded upstream of pressure controls. Additionally, the gas supply is limited to cylinders that do not exceed 125 pounds (57 kg) water capacity in accordance with 49 CFR 173.192 for Hazard Zone A toxic gases.

The need for detached storage is a function of the type, physical state and quantity of material. Because such a single-use structure must be located an adequate distance from surrounding lot lines and other buildings, exterior walls and exterior openings need not be protected for exposure.

Topic: General Requirements
Reference: IBC 416.1, 416.2

Category: Detailed Use Requirements
Subject: Spray Application of Flammable Finishes

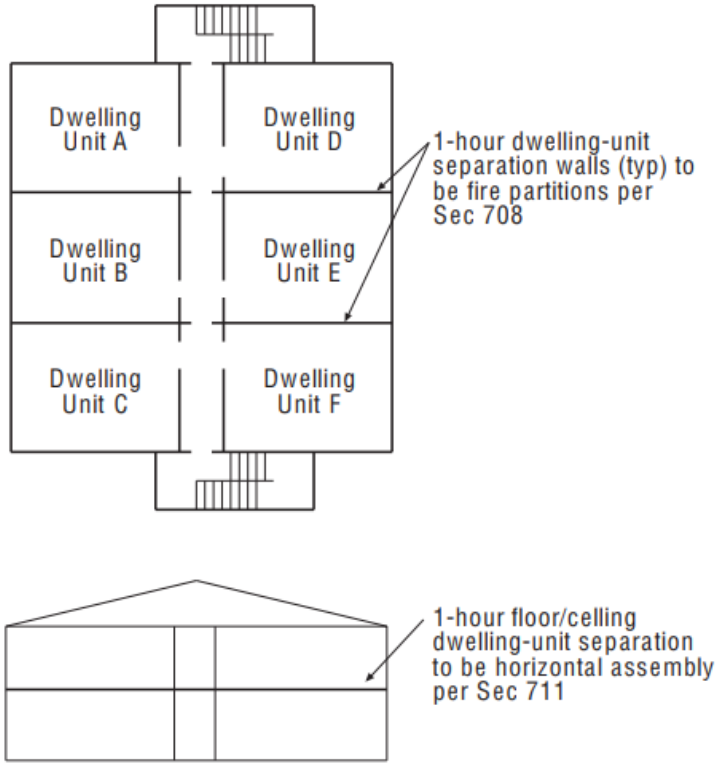
Spray rooms	Spray booths	Limited spray space
• Designed and constructed per IBC Section 416 • Separated from remainder of building by 1-hour fire barriers • Automatic fire-extinguishing system required	• Designed and constructed per IFC Section 2404.3.3 • Constructed of approved noncombustible materials • Limited in size and location • Automatic fire-extinguishing system required	• Aggregate surface area to be sprayed limited to 9 sq ft • Spraying operations not to be continuous in nature • Mechanical ventilation and hazardous location wiring regulated

Chapter 24 of the *International Fire Code* provides comprehensive requirements for the application of flammable finishes, including detailed provisions for spray booths. Spray finishing operations in Group A, E, I or R occupancies shall be located in a spray room. In other occupancies, such operations may occur in a spray room, spray booth or spraying space approved for such use.

Source: 2021 IBC

Topic: Unit Separations
Reference: IBC 420

Category: Detailed Use Requirements
Subject: Groups I-1, R-1, R-2 and R-3

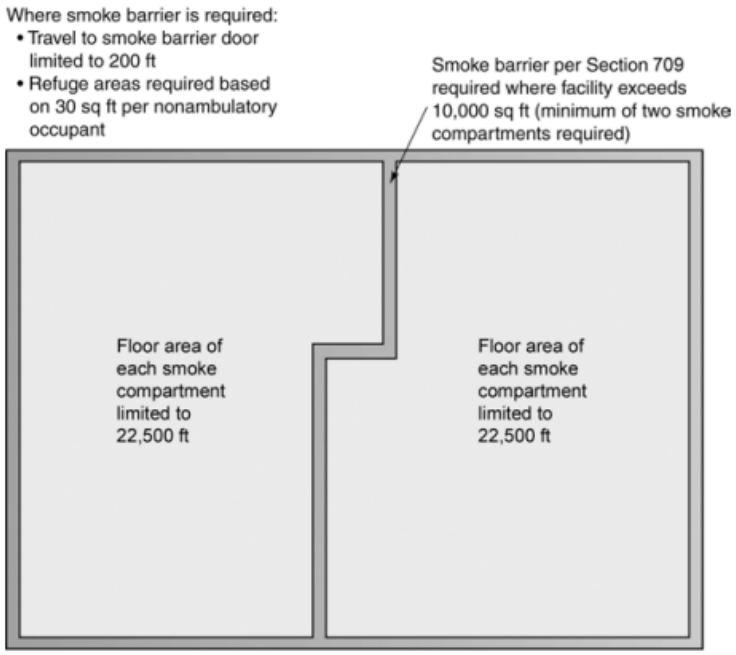


Section AA

All vertical (fire partitions) and horizontal (horizontal assemblies) separation elements are required to be of minimum one-hour fire-resistance-rated construction and provided with protected openings. Where the building is sprinklered throughout with an NFPA 13 system, the required separation may be reduced to $^1/_2$ hour.

Topic: Smoke Barriers
Reference: IBC 422.2

Category: Detailed Use Requirements
Subject: Ambulatory Care Facilities



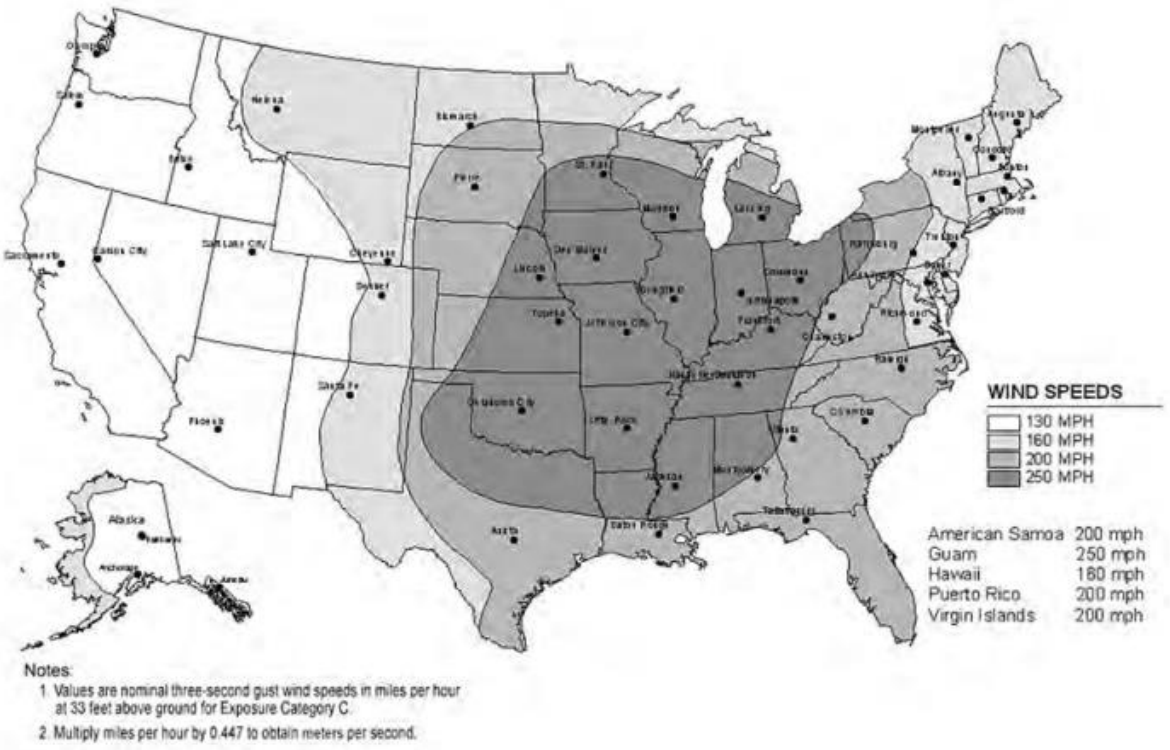
For SI: 1 foot = 304.8 mm, 1 square foot = 0.093 m^2 **Ambulatory health care facility**

In addition to the requirement for smoke compartments in those ambulatory care facilities over 10,000 square feet in floor area, the installation of fire protection systems is often mandated. A manual fire alarm system is required in all ambulatory care facilities, and an automatic sprinkler system is required where there are four or more care recipients incapable of self-preservation, or if one or more such recipients is located on other than the level of exit discharge.

