2018 IBC
Means of Egress

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

PREFERRED
EDUCATION
PROVIDER

CONTINUING EDUCATION

Instructor Information

Patrick Vandergriff

35 Cottonwood Canyon Road

La Luz, NM 88337

1-575-430-8752

pvandergriff@codeconsult.org

AIA Provider # 404108892

ICC Provider # 0008

Cell Phone Etiquette

Introductions

- Instructor introduction
- Exits
- Restrooms
- Schedule and breaks
- Student introductions

Goal

- Participants will receive an overview of the fundamental requirements for means of egress as indicated in the 2015 *International Building Code*® (IBC®).
- Upon completion of this course, participants will be able to apply provisions of the 2015 IBC specifically related to the design, plan review and inspection of the means of egress system in commercial buildings.

Objectives

- List and describe each of the three parts of a means of egress.
- Identify the fundamental means of egress design issues.
- Differentiate the exiting provisions based on occupancy types.
- Calculate the occupant load and determine the required means of egress capacity for rooms, stories and buildings.
- Determine the required number of exit access doorways and exits for rooms, stories and buildings.

Objectives

- Detail requirements for the M.O.E. elements. I.E.:
  - Location of exit doors.
  - Travel distances.
  - Common path of travel.
  - Egress through adjoining spaces where allowed and where not allowed.
- M.O.E. corridors, stairways, exit passageways and horizontal exits.

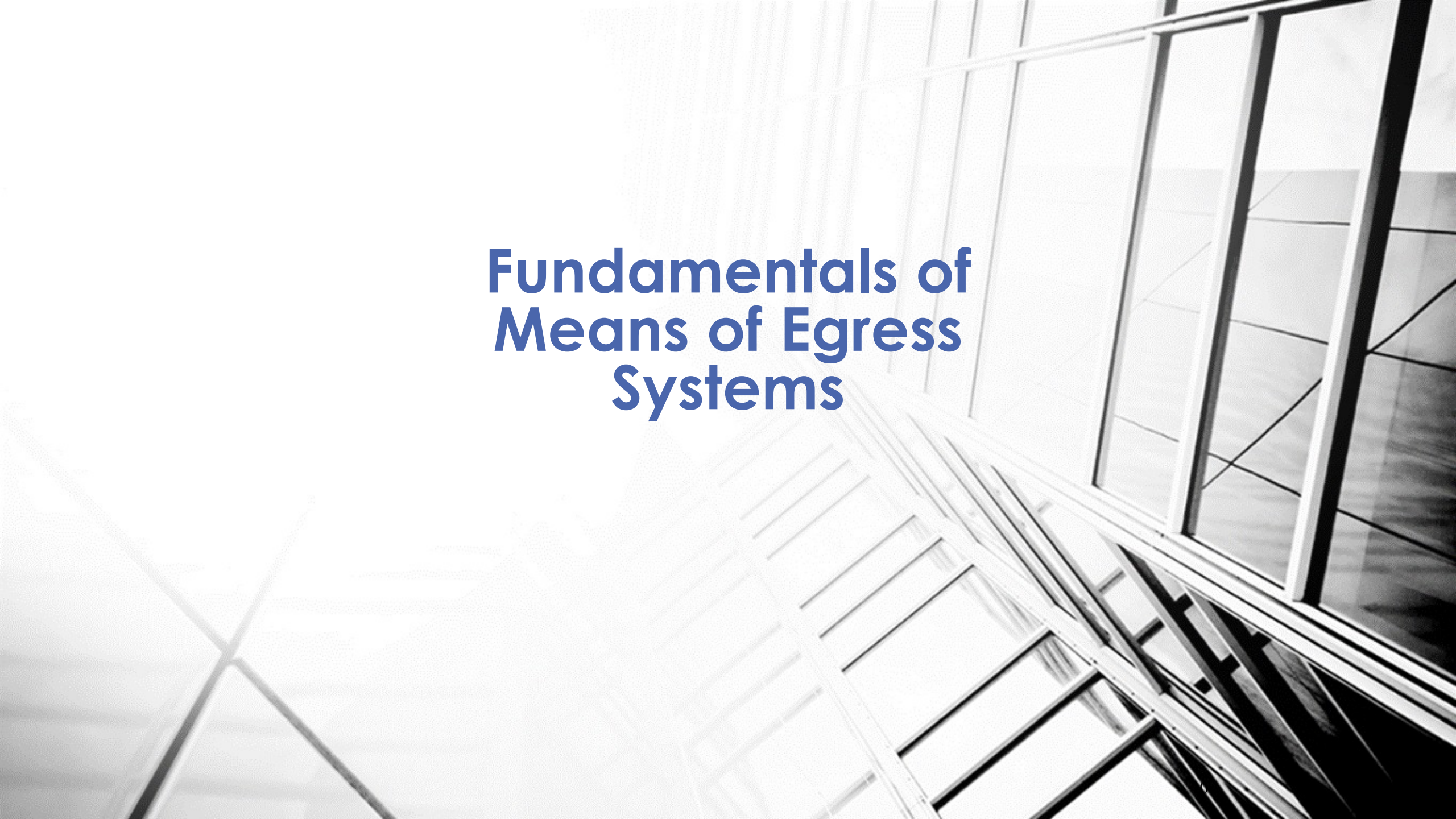
Objectives

- Explore requirements for doors, door swing, special doors and hardware.
- Evaluation of illumination levels of means of egress lighting and signage.
- Understand horizontal exit and their relationship to the M.O.E.
- Evaluate the means of egress in assembly spaces.
- Evaluate the adequacy of accessible means of egress.
- Differentiate the exiting provisions based on occupancy types.
- Provide greater understanding of how exiting provisions relate to the protection of occupants within the built environment.
- Detail alternative methods of design that relates to the exiting provisions of the code.

Target Audience

- Building inspectors
- Fire inspectors
- Building plan reviewers
- Fire plan reviewers
- Design professionals

Fundamentals of Means of Egress Systems



Fundamental of M.O.E. Design and Component Issues

- The purpose of codes is to safeguard life in the presence of a fire. Fundamental to this, is the path of egress travel for occupants to escape and avoid a fire. The principles on which means of egress are based are:

  1. Will give occupants different paths of travel to a place of safety during a fire.

  2. Will protect occupants from fire and the products of combustion.

  3. Will accommodate all occupants of a structure.

  4. Is clear, unobstructed, well-marked and illuminated so that all components are under control of the user without requiring any tools, keys, special knowledge, or, effort.

Fundamental of M.O.E. Design and Component Issues

Construction related disasters in the history of codes is the driving force for changes that have occurred since the code processes began.

Fires such as the great London fires or the Chicago fires are major examples. More modern examples include the Broadway Supper club fire, the recent Station night club fire and other multiple-fatality fires where the fatalities are directly related to the compromise of one or more of the fundamentals listed on the previous slide.

To truly address these issues the holistic approach would also include provisions of Chapter 7, Chapter 8, and Chapter 9 and other relative codes that deal with these issues.

Fire Example 1

Broadway Night Club Fire

Fire Example 2

Station Night Club Fire

Fire Example 3

MGM Grand Fire

Fundamental of M.O.E. Design and Component Issues

1. Number of occupants
2. Total width and capacity of egress elements
3. Number of exit access doorways/exits required
4. Location of egress elements
5. Fire-resistance-rated construction
6. Design of egress components
7. Egress doors
8. Lighting and signage
9. Accessibility
10. Use of horizontal exits
11. Assembly seating

Means of Egress Basics in the IBC

Administration and Definitions

- 1001,1002

General Means of Egress

- 1003-1013

Components of Means of Egress

- Exit Access 1014-1016
- Exits 1017-1022
- Exit discharge 1023-1024

Miscellaneous

- Assembly 1025
- Emergency Escape and Rescue 1026

Example

Section 1003 through Section 1015 contain provisions that apply to all of three parts of the exit system.

The stair tread and riser dimensions in Section 1009 apply to interior exit access stairways, such as those leading from a mezzanine, and apply to enclosed exit stairways per Section 1022, exterior exit stairways per Section 1026 and steps in the exit discharge per Section 1027.

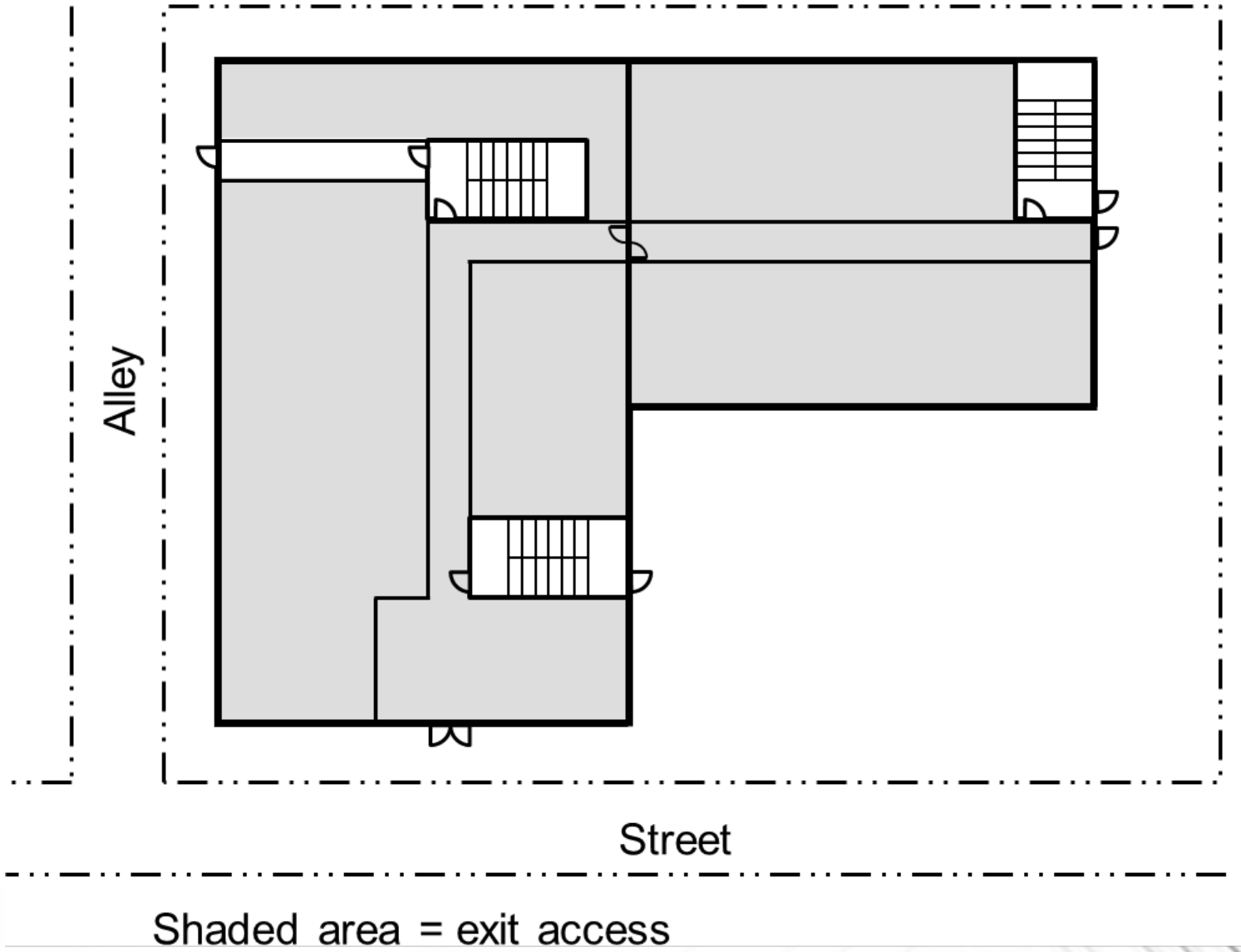
Three Parts of a Means of Egress Chapter 2