Source: 2021 IBC

Topic: Required Shelters
Reference: IBC 423.4, 423.5

Category: Detailed Use Requirements
Subject: Storm Shelters



[Rule for tornado shelter sends Cathedral Prep expansion to court (goerie.com)]

In addition to the necessary administrative and application provisions established in Chapter 1 and definitions in Chapter 2, ICC 500, *ICC/NSSA Standard for the Design and Construction of Storm Shelters,* includes criteria for structural design, siting, occupancy, means of egress, access, accessibility and fire safety.

IBC

Class 14: Chapters 14, 15 and 18
Exterior Wall Coverings, Roofs and Foundations

Source: 2021 IBC

Objective

- To obtain an understanding of the requirements for exterior wall coverings, including weather-resistant coverings and veneer; roofing assemblies, roof coverings and rooftop structures; and footings and foundations.

Source: 2021 IBC

Topic: Weather Protection | **Category:** Exterior Walls

Reference: IBC 1402.2 | **Subject:** Performance Requirements

Code Text: *Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing, as described in Section 1404.4. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior veneer, as described in Section 1403.2, and a means for draining water that enters the assembly to the exterior.* See the three exceptions.

Discussion and Commentary: The code considers it necessary to apply at least one layer of water-resistive barrier material attached to the *studs or sheathing in order to provide a continuous water-resistive-barrier behind the exterior wall veneer*. The use of flashing in conjunction with the felt provides a continuous barrier against water penetration.

Exterior Continuous Insulation Comparison - YouTube

Source: 2021 IBC

Topic: Weather Protection

Category: Exterior Walls

Reference: IBC 1402.2

Subject: Performance Requirements

TABLE 1404.2
MINIMUM THICKNESS OF WEATHER COVERINGS

COVERING TYPE	MINIMUM THICKNESS (inches)
Adhered masonry veneer	0.25
Aluminum siding	0.019
Anchored masonry veneer	
Stone (natural)	2.0
Architectural cast stone	2.5
Other	2.0
Asbestos-cement boards	0.125
Asbestos shingles	0.156
Cold-rolled copper[d]	0.0216 nominal
Copper shingles[d]	0.0162 nominal
Exterior plywood (with sheathing)	0.313
Exterior plywood (without sheathing)	See Section 2304.6
Fiber cement lap siding	0.25[c]
Fiber cement panel siding	0.25[c]
Fiberboard siding	0.5
Glass-fiber reinforced concrete panels	0.375
Hardboard siding[c]	0.25
High-yield copper[d]	0.0162 nominal
Lead-coated copper[d]	0.0216 nominal
Lead-coated high-yield copper	0.0162 nominal
Marble slabs	1
Particleboard (with sheathing)	See Section 2304.6
Particleboard (without sheathing)	See Section 2304.6
Porcelain tile	0.125 nominal
Steel (approved corrosion resistant)	0.0149

(Continued)

For all exterior walls other than those constructed of concrete or masonry, the IBC requires the installation of a weather-resistant exterior wall envelope. Any other approved method to resist condensation and moisture leakage is also acceptable.

Source: 2021 IBC

Topic: Vapor Retarders | **Category:** Exterior Walls

Reference: IBC 1404.3 | **Subject:** Installation of Wall Coverings

Code Text: *Vapor retarder materials shall be classified in accordance with Table 1404.3(1). A vapor retarder shall be provided on the interior side of frame walls in accordance with Tables 1404.3(2) and 1404.3(3), or an approved design using accepted engineering practice for hydrothermal analysis. Only Class III vapor retarders shall be used on the interior side of frame walls where foam plastic insulating sheathing with a perm rating of less than 1 is applied in accordance with Table 1404.3(3) on the exterior side of the frame wall.*

Discussion and Commentary: Prescriptive methods are provided in Section 1404.3 to address moisture control. The code prescribes three different vapor retarder classes, based on the vapor permeability of the material as defined in Chapter 2.

Source: 2021 IBC

Topic: Vapor Retarders | **Category:** Exterior Walls

Reference: IBC 1404.3 | **Subject:** Installation of Wall Coverings

TABLE 1404.3(1)
VAPOR RETARDER MATERIALS AND CLASSES

VAPOR RETARDER CLASS	ACCEPTABLE MATERIALS
I	Sheet polyethylene, nonperforated aluminum foil, or other approved materials with a perm rating of less than or equal to 0.1
II	Kraft-faced fiberglass batts or vapor retarder paint or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating greater than 0.1 and less than or equal to 1.0
III	Latex paint, enamel paint, or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating of greater than 1.0 and less than or equal to 10

Wall assemblies can be designed and constructed to dry inward, outward and to both sides in all climate zones. The provisions allow more flexibility in the design and construction of moisture-forgiving wall systems. The requirements recognize that many common materials function to various degrees to slow the passage of moisture.

Source: 2021 IBC

Topic: Flashing | **Category:** Exterior Walls

Reference: IBC 1404.4 | **Subject:** Installation of Wall Coverings

Code Text: *Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect that moisture to the surface of the exterior wall finish or to a water-resistive barrier that is part of a means of drainage complying with Section 1402.2. Flashing shall be installed at the perimeters of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimneys, porches, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashing with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim.*

Discussion and Commentary: In general, the code requires that all intersections of exterior surfaces and/or components be flashed to prevent water intrusion. Roof and wall intersections and parapets are especially troublesome, as are exterior wall openings exposed to weather and, in particular, wind-driven rain.

Flashing at Bottom of Exterior Walls - YouTube

Bottom of Siding Water Damage from Incorrect Installation of Foundation Metal - YouTube

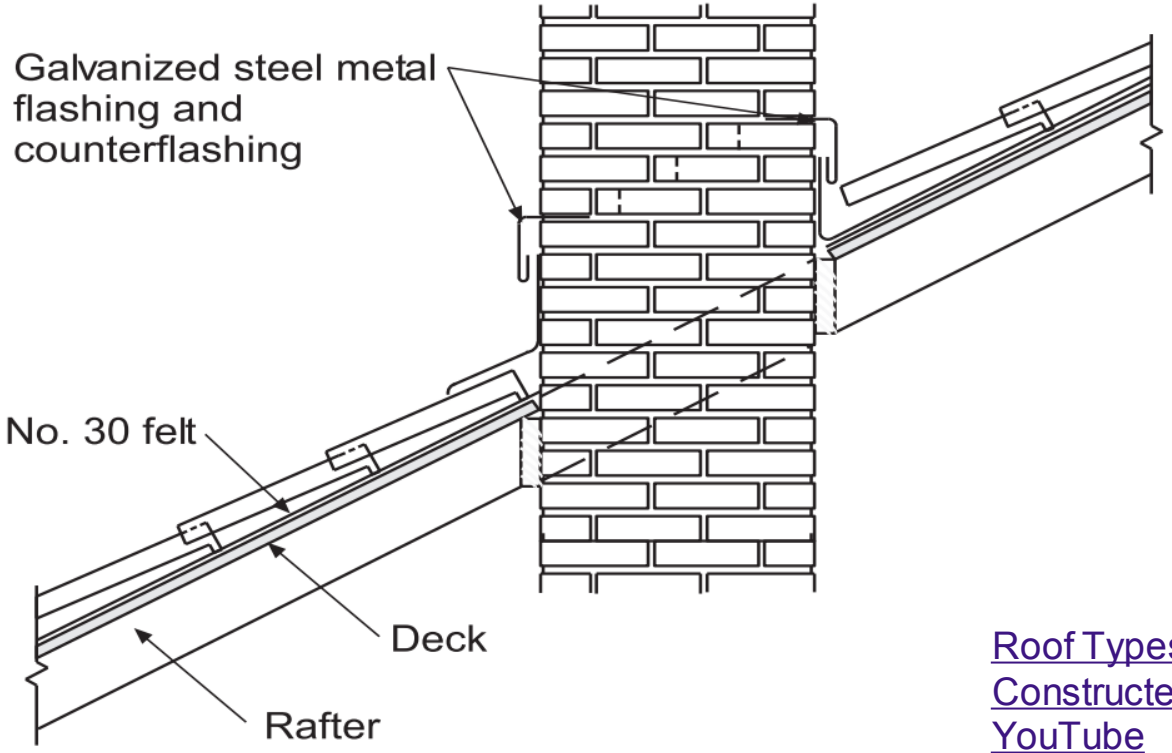
Source: 2021 IBC

Topic: Flashing

Category: Exterior Walls

Reference: IBC 1404.4

Subject: Installation of Wall Coverings



[Roof Types & How They Are Constructed - Carpentry 101 - YouTube]

For SI: 1 inch = 25.4 mm.