- **Exit** - That portion of a means of egress system between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways and ramps, exit passageways, exterior exit stairways and ramps and horizontal exits.

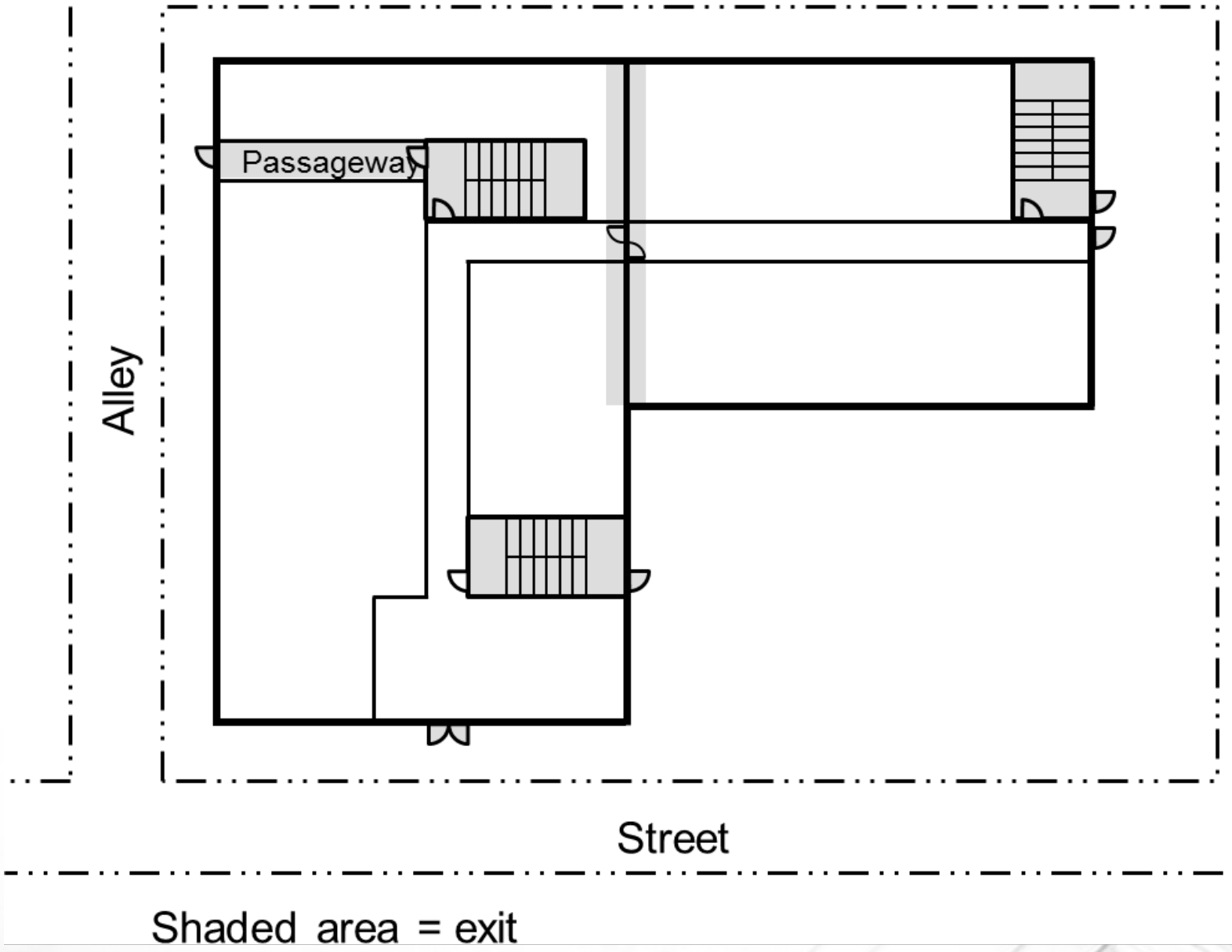
- **Exit access** - That portion of a means of egress system that leads from any occupied portion of a building or structure to an exit.

- **Exit discharge** - That portion of a means of egress system between the termination of an exit and a public way.