Chimney flashing detail

Where anchored masonry veneer is installed, the masonry must be provided with flashing and weepholes in the first course above finished ground level above the foundation wall or slab, as well as at other points of support.

urce: 2021 IBC

Topic: Definitions | **Category:** Exterior Walls

Reference: IBC 1404.5, 1404.11, 202 | **Subject:** Veneer

Code Text: Veneer is *a facing attached to a wall for the purpose of providing ornamentation, protection, or insulation, but not counted as adding strength to the wall.* Adhered masonry veneer is *veneer secured and supported through the adhesion of an approved bonding material applied to an approved backing.* Anchored masonry veneer is *veneer secured with approved mechanical fasteners to an approved backing. Wood veneers on exterior walls of buildings of Type I, II, III and IV construction shall be not less than 1 inch (25 mm) nominal thickness, 0.438-inch (11.1 mm) exterior hardboard siding or 0.375-inch (9.5 mm) exterior-type wood structural panels or particleboard. Metal veneers shall not be less than 0.0149-inch (0.378 mm) nominal thickness sheet steel mounted on wood or metal furring strips or approved sheathing on light-frame construction.*

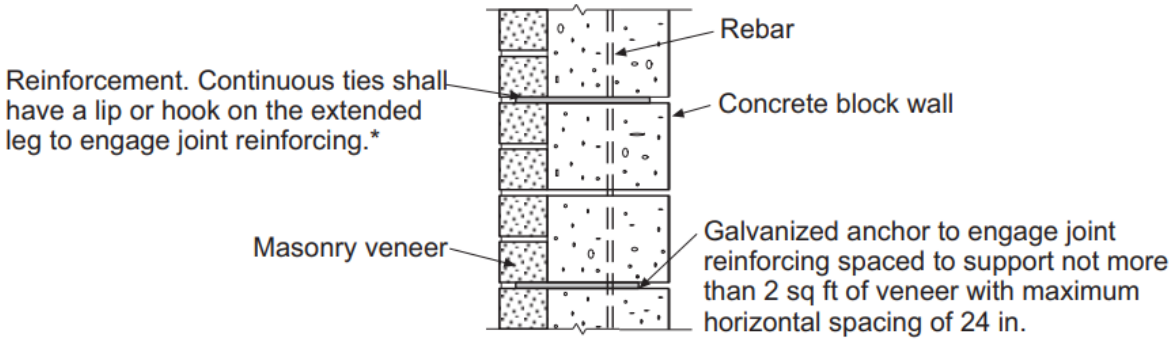
Discussion and Commentary: Years ago, veneer was considered an ornamental facing for a masonry wall. Today, the IBC regulates a variety of veneer materials: wood, anchored masonry, stone, slab-type, terra cotta, adhered masonry, metal, glass and, in Chapter 26, plastic. The code regulates material size, type and attachment, as well as other concerns that would cause the veneer to fail.

How to Install Veneer Stone - YouTube

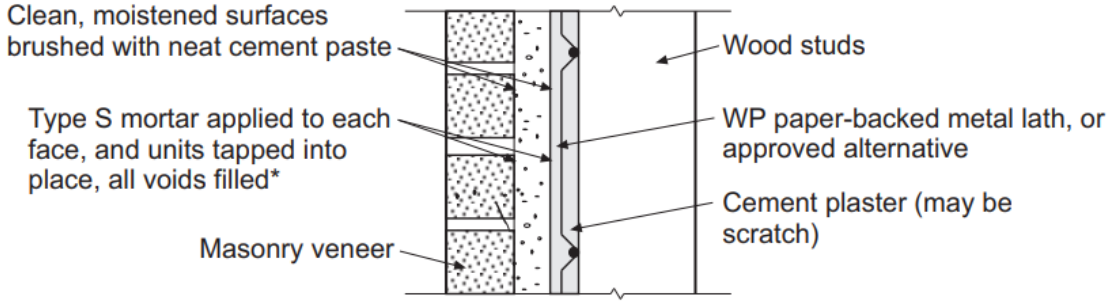
Source: 2021 IBC

Topic: Definitions **Category:** Exterior Walls

Reference: IBC 1404.5, 1404.11, 202 **Subject:** Veneer



A. To concrete block wall



B. To wood studs and paper-backed metal lath

Generic application of anchored masonry veneer (5 in. max thickness)

For SI: 1 inch = 25.4 mm, 1 square foot = 0.093 m^2.

As they are constantly subjected to alternate cycles of wetting and drying, the anchors, ties or supports used in the attachment of veneer must be corrosion resistant. These materials, when used on the exterior of a building, must support the veneer properly for the life of the building.

Source: 2021 IBC

Topic: Scope and Definitions | **Category:** Roof Assemblies and Rooftop Structures

Reference: IBC 1501.1, 202 | **Subject:** Roof Assembly

Code Text: *The provisions of* Chapter 15 *shall govern the design, materials, construction and quality of roof assemblies and rooftop structures.* A roof assembly *is a system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly can include an underlayment, a thermal barrier, insulation or vapor retarder.* Roof covering is *the covering applied to the roof deck for weather resistance, fire classification or appearance.*

Discussion and Commentary: There are many components of a roof assembly. Viewed as a unit, a roof assembly is regulated for its resistance to wind, weathering, impact and fire. In addition, roof coverings must be designed, installed and maintained to protect the building from the weather.

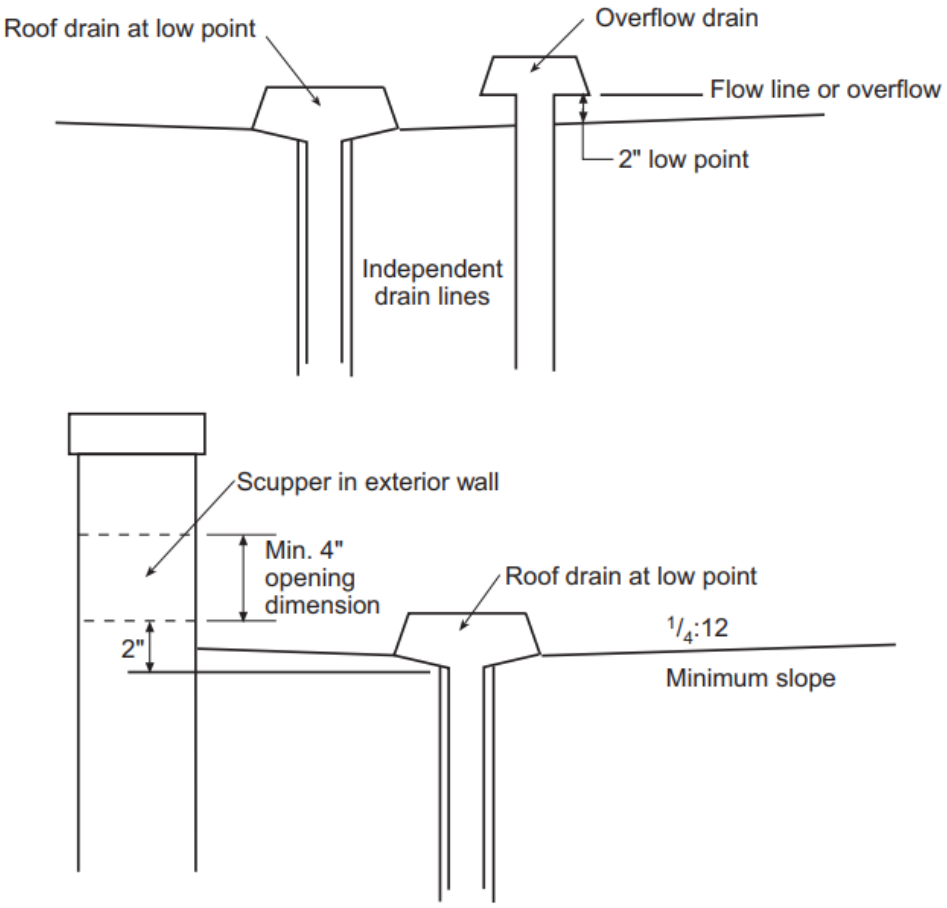
5 Commercial Roof Types Every Business Owner Must Know - YouTube

Basic roof components - YouTube

Source: 2021 IBC

Topic: Scope and Definitions
Reference: IBC 1501.1, 202

Category: Roof Assemblies and Rooftop Structures
Subject: Roof Assembly



For SI: 1 inch = 25.4 mm.

Chapter 11 of the *International Plumbing Code* is referenced in Section 1502.1 for the design and installation of roof drainage systems. Where water on the roof is not intended to flow over the roof edge, provisions for roof drainage will include primary roof drains supplemented by overflow drains.