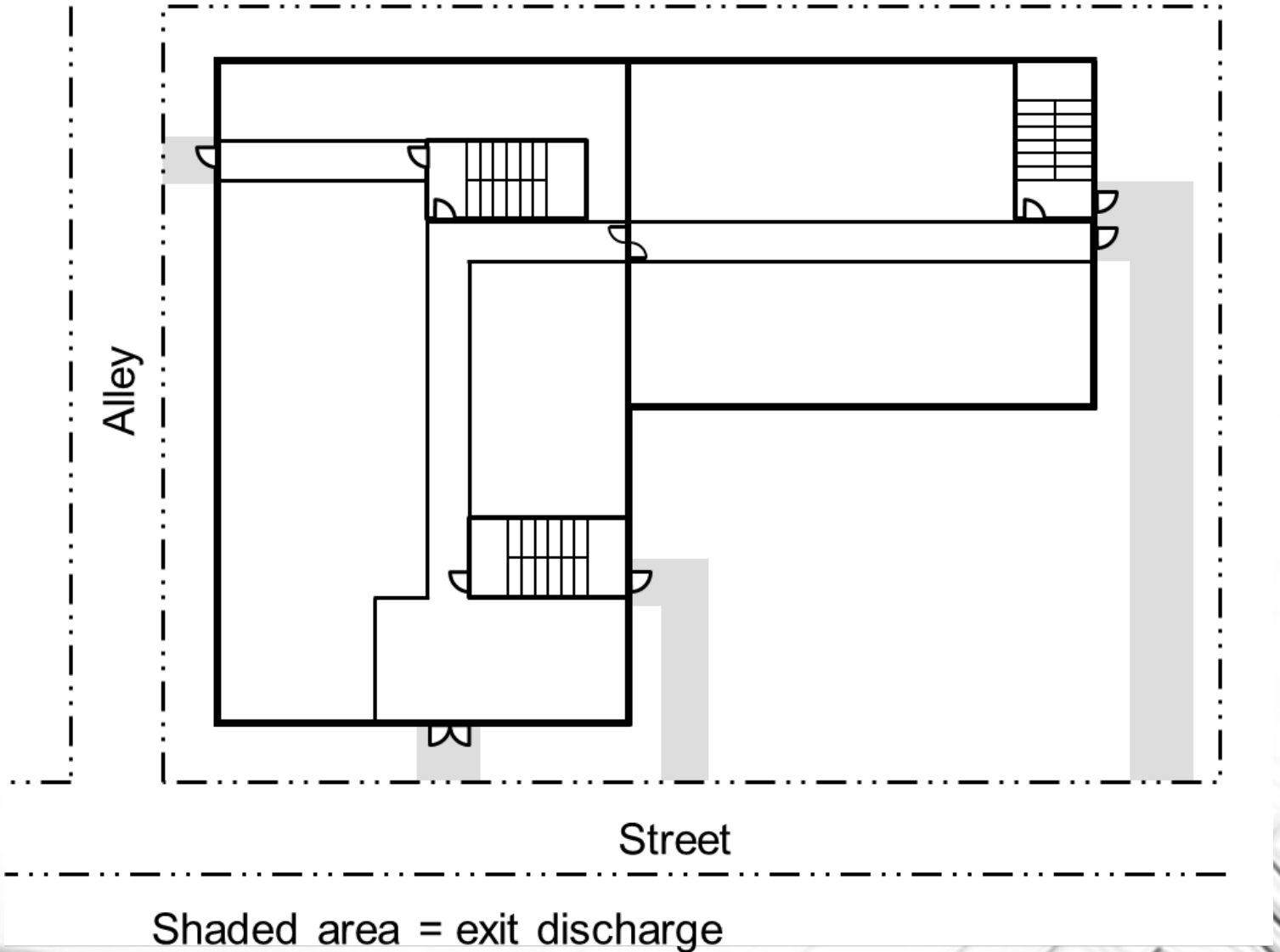
Exit Access



Exit



Exit Discharge



Definition
Section 1002

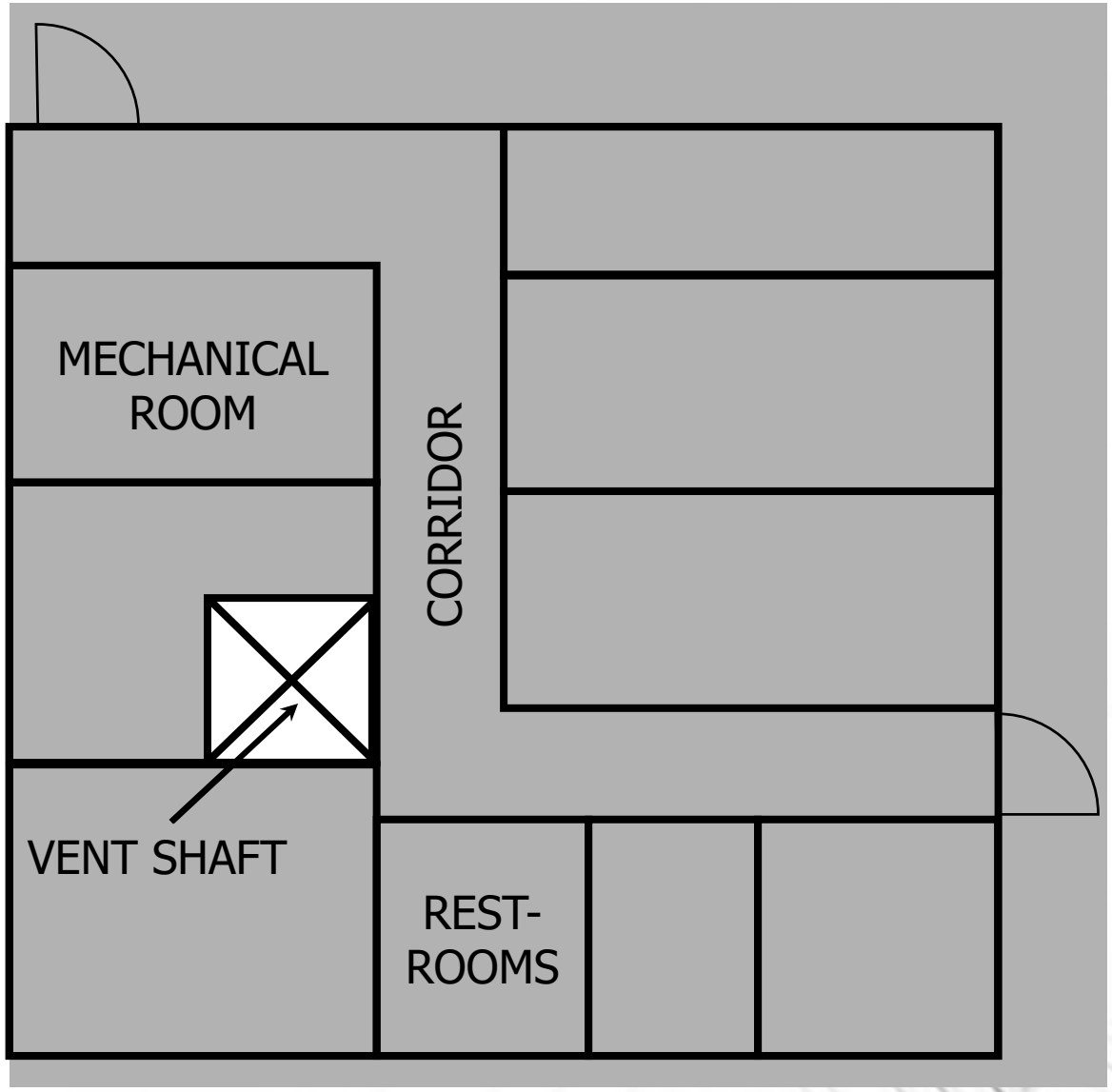
FLOOR AREA, GROSS. Gross floor area is that area measured within the perimeter formed by the inside surface of the exterior walls. The area of all occupiable and non-occupiable spaces, including mechanical and elevator shafts, toilets, closets, mechanical equipment rooms, etc., is included in the gross floor area. This area could also include any covered porches, carports or other exterior space intended to be used as part of the building's occupiable space. This gross and net floor areas are primarily used for the determination of occupant load in accordance with Table 1004.1.1.

FLOOR AREA, NET. This area is intended to be only the room areas that are used for specific occupancy purposes and does not include circulation areas, such as corridors or stairways, and service and utility spaces, such as toilet rooms and mechanical and electrical equipment rooms. Floor area, net and gross, is utilized in Table 1004.1.1 to determine occupant load for a space.

Definition
Section 1002

- Floor area, *gross*

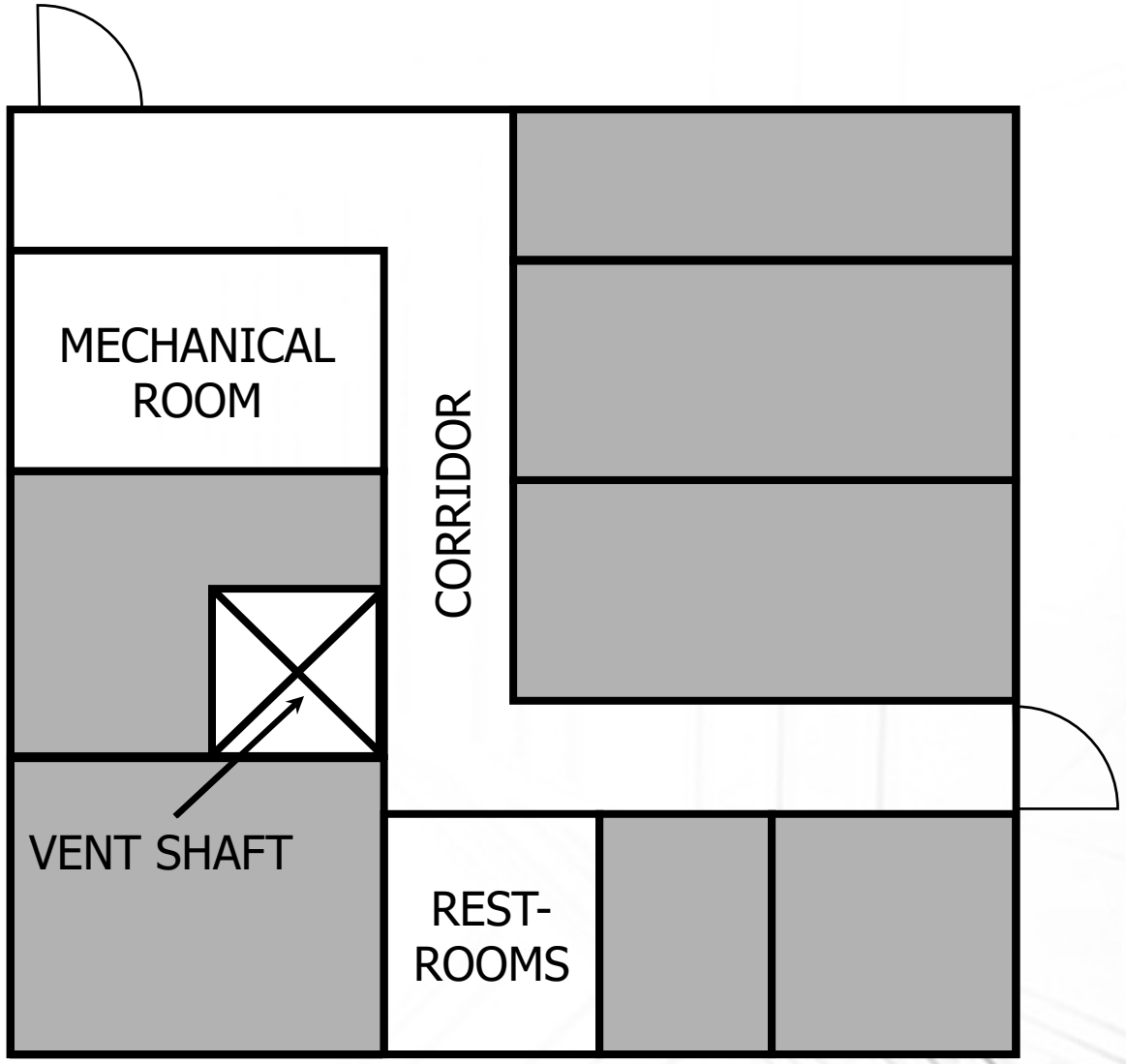
- Shaded area indicates the portion included in the gross floor area



Definition
Section 1002

- Floor area, *net*

- Shaded area indicates the portion included in the net floor area



Impact of the Occupant Load

The relationship to the M.O.E. Egress Width, Number of Egress, Egress Locations and Capacity

Occupant Load (OL)
Section 1004

- The number of occupants is determined in accordance with IBC Section 1004.1:
  1. Where occupants pass through intervening rooms the occupant load is cumulative for all rooms and spaces along egress path.
  2. Where occupants on a mezzanine egress through an adjacent floor level occupant load is cumulative for that level and the mezzanine(s) exiting through that where stairways serve more than one story.
  3. In areas without fixed seating occupant load is calculated at one occupant per tabular unit for the area of each space.
  4. In areas with fixed seating occupant load is based on seating capacity.

Design Occupant Load - Section 1004.1

1004.1 The design occupant load is the number of people that are intended to occupy all or a portion of a building.

This establishes a number upon which the means of egress is established.

It is the largest number that is established by the application of Sections 1004.1 through 1004.1.3.

1. There is a limit to the density of occupants permitted in an area to enable a reasonable occupants in the space to move freely (Section 1004.2).