Flat Roof Installation Over Tar and Gravel - most effective recover roofing system - YouTube

15 (actually 16) roofing terms you need to know! | Pro Exteriors & Construction - YouTube

Source: 2021 IBC

Topic: General Requirements
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1503, 1507
Subject: Roof Coverings

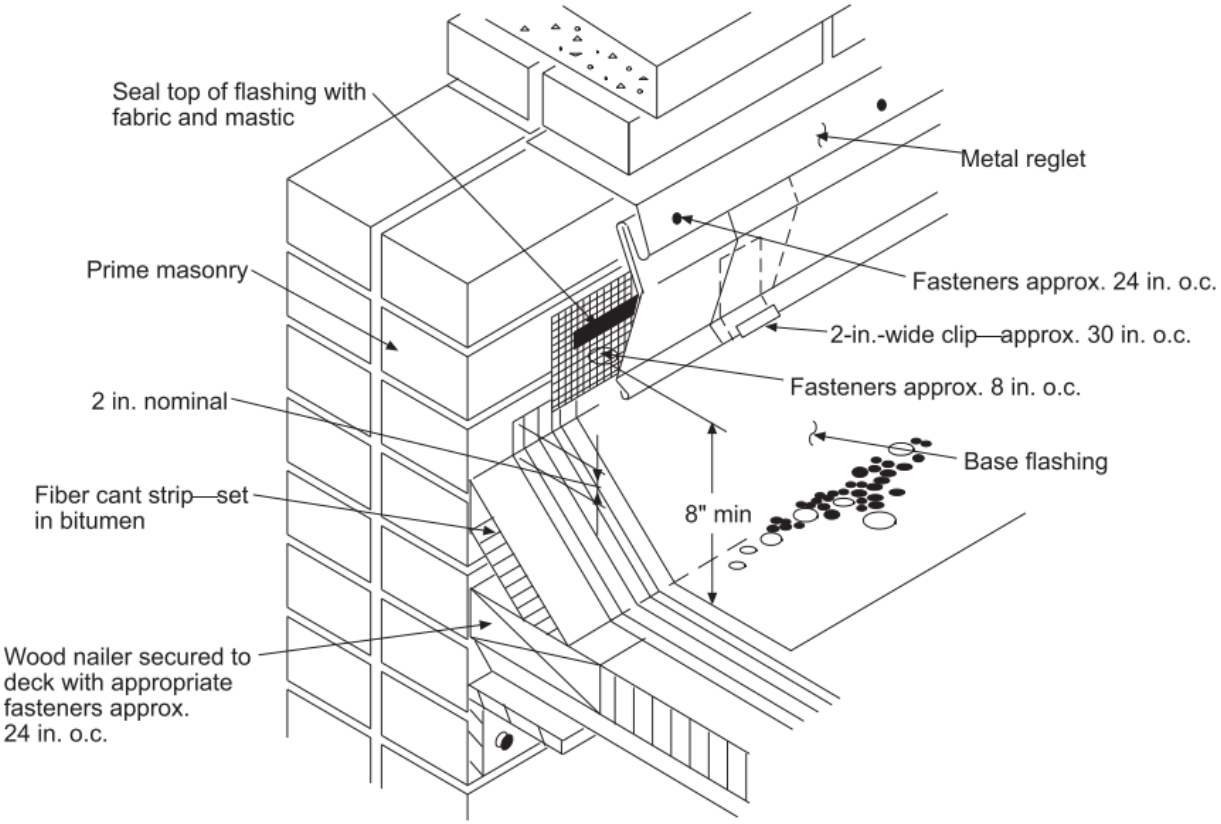
Code Text: *Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of* Chapter 15. *Roof coverings shall be designed in accordance with* the IBC, *and installed in accordance with* the IBC *and the manufacturer's approved instructions. Roof coverings shall be applied in accordance with the applicable provisions of* Section 1507 *and the manufacturer's installation instructions.*

Discussion and Commentary: The IBC contains installation requirements for a number of types of roof covering materials and systems. Selectively included in the provisions are deck requirements, limitations on roof slope, underlayment, materials, fasteners and attachment, flashings and application methods.

Source: 2021 IBC

Topic: General Requirements
Reference: IBC 1503, 1507

Category: Roof Assemblies and Rooftop Structures
Subject: Roof Coverings



Note: This detail should be used only where the deck is supported by the wall.

Base flashing at bearing wall

For SI: 1 inch = 25.4 mm.

Flashing is essential to a weatherproof roofing assembly. It is required at wall and roof intersections, at gutters, around roof openings such as chimneys and vents, and wherever there is a change in roof slope or direction. Metal flashing shall be minimum No. 26 galvanized sheet.

Topic: Wind Resistance | **Category:** Roof Assemblies and Rooftop Structures

Reference: IBC 1504.9 | **Subject:** Performance Requirements

Code Text: *Parapets shall be provided for aggregate surfaced roofs and shall comply with Table 1504.9.*

Discussion and Commentary: Field assessments of damage to buildings caused by high-wind events have shown that aggregate, gravel or stone blown from the roofs of buildings has increased the damage to other buildings due to the breakage of glass. Once the glass is broken, higher internal pressures are created within the building, often resulting in substantial structural damage. In addition, breakage of windows will generally result in considerable wind and water damage to the building's interior and contents. Table 1504.9 considers aggregate size, roof height and wind speed to determine the minimum required parapet height for aggregate-surfaced roofs.

Source: 2021 IBC

Topic: Wind Resistance

Category: Roof Assemblies and Rooftop Structures

Reference: IBC 1504.9

Subject: Performance Requirements

TABLE 1504.9
MINIMUM REQUIRED PARAPET HEIGHT (INCHES) FOR AGGREGATE SURFACED ROOFS[a, b, c]

AGGREGATE SIZE	MEAN ROOF HEIGHT (ft)	WIND EXPOSURE AND BASIC DESIGN WIND SPEED (MPH)																	
		Exposure B									Exposure C[d]								
		≤ 95	100	105	110	115	120	130	140	150	≤ 95	100	105	110	115	120	130	140	150
ASTM D1863 (No. 7 or No. 67)	15	2	2	2	2	12	12	16	20	24	2	13	15	18	20	23	27	32	37
	20	2	2	2	2	12	14	18	22	26	12	15	17	19	22	24	29	34	39
	30	2	2	2	13	15	17	21	25	30	14	17	19	22	24	27	32	37	42
	50	12	12	14	16	18	21	25	30	35	17	19	22	25	28	30	36	41	47
	100	14	16	19	21	24	27	32	37	42	21	24	26	29	32	35	41	47	53
	150	17	19	22	25	27	30	36	41	46	23	26	29	32	35	38	44	50	56
ASTM D1863 (No. 6)	15	2	2	2	2	12	12	12	15	18	2	2	2	13	15	17	22	26	30
	20	2	2	2	2	12	12	13	17	21	2	2	12	15	17	19	23	28	32
	30	2	2	2	2	12	12	16	20	24	2	12	14	17	19	21	26	31	35
	50	12	12	12	12	14	16	20	24	28	12	15	17	19	22	24	29	34	39
	100	12	12	14	16	19	21	26	30	35	16	18	21	24	26	29	34	39	45
	150	12	14	17	19	22	24	29	34	39	18	21	23	26	29	32	37	43	48

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

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

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

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

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

Critical parameters established in Table 1504.9 govern performance. The use of aggregate-surfaced roofing systems is a viable option in high-wind areas with appropriate aggregate sizing and parapet height.

Topic: General Requirements | **Category:** Roof Assemblies and Rooftop Structures

Reference: IBC 1505.1 | **Subject:** Fire Classification

Code Text: *Roof assemblies shall be divided into the classes defined below. Class A, B and C roof assemblies and roof coverings required to be listed by* Section 1505 *shall be tested in accordance with ASTM E108 or UL 790. The minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.* See the exception for skylights and sloped glazing.

Discussion and Commentary: The various required roof covering classifications are related directly to the type of construction of the building. Based on Table 1505.1, a minimum level of fire protection is assigned to address external fire exposures. The exposures are generally created by fires in adjoining structures, wild fires and fire from the subject building that may extend up the exterior wall and onto the top surface of the roof.

Source: 2021 IBC

Topic: General Requirements
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1505.1
Subject: Fire Classification

TABLE 1505.1[a, b]
MINIMUM ROOF COVERING CLASSIFICATION FOR TYPES OF CONSTRUCTION

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C[c]	B	C[c]	B	B	C[c]

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. Unless otherwise required in accordance with the *International Wildland-Urban Interface Code* or due to the location of the building within a fire district in accordance with Appendix D.

b. Nonclassified roof coverings shall be permitted on buildings of Group R-3 and Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.

c. Buildings that are not more than two stories above grade plane and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles.

In addition to the Class A, B and C listed roof assemblies, the IBC permits the use of nonclassified roofing and special purpose roofs under limited conditions. These types of roof coverings are limited, respectively, to Group R-3 occupancies and small nonfire-rated buildings.

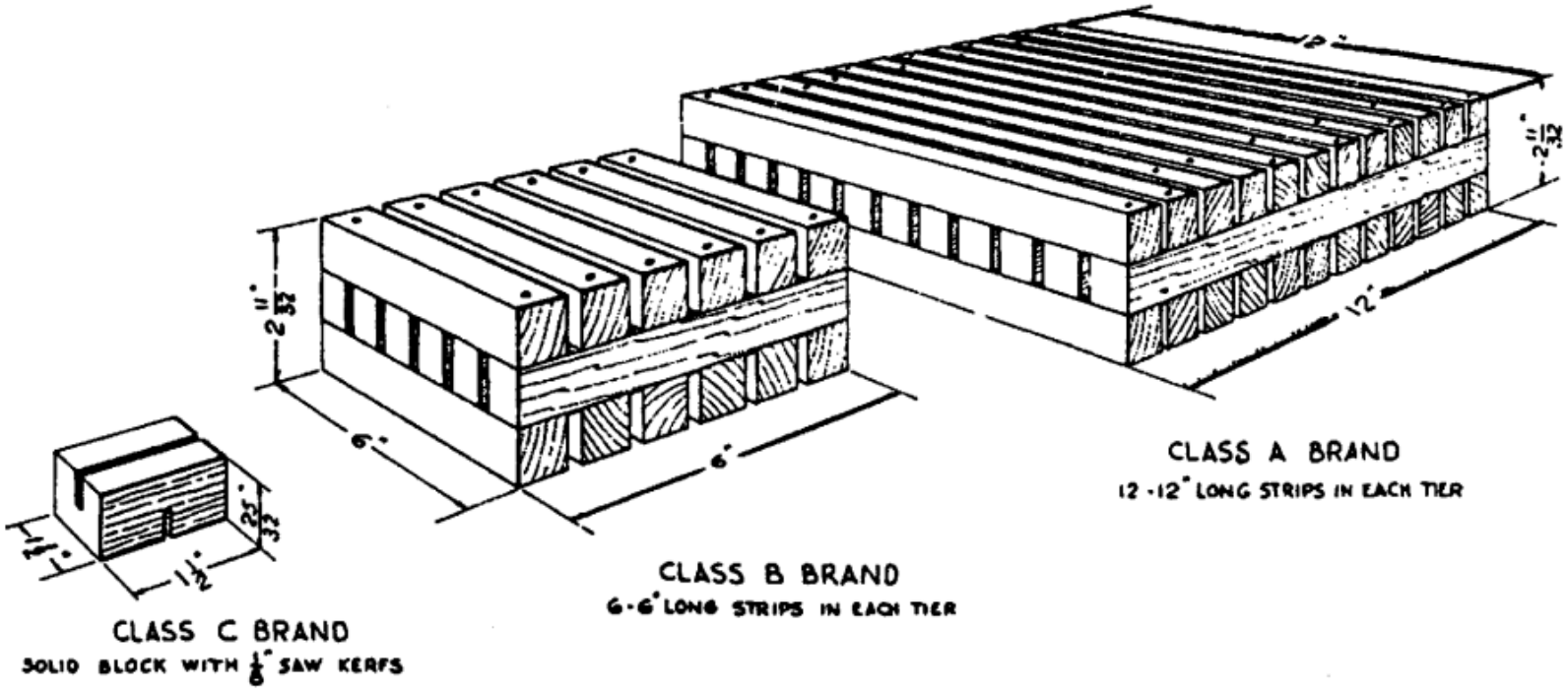
Topic: Roof Assemblies
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1505
Subject: Fire Classification

Code Text: *Class A roof assemblies are those that are effective against severe fire-test exposure. Class B roof assemblies are those that are effective against moderate fire-test exposure. Class C roof assemblies are those that are effective against light fire-test exposure. Non-classified roofing is approved material that is not listed as a Class A, B or C roof covering.*

Discussion and Commentary: Class A roof coverings include masonry, concrete, slate, tile and cement-asbestos, as well as ferrous or copper shingles or sheets, metal sheets and metal shingles. Additionally, any assembly that is tested as Class A in accordance with ASTM E108 or UL 790 by an approved testing agency and is listed and identified by that agency is included. There are no specific materials that qualify as Class B or C; therefore all Class B and C roof covering are listed as such.

Source: 2021 IBC

Topic: Roof Assemblies
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1505
Subject: Fire Classification



Brands for Classes A, B, and C Tests

Several test methods are included as parts of the fire-test-response standards ASTM E108 and UL 790, including the intermittent flame exposure test, spread of flame test, burning brand test, flying brand test and rain test. It also is critical that the roof coverings do not slip from position.

Topic: Identification
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1506.3
Subject: Roof Covering Materials

Code Text: *Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels required in accordance with Section 1505. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.*

Discussion and Commentary: Roof covering materials must comply with the appropriate quality standards set forth in Section 1507 for each different type of material. The materials must be compatible with the building or structure to which they are applied. In addition, identification of the roof covering materials is mandatory to verify that they comply with the quality standard. Gardens and other landscaping installed on a roof are specifically regulated in regard to roof construction and structural integrity. For structural purposes, the provisions of Sections 1607.13.3 and 1607.13.3.1 addressing occupiable and landscaped roofs, respectively, are applicable.

Source: 2021 IBC

Topic: Identification
Reference: IBC 1506.3

Category: Roof Assemblies and Rooftop Structures
Subject: Roof Covering Materials

Asphalt Shingles	**Section 1507.2**
Clay and Concrete Tile	**Section 1507.3**
Metal Roof Panels	**Section 1507.4**
Metal Roof Shingles	**Section 1507.5**
Mineral-surfaced Roll Roofing	**Section 1507.6**
Slate Shingles	**Section 1507.7**
Wood Shingles	**Section 1507.8**
Wood Shakes	**Section 1507.9**
Built-up Roofs	**Section 1507.10**
Modified Bitumen Roofing	**Section 1507.11**
Single-ply Roofing	**Section 1507.12**
Sprayed Polyurethane Foam Roofing	**Section 1507.13**
Liquid-applied Roofing	**Section 1507.14**
Vegetative Roofs and Roof Gardens	**Section 1507.15**
Photovoltaic Shingles	**Section 1507.16**
BIPV Roof Panels	**Section 1507.17**

Where there are not applicable standards for a specific roof covering material, or where the materials are of questionable suitability, the building official must ask for testing by an approved agency to determine the material's character, quality and limitations of application.

Topic: Asphalt Shingles
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1507.2
Subject: Roof Coverings

Code Text: *Asphalt shingles shall be fastened to solidly sheathed decks. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (17-percent slope) or greater. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), up to four units vertical in 12 units horizontal (33-percent slope), double underlayment application is required in accordance with Section 1507.2.8. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer, but not less than four fasteners per strip shingle or two fasteners per individual shingle. A drip edge shall be provided at eaves and rake edges of shingle roofs.*

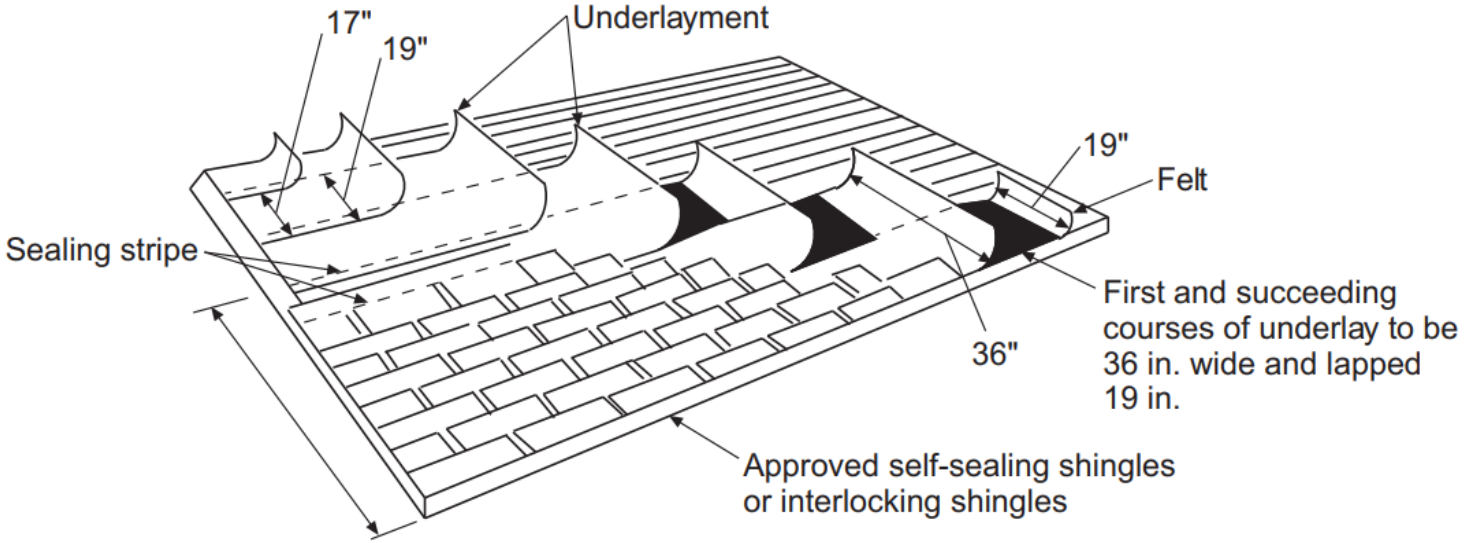
Discussion and Commentary: There are two fundamental types of asphalt shingles: strip shingles (the most common type) such as three-tab shingles, and individual interlocking shingles such as t-lock shingles. In addition to three-tab, other strip shingles include random or multi-tab, no-cut-out and laminated architectural.

https://www.youtube.com/watch?v=4z0_QHE7a4w

Source: 2021 IBC

Topic: Asphalt Shingles
Reference: IBC 1507.2

Category: Roof Assemblies and Rooftop Structures
Subject: Roof Coverings



Note: In areas where there has been a history of ice forming along the eaves causing a backup of water, felt plies of underlayment should be cemented up from eaves far enough to overlie a point 24 in. inside the wall line of the building.

source NRCA

For SI: 1 inch = 25.4 mm, °C = [(°F)-32/1.8].