2. This number is also used to determine the required plumbing fixture count (Chapter 29).

3. Establish criteria for when occupant load requires a fire sprinkler system.

TABLE 1004.1.2
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 Baggage handling Concourse Waiting areas	 20 gross 300 gross 100 gross 15 gross
Assembly Gaming floors (keno, slots, etc.) Exhibit gallery and museum	 11 gross 30 net
Assembly with fixed seats	See Section 1004.4
Assembly without fixed seats Concentrated (chairs only—not fixed) Standing space Unconcentrated (tables and chairs)	 7 net 5 net 15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	100 gross
Courtrooms—other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational Classroom area Shops and other vocational room areas	 20 net 50 net
Exercise rooms	50 gross
Group H-5 Fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas Inpatient treatment areas Outpatient areas Sleeping areas	 240 gross 100 gross 120 gross
Kitchens, commercial	200 gross
Library Reading rooms Stack area	 50 net 100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 402.8.2
Mercantile Storage, stock, shipping areas	60 gross 300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools Rink and pool Decks	 50 gross 15 gross
Stages and platforms	15 net
Warehouses	500 gross

Design Occupant Load
Section 1004.1

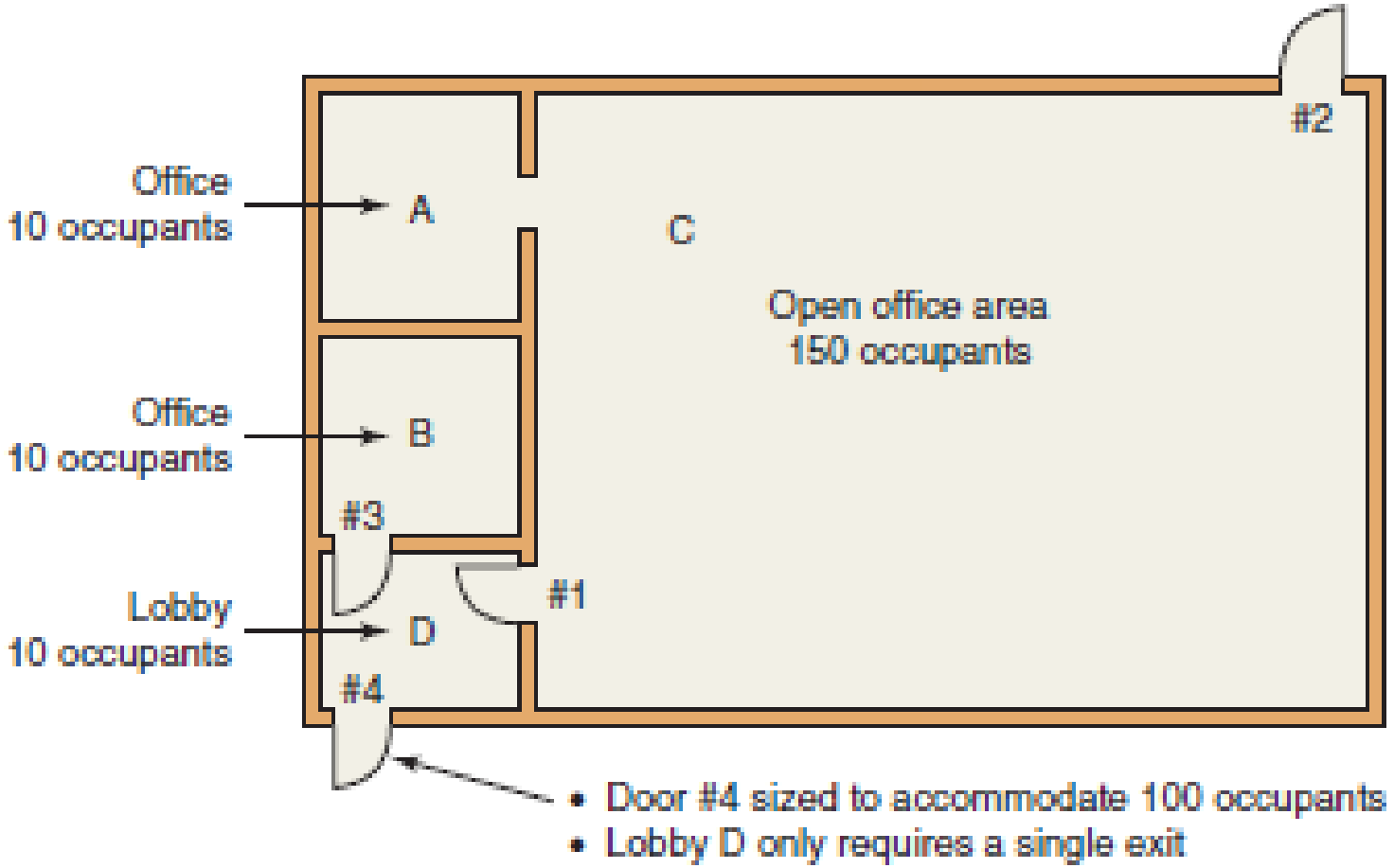
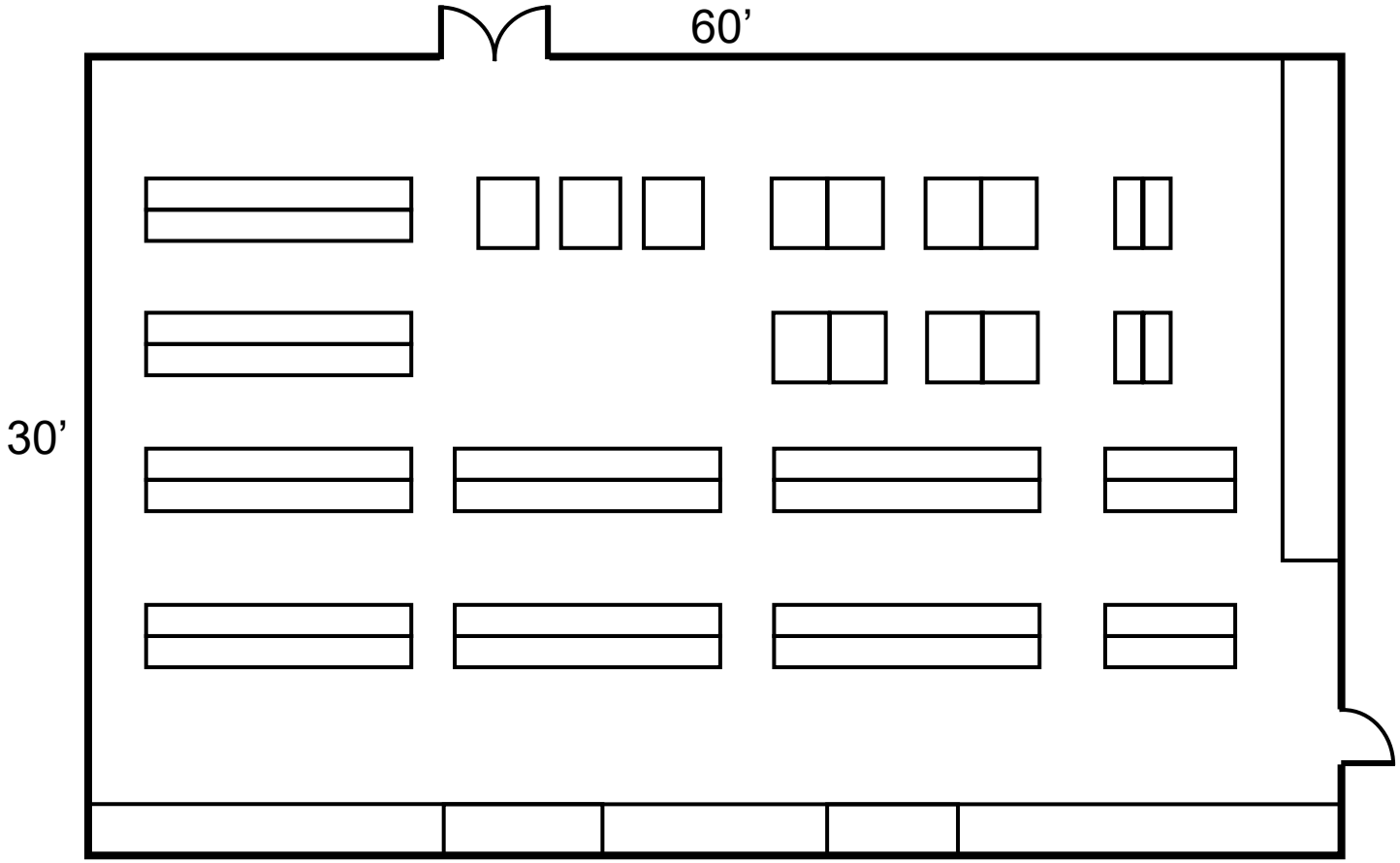


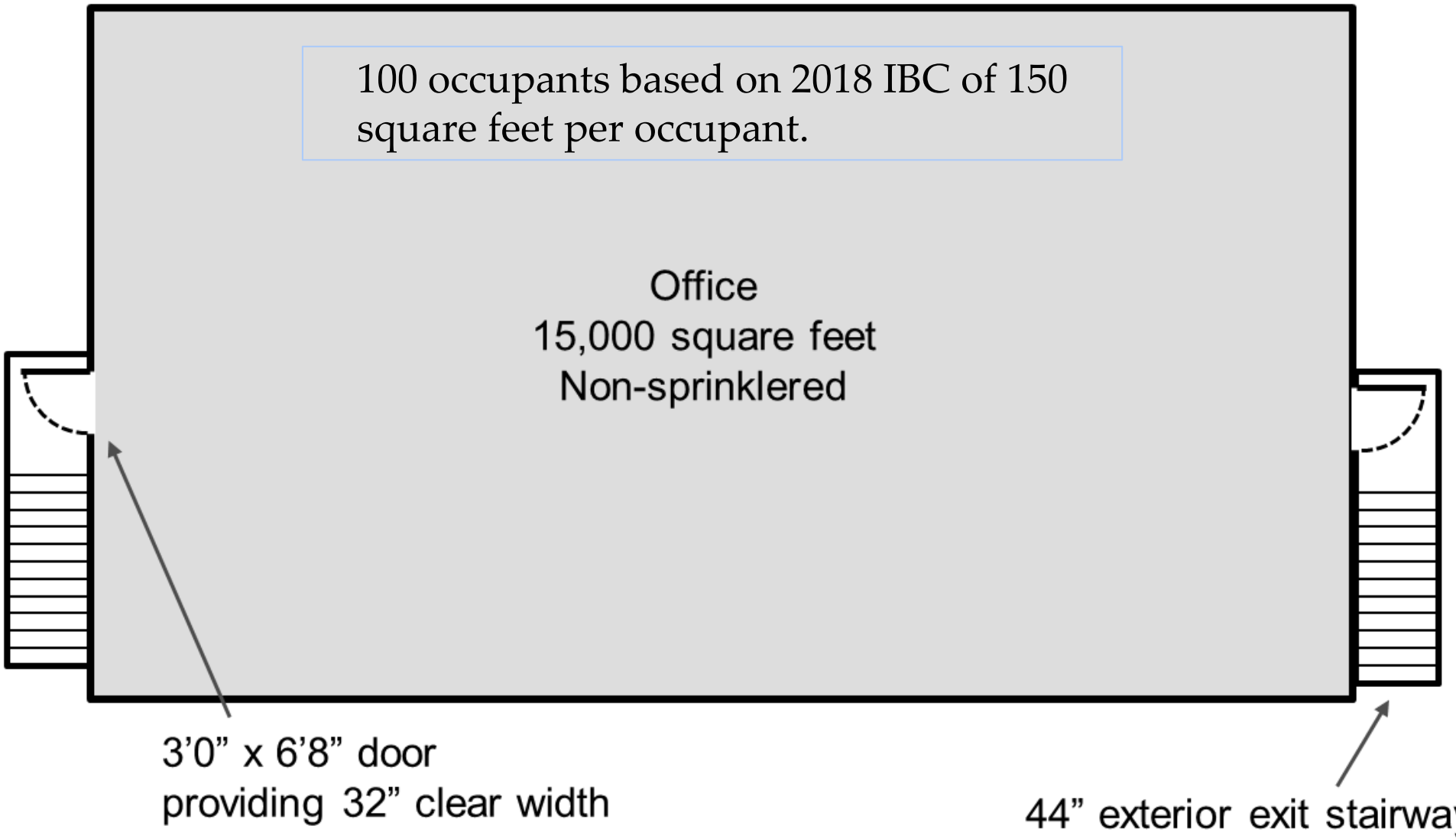
Figure 6: Cumulative Occupant Loads for Intervening Spaces