Application of asphalt shingle on slopes between 2:12 and 4:12

Asphalt shingles are typically classified in two types, either cellulose felt reinforced (i.e., organic shingles) and fiberglass mat reinforced (i.e., fiberglass shingles). Consistent with the requirements of Section 1203.2, the roofing industry recommends the attic space below asphalt shingle roofs be properly ventilated.

Topic: Wood Shakes
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1507.9
Subject: Roof Coverings

Code Text: *Wood shakes shall only be used on solid or spaced sheathing. Wood shakes shall only be used on slopes of not less than four units vertical in 12 units horizontal (33-percent slope). Interlayment shall comply with ASTM D226, Type I. Fasteners for wood shakes shall be corrosion resistant with a minimum penetration of $^{3}/_{4}$ inch (19.1 mm) into the sheathing. Wood shakes shall be laid with a side lap not less than $1^{1}/_{2}$ inches (38 mm) between joints in adjacent courses.Spacing between shakes in the same course shall be $^{3}/_{8}$ to $^{5}/_{8}$ (9.5 to 15.9 mm) inches for shakes and taper sawn shakes of naturally durable wood and shall be $^{1}/_{4}$ to $^{3}/_{8}$ inch (6.4 to 9.5 mm) for preservative taper sawn shakes. Weather exposure for wood shakes shall not exceed those set in Table 1507.9.8.*

Discussion and Commentary: Wood shakes, which are defined as roofing products split from logs and then shaped as required by the individual manufacturers, differ from wood shingles in that shingles are defined as sawed wood products featuring a uniform butt thickness per individual length.

Source: 2021 IBC

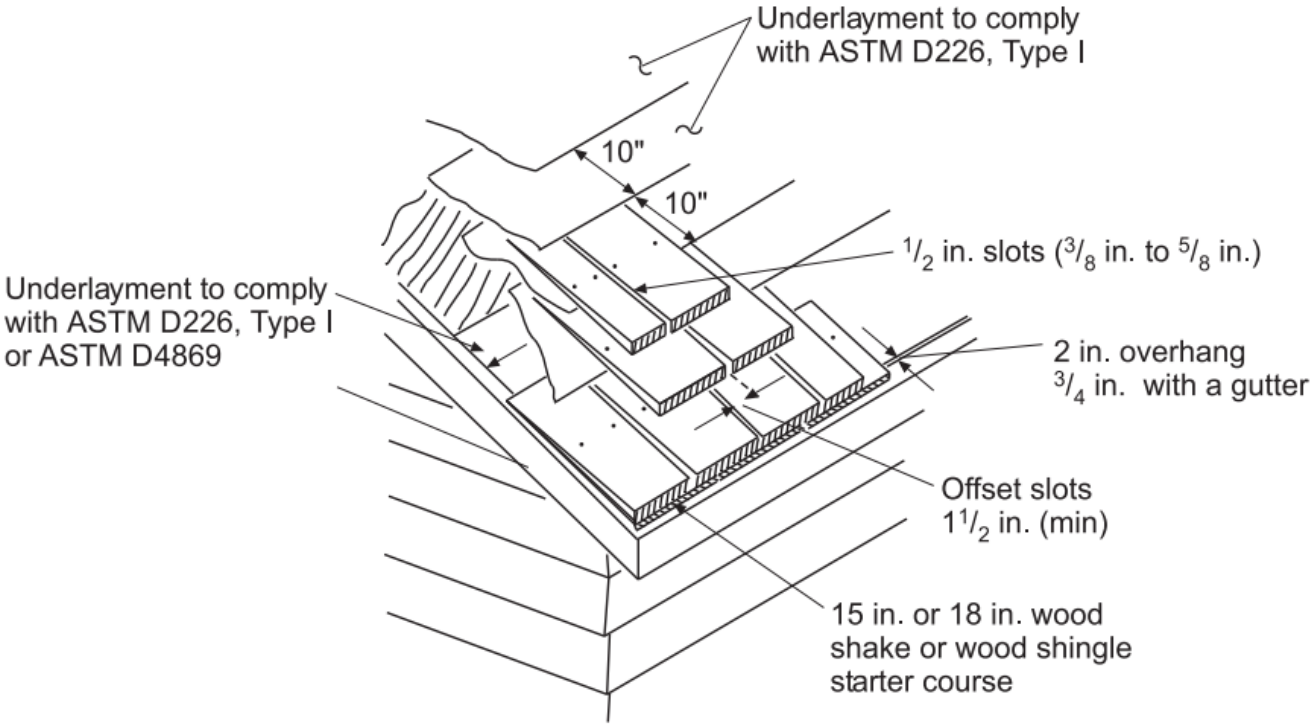
Topic: Wood Shakes

Category: Roof Assemblies and Rooftop Structures

Reference: IBC 1507.9

Subject: Roof Coverings

Weather exposure to be limited by Table 1507.9.8



Wood shake application

For SI: 1 inch = 25.4 mm.

Both wood shakes and wood shingles are required to be labeled by an approved third-party inspection agency. The applicable set of grading rules, required of the quality control program, is typically prescribed by the Cedar Shake and Shingle Bureau.

Topic: Penthouses | **Category:** Roof Assemblies and Rooftop Structures

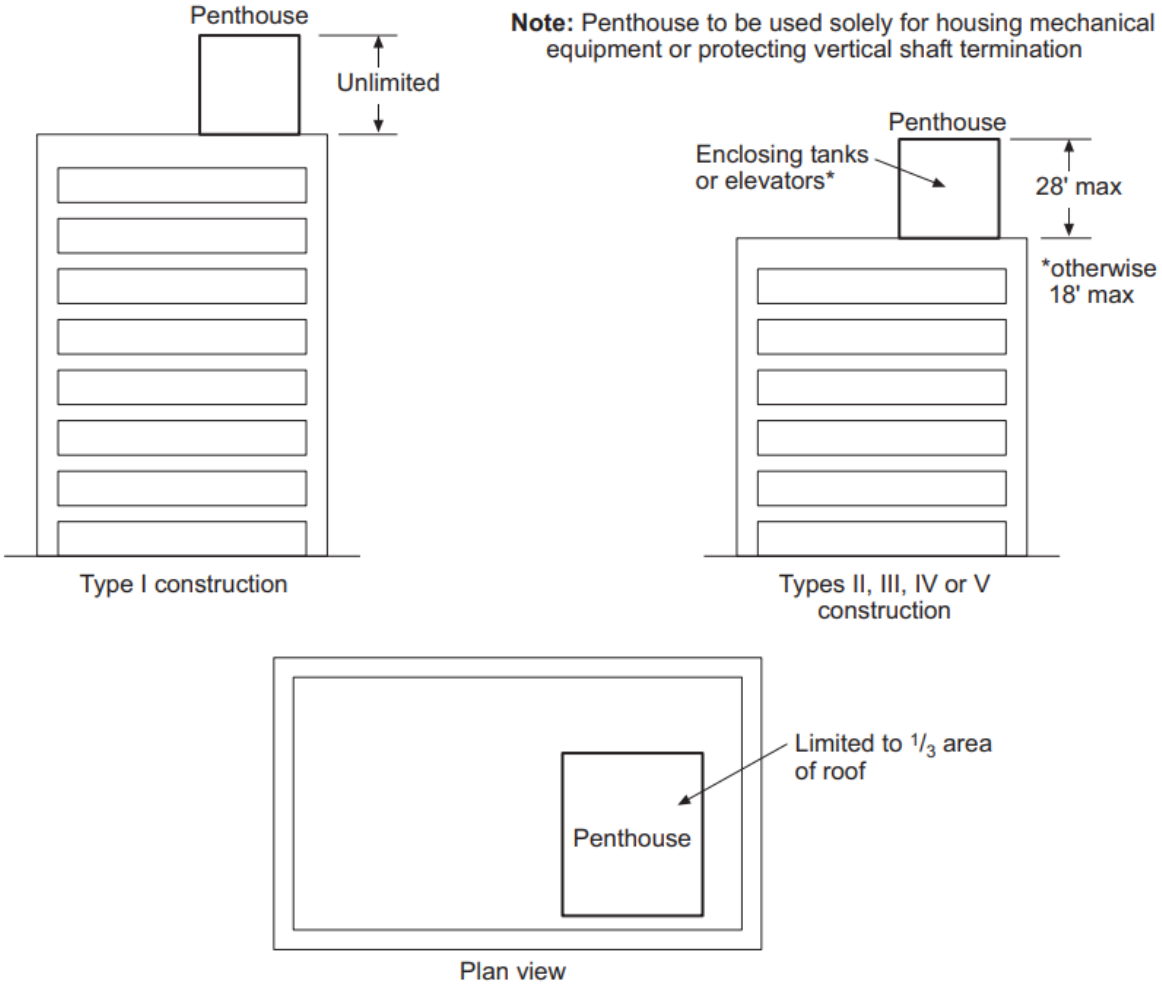
Reference: IBC 1511.2, 202 | **Subject:** Rooftop Structures