Retail Sales/Mercantile



Occupant load = 1,800 ÷ 60 = 30

Increased Occupant Load
Section 1004.5



Increased Occupant Load Section 1004.5

- An increased occupant load is permitted above that developed by using Table 1004.1.2, for example, by utilizing the actual occupant load. However, if the occupant load exceeds that which is determined in accordance with Section 1004.1.2, the building official has the authority to require aisle, seating and equipment diagrams to confirm that all occupants have access to an exit, the exits provide enough capacity for all occupants and compliance with this section is attained.
- The maximum area of 7 square feet (0.65 m2) per occupant should allow for enough occupant movement in actual fire situations. This is not a conflict with the standing space provisions of 5 square feet (0.46 m2) net in accordance with Table 1004.1.2. Standing space is typically limited to a portion of a larger area, such as the area immediately in front of the bar or the waiting area in a restaurant, while the rest of the dining area would use 15 square feet (1.4 m2) net per occupant.

Width and required capacity for Means of Egress

Required Egress Capacity Stairways

- Required capacity for **stairways**
  - Occupant load served multiplied by 0.3”
  - For other than Group H and I-2, the minimum width is occupant load served multiplied by 0.2” ***IF***
    - Building is equipped with an emergency voice/alarm communication system ***and***
    - Building is equipped with a fire sprinkler system (NFPA 13 or 13R)

Philosophy of Exit Width

The traditional egress capacity was based on a "unit exit width" that was for the typical adult male body.

- A basic dimensional width of 22 inches (559 mm)—approximately the shoulder.
- This was combined with assumed egress movement, i.e., single file or staggered file) to establish the egress capacity per unit exit width for various occupancies.

Note One: The capacity factor for stairways is larger than "other egress components" because of the slowdown of travel to negotiate the steps.

Note Two: This assumption simplifies the dynamic egress process since contemporary studies have indicated that people do not egress in such precise and predictable movements.

Required Egress Capacity Stairways

- Required capacity for the egress stairway shall be determined based solely on the occupant load of the adjacent story served by the stairway.

Required Capacity for Horizontal Egress Components

- Required capacity of all other egress components
  - Occupant load served multiplied by 0.2”
  - For other than Group H and I-2, the required capacity is occupant load served multiplied by 0.15” ***IF***
    - Building is equipped with an emergency voice/alarm communication system ***and***
    - Building is equipped with a fire sprinkler system (NFPA 13 or 13R)

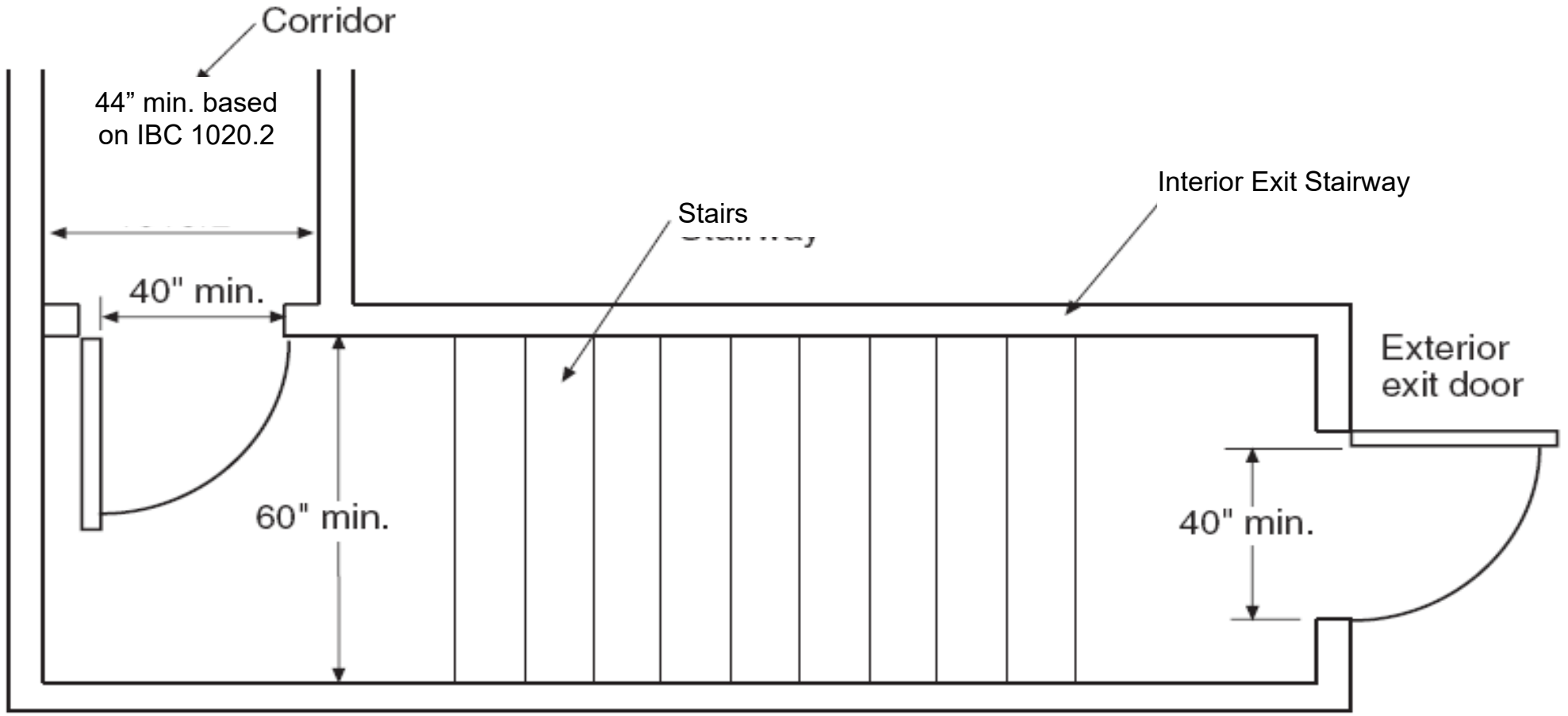
Application Example

- Assuming exit serves 200 people
- **Non-sprinklered** building
- Occupancy other than H-1, H-2, H-3, H-4, or I-2

200 (occupants) x 0.3 (stairs) = 60" exit width

200 (occupants) x 0.2 (other egress) = 40" exit width

Application Example



For SI: 1 inch = 25.4 mm

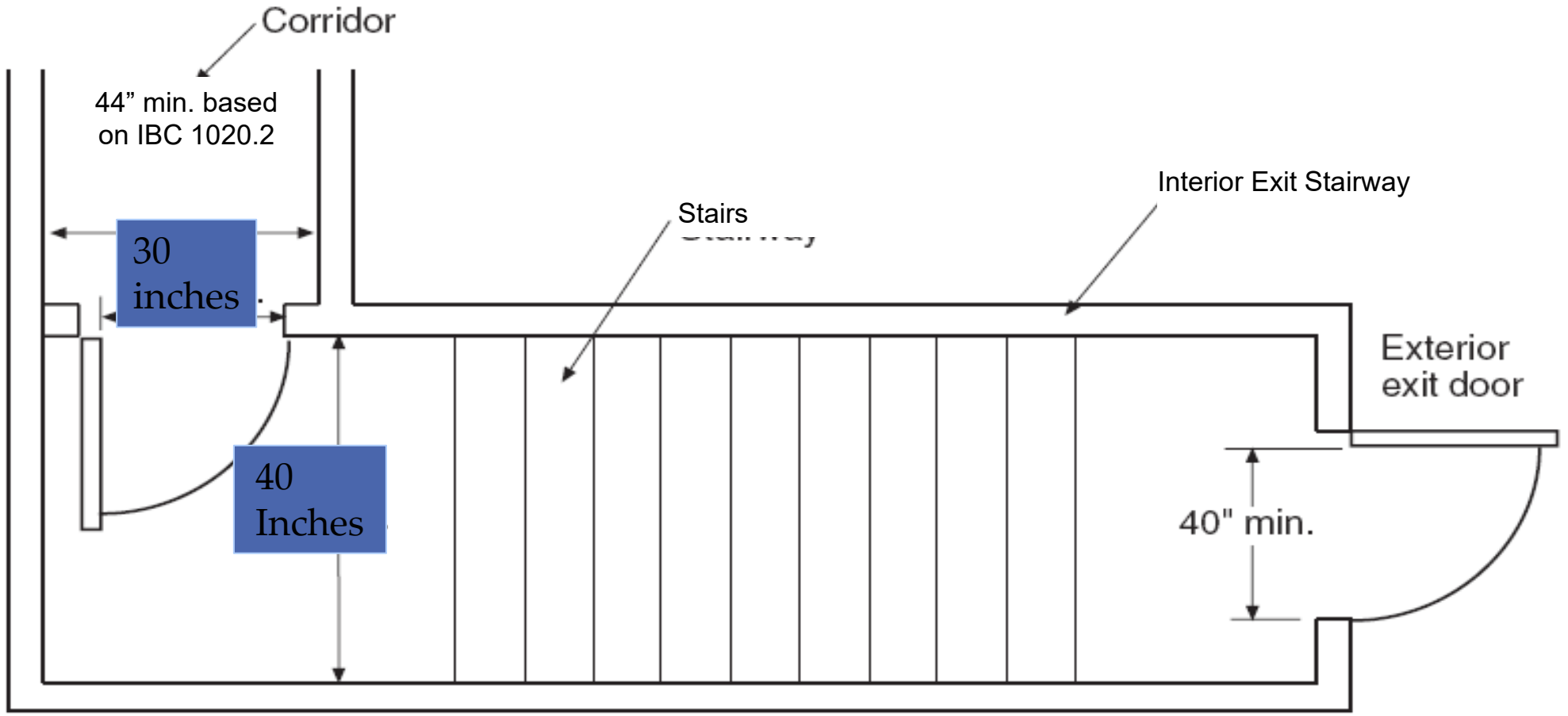
Application Example

- Assuming exit serves 200 people
- Sprinklered building and emergency voice/alarm communication system
- Occupancy other than H-1, H-2, H-3, H-4, or I-2

200 (occupants) x 0.2 (stairs) = 40" exit width

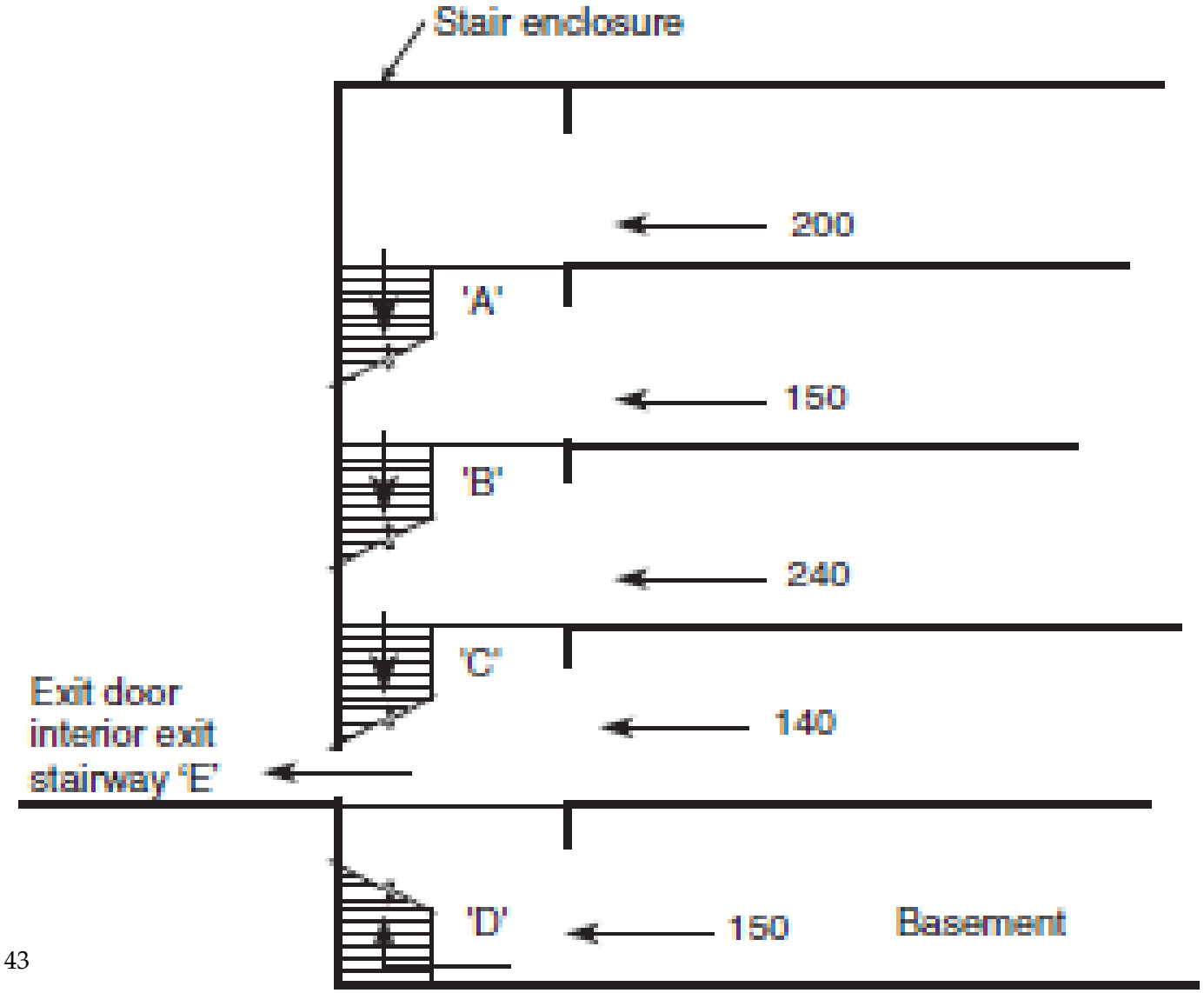
200 (occupants) x 0.15 (other egress) = 30" exit width

Application Example



For SI: 1 inch = 25.4 mm

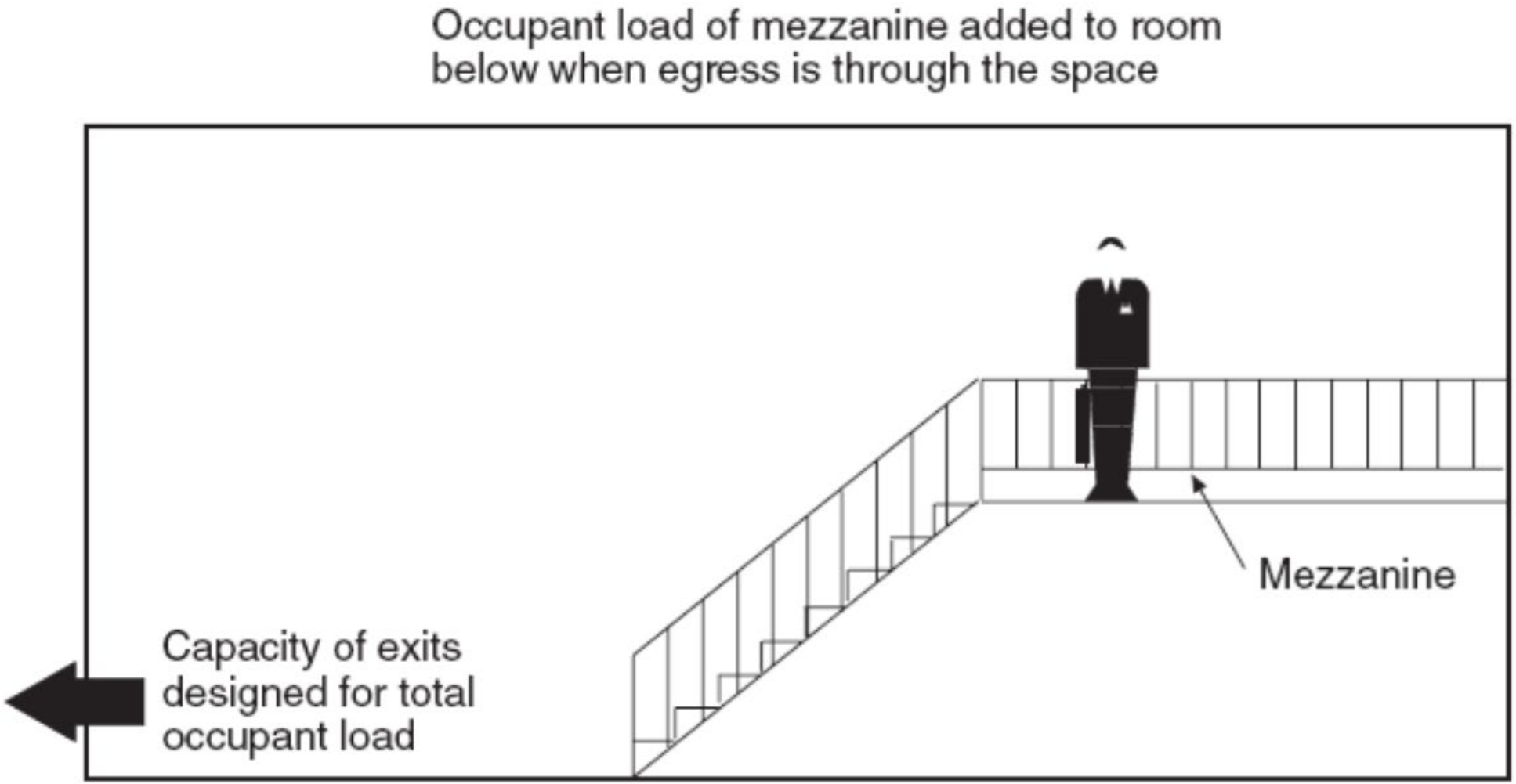
Exiting From Multiple Levels – Egress Convergence



GIVEN:

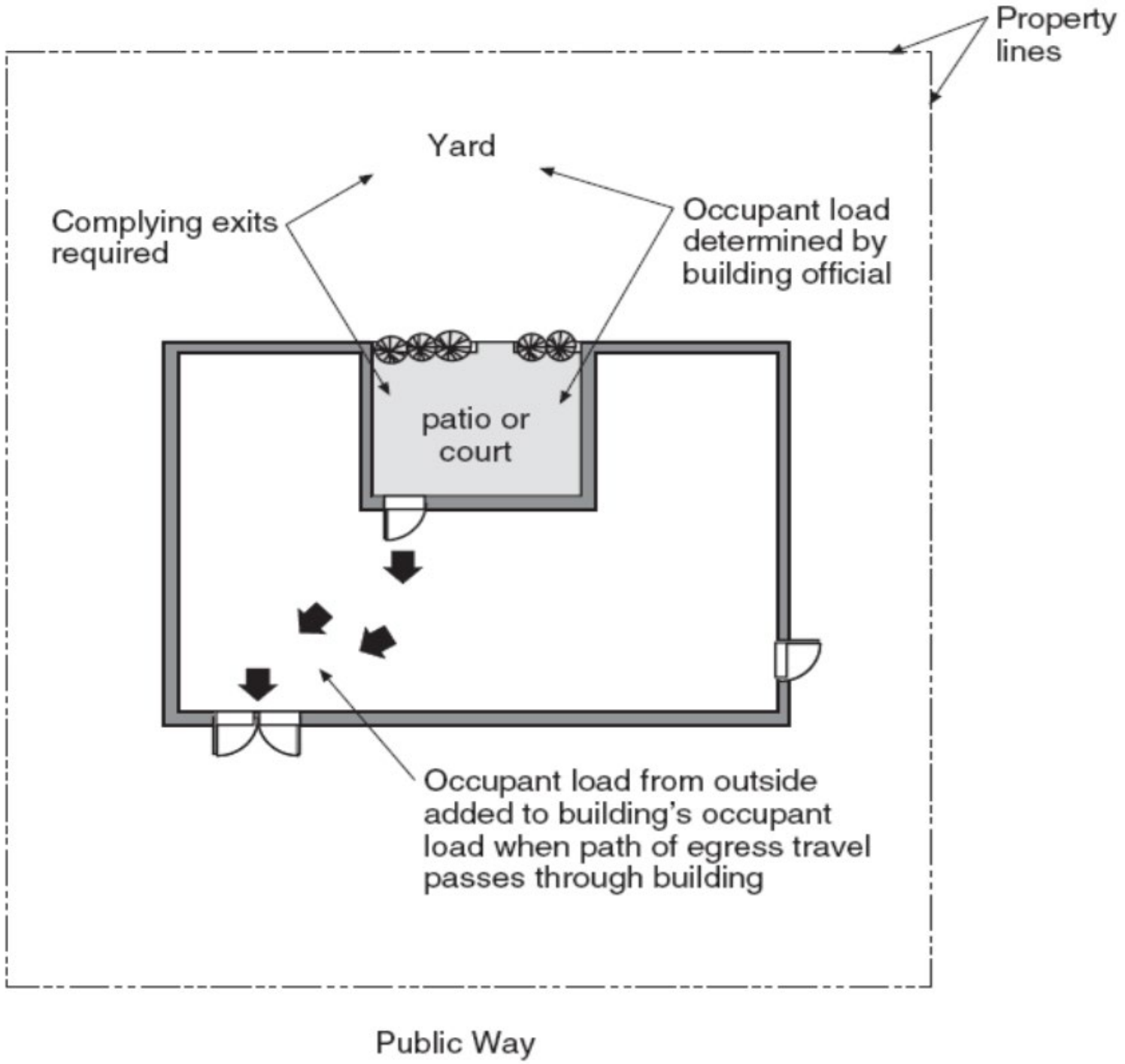
- A sprinklered office building with no emergency voice/alarm system.
- Occupant load exiting into interior exit stairway at each level, as indicated.
- 140 first floor occupants exit to exterior through the interior exit stairway.

Adjacent Levels for Mezzanines
Section 1004.2.2



Outdoor Areas
Section 1004.7

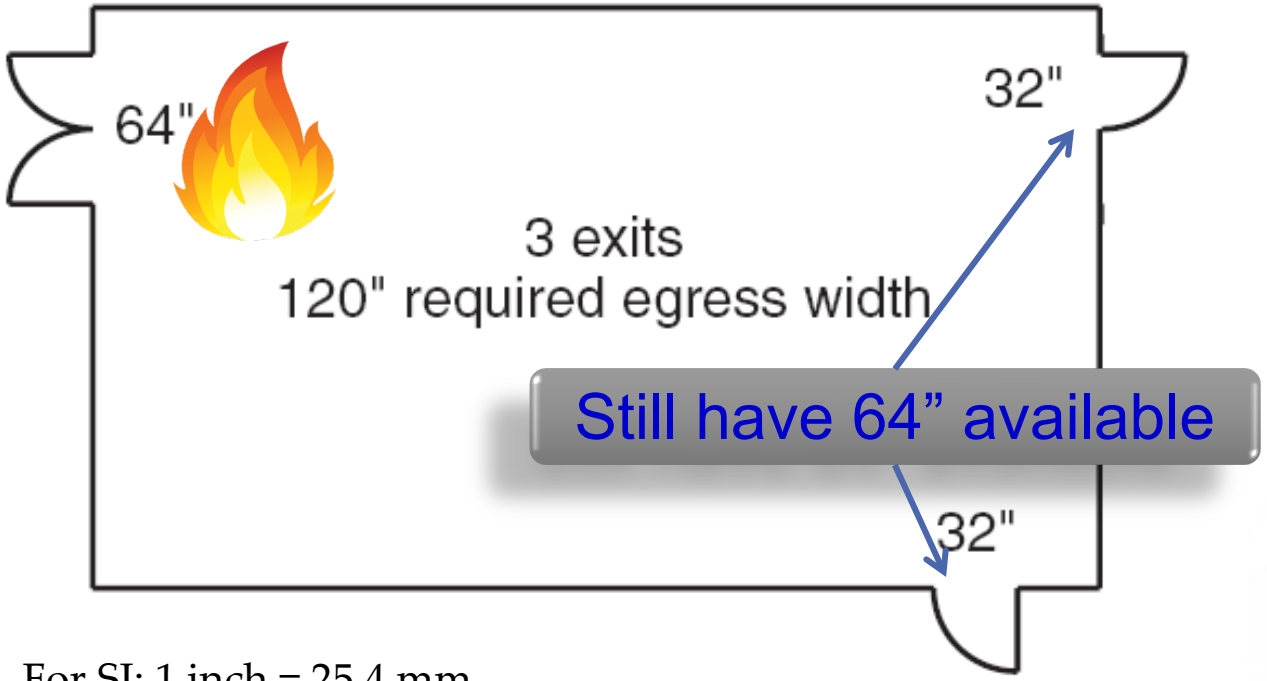
Exceptions:
1. Outdoor areas used exclusively for service of the building need only have one means of egress.
2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2.



Distribution of Exits
Section 1005.5

- Multiple means of egress shall be sized such that the loss of any single means of egress will not reduce the available capacity or width to less than 50 percent of the required capacity or width.

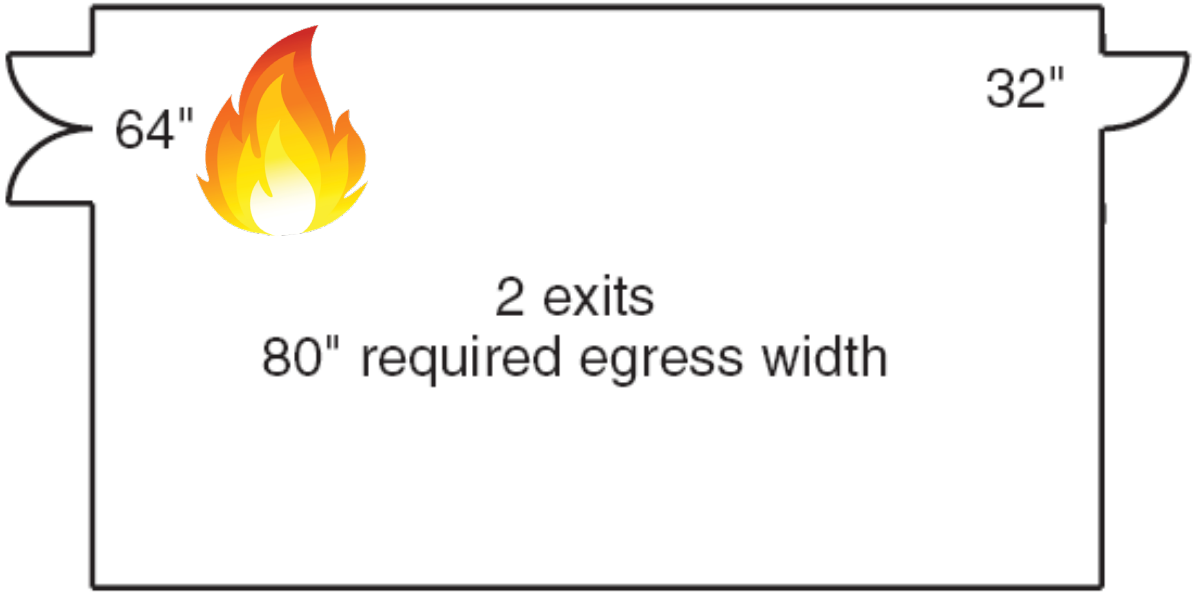
Application Example



For SI: 1 inch = 25.4 mm.

OK: The loss of any single exit will not result in less than half of required width or capacity remaining

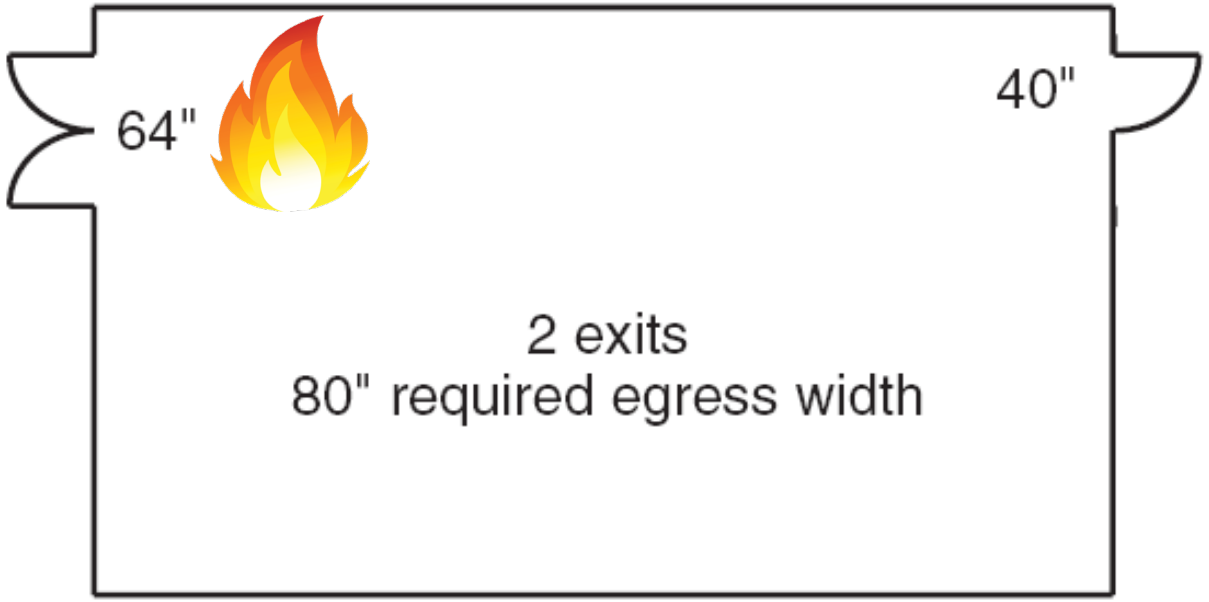
Application Example



For SI: 1 inch = 25.4 mm.