Code Text: A penthouse is *an enclosed, unoccupied rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, stairways and vertical shaft openings. Penthouses in compliance with Sections 1511.2.1 through 1511.2.4 shall be considered as a portion of the story directly below the roof deck on which such penthouses are located. Other penthouses shall be considered as an additional story of the building. Penthouses shall not be used for purposes other than the shelter of mechanical or electrical equipment, tanks, elevators and related machinery, stairways or vertical shaft openings in the roof assembly, including ancillary spaces used to access elevators and stairways.*

Discussion and Commentary: The general premise is that a penthouse be treated no differently than any other portion of the building. However, the reductions in the general requirements for a story recognize the lack of occupant load or fire loading, as well as the reduced exposure of penthouses when the exterior wall is recessed from the exterior wall of the building. Penthouses do not contribute to the building area, number of stories or fire area of the buildings on which they are located.

Source: 2021 IBC

Topic: Penthouses
Category: Roof Assemblies and Rooftop Structures
Reference: IBC 1511.2, 202
Subject: Rooftop Structures



For SI: 1 foot = 304.8 mm

Penthouse limitations

Special allowances are provided for towers, spires, domes and cupolas. It is important, however, to limit the height of such structures where constructed of combustible materials. Limited provisions also regulate the installation of tanks and cooling towers on buildings.

urce: 2021 IBC

Topic: Foundation Elevation | **Category:** Soils and Foundations

Reference: IBC 1808.7.4 | **Subject:** Foundations

Code Text: *On graded sites, the top of any exterior foundation shall extend above the elevation of the street gutter at point of discharge or the inlet of an approved drainage device a minimum of 12 inches (305 mm) plus 2 percent. Alternate elevations are permitted subject to the approval of the building official, provided it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on the site.*

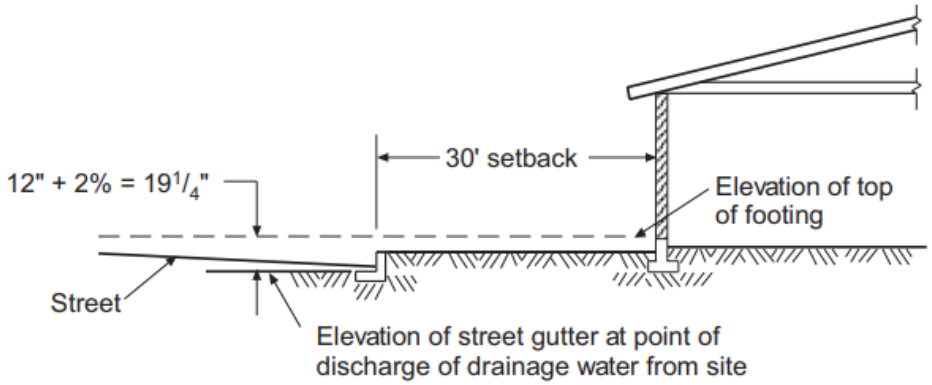
Discussion and Commentary: Where natural drainage away from a building is not available, the site must be graded so that water will not drain toward, or accumulate at, the exterior foundation wall. A prescriptive elevation is set forth that will ensure positive drainage to a street gutter or other drainage point; however, any other method that moves water away from the building can be accepted by the building official.

https://www.youtube.com/watch?v=ddkroD9alAQ

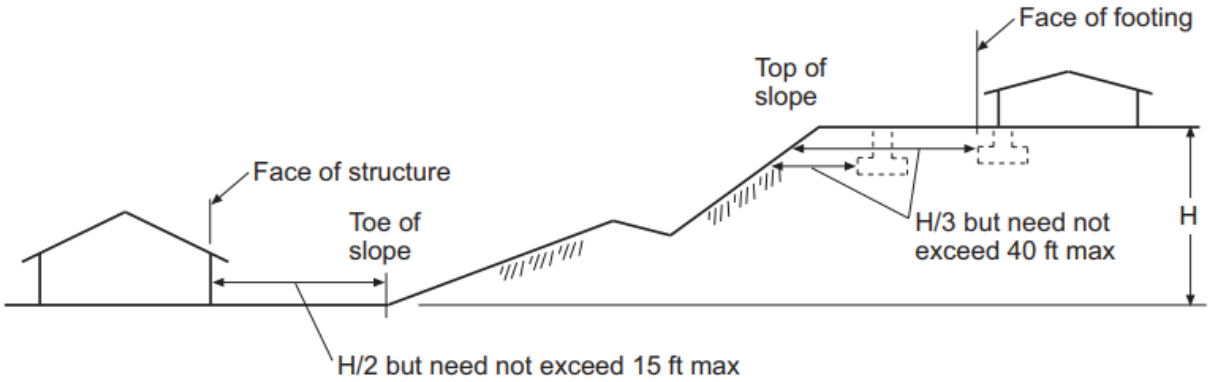
Source: 2021 IBC

Topic: Foundation Elevation | **Category:** Soils and Foundations

Reference: IBC 1808.7.4 | **Subject:** Foundations



Footing elevation on graded sites



Foundation clearances from slopes

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

Where footings are located adjacent to a slope steeper than 1:3 (1 vertical to 3 horizontal), either at the top or the bottom, special clearances between the building and the sloping surfaces are required to protect against slope drainage, erosion and shallow failures.

Source: 2021 IBC

Topic: Stepped Footings | **Category:** Soils and Foundations

Reference: IBC 1809.2, 1809.3 | **Subject:** Footings and Foundations

Code Text: *Shallow foundations shall be built on undisturbed soil, compacted fill material, or controlled low-strength material (CLSM). The top surface of footings shall be level. The bottom surface of footings are permitted to have a slope not exceeding 1 unit vertical in 10 units horizontal (10-percent slope). Footings shall be stepped where it is necessary to change the elevation of the top surface of the footing or where the surface of the ground slopes more than 1 unit vertical in 10 units horizontal (10-percent slope).*

Discussion and Commentary: If compacted fill material is used to support a footing, the material must be in compliance with the provisions of an approved report. The code identifies a number of issues that must be addressed in the report, including specifications for both the site preparation and the material to be used as fill.

https://www.youtube.com/watch?v=3FTa1fc_AjI

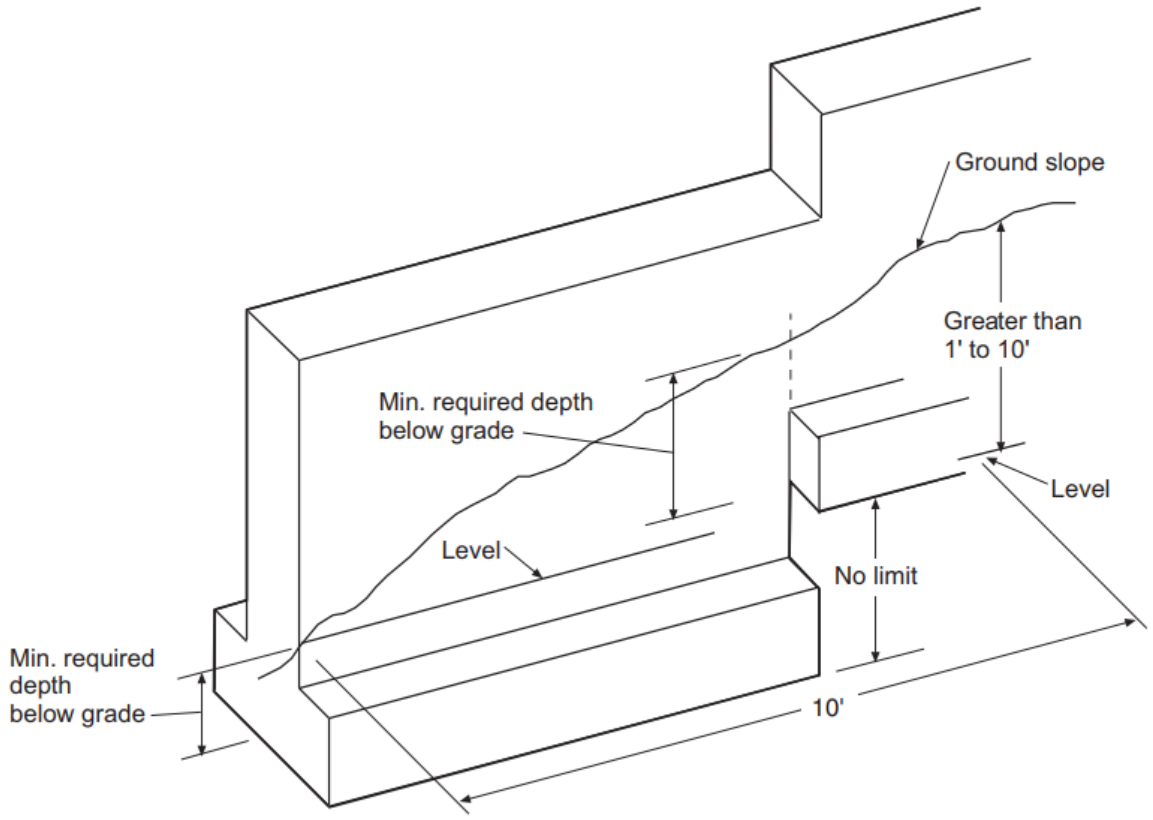
Source: 2021 IBC

Topic: Stepped Footings

Category: Soils and Foundations

Reference: IBC 1809.2, 1809.3

Subject: Footings and Foundations



Footings must be placed at least 12 inches below the undisturbed ground surface. Where the site is recognized to contain shifting or moving soils, the footings must be extended to a sufficient depth to ensure stability.

Topic: Frost Protection | **Category:** Soils and Foundations

Reference: IBC 1809.4, 1809.5 | **Subject:** Shallow Foundations

Code Text: *The minimum depth of footings below the undisturbed ground surface shall be 12 inches (305 mm). Except where otherwise protected from frost, foundations and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods: (1) extending below the frost line of the locality, (2) construction in accordance with ASCE 32* (Design and Construction of Frost Protected Shallow Foundations), *or (3) erecting on solid rock.* See the exception for small free-standing structures. *Shallow footings shall not bear on frozen soil unless such frozen condition is of a permanent character.*

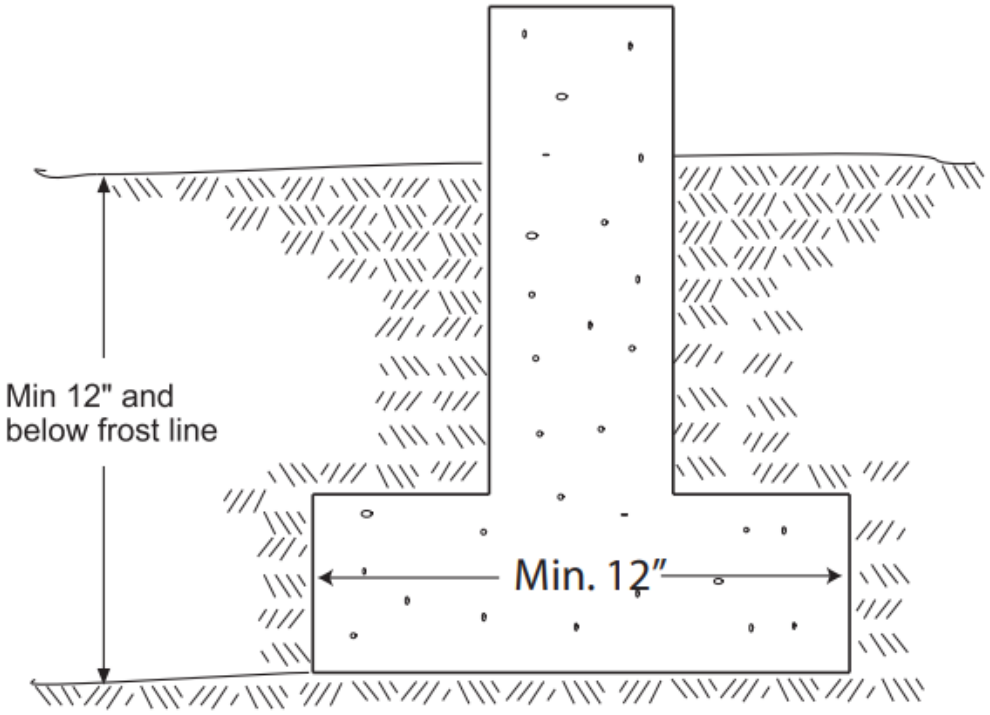
Discussion and Commentary: In winter, frost action can raise the ground level (frost heave), whereas in springtime, the same area will soften and settle back. If foundations are constructed on soils that can freeze, then the heave or vertical movement of the ground, which is rarely uniform, can cause serious damage to buildings and other structures.

https://www.youtube.com/watch?v=zK1vNMvP7R8

Source: 2021 IBC

Topic: Frost Protection | **Category:** Soils and Foundations

Reference: IBC 1809.4, 1809.5 | **Subject:** Shallow Foundations



Depth of footing

For SI: 1 inch = 25.4 mm.

The frost line is set for the particular locality of construction. The factors determining the depth of the frost line are air temperature and the length of time it remains below freezing, as well as the soil's level of thermal conductivity and its ability to conduct heat.

Topic: Light-Frame Construction | **Category:** Soils and Foundations

Reference: IBC 1809.7 | **Subject:** Footings

Code Text: *Where a specific design is not provided, concrete or masonry-unit footings supporting walls of light frame construction are permitted to be designed in accordance with Table 1809.7.*

Discussion and Commentary: In lieu of an engineered design, Table 1809.7 provides a prescriptive method for determining footing size criteria that can be used in conjunction with conventional light-framed construction. The minimum thickness of the foundation wall, as well as the minimum width and thickness of the footing, are specified based on the number of floors supported. The minimum depth below undisturbed ground surface is also addressed. Unless protected from frost or erected on solid rock, the footings must also extend below the frost line. The table is based on anticipated loads on the footings and foundations due to wall, floor and roof systems.

Source: 2021 IBC

Topic: Light-Frame Construction

Category: Soils and Foundations

Reference: IBC 1809.7

Subject: Footings

TABLE 1809.7
PRESCRIPTIVE FOOTINGS SUPPORTING WALLS OF LIGHT-FRAME CONSTRUCTION[a, b, c, d, e]

NUMBER OF FLOORS SUPPORTED BY THE FOOTING[f]	WIDTH OF FOOTING (inches)	THICKNESS OF FOOTING (inches)
1	12	6
2	15	6
3	18	8[g]

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

a. Depth of footings shall be in accordance with Section 1809.4.

b. The ground under the floor shall be permitted to be excavated to the elevation of the top of the footing.

c. Interior stud-bearing walls shall be permitted to be supported by isolated footings. The footing width and length shall be twice the width shown in this table, and footings shall be spaced not more than 6 feet on center.

d. See Section 1908 for additional requirements for concrete footings of structures assigned to Seismic Design Category C, D, E or F.

e. For thickness of foundation walls, see Section 1807.1.6.

f. Footings shall be permitted to support a roof in addition to the stipulated number of floors. Footings supporting roof only shall be as required for supporting one floor.

g. Plain concrete footings for Group R-3 occupancies shall be permitted to be 6 inches thick.

Although Table 1809.7 is normally used for continuous footings, it can also be used for isolated footings that support interior-stud bearing walls. The footings shall be spaced a maximum of 6 feet on center, with their widths and lengths being twice that shown in the table.

Source: 2021 IBC

Class Project (20 Points)

Team of 3 to 4 students
Inspection Report writing

Commercial Property Inspection Preliminary Walkthrough - YouTube ← How to conduct property inspection

Flow of a Restaurant Inspection - YouTube

Office Suite Inspection - YouTube ← Examples

Extra Credit!

- Create a 10 minute video with your team demonstrating your inspection walk through. Each team member should have a chance to speak in the video. (+5 Points)

Class Project (20 Points)

Format

INSPECTION REPORT

Building Address

Executive Summary

Chapters 1 and 35—Scope and Administration

Chapter 3 and Sections 508 and 509

Chapter 6—Types of Construction

Chapter 5—General Building Heights and Areas

Sections 701 through 705—Fire and Smoke Protection Features I

Sections 706 through 712— Fire and Smoke Protection Features II

Update

Contents

Minimum 300 word each chapter (Photos are encouraged)

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