Not permitted: Loss of a single exit could result in less than half of required width or capacity remaining.

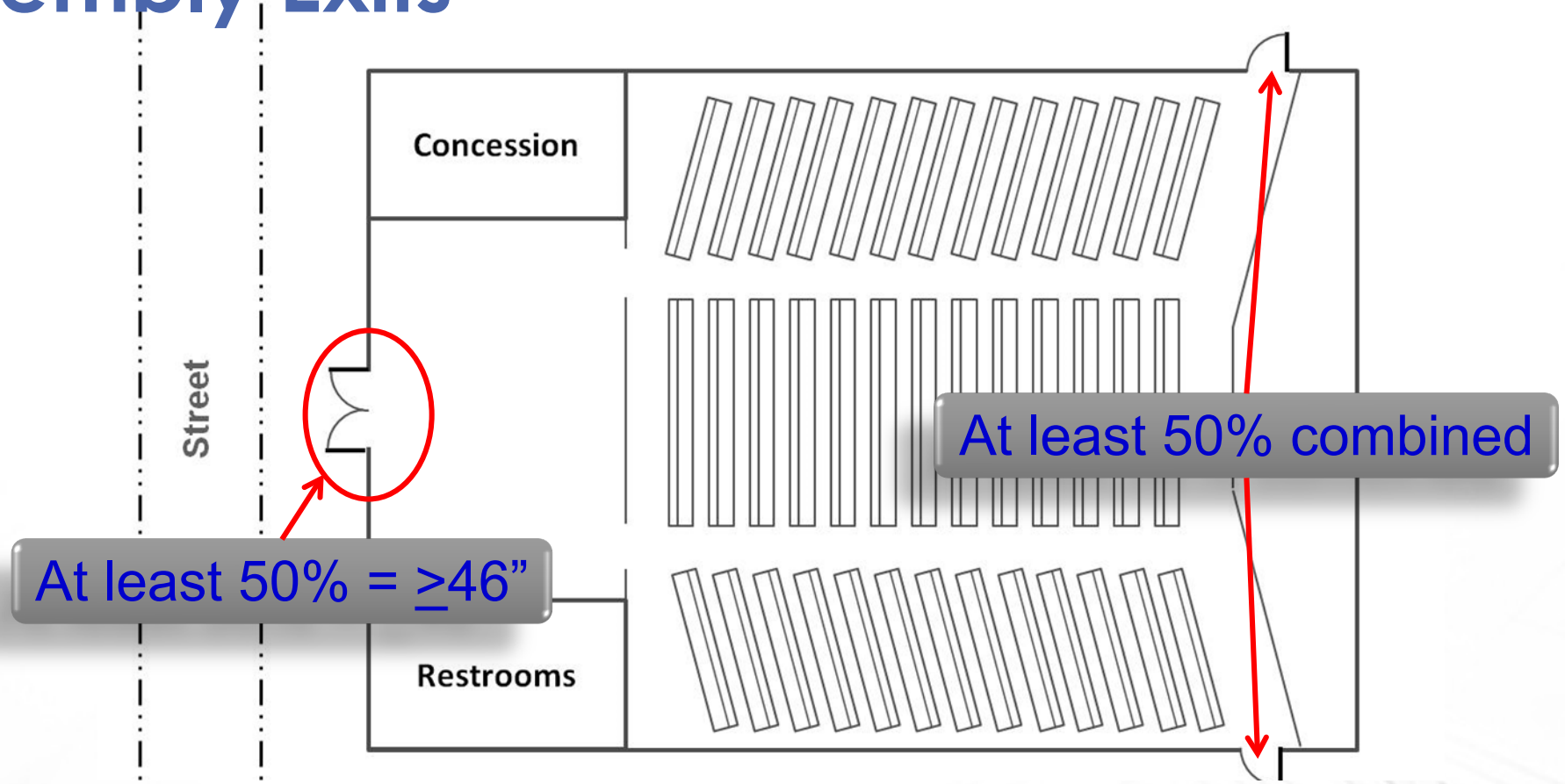
Application Example



For SI: 1 inch = 25.4 mm.

OK: Although double doors give greater than half of available width or capacity, not less than half of required width or capacity would still remain.

Assembly Exits



Occupant Load: 460
Required Capacity: 460 x 0.2 = 92 inches

Number of Exits and Exit Access Doorways

Egress from Spaces Section 1006.2.1

- Two exits or exit access doorways are required from a space where:
  - The occupant load of the space exceeds the number shown in Table 1006.2.1, or
  - The common path of travel exceeds the limitations set forth in Table 1006.2.1.
  - Requirements vary based on the occupancy classification, the occupant load and installation of sprinklers. Section 1006.2.1 and Table 1006.2.1.

travel distance requirements of Section 1029.7.

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.

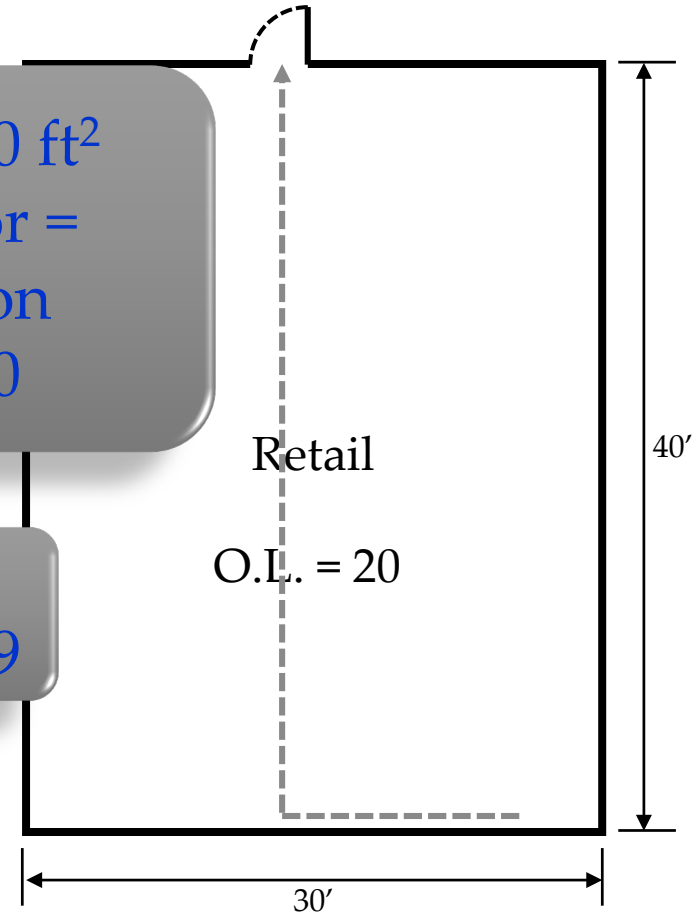
g. For the travel distance limitations in Groups R-3 and R-4 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3, see Section 1006.2.2.6.

Minimum Number of Exits
Section 1006.2.1

- Every space shall have access to at least one exit
- Two exits when the occupant load is above the threshold in Table 1006.2.1
- Two exits when the common path of travel is exceeded

Area = 1200 ft²
O.L. Factor = 60 / person
O.L. = 20

Table 1015.1: only 1 exit ≤49



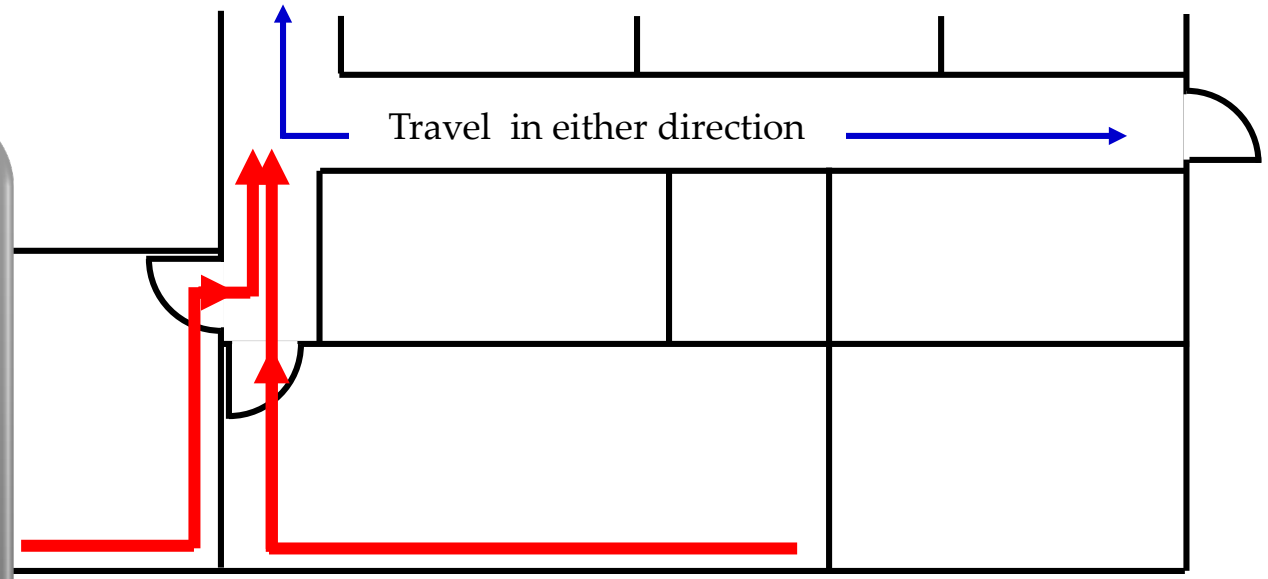
Allowable Common Path of Travel = 75′

Common Path of Egress Travel
Sections 202, 1006.2, and 1006.3

- COMMON PATH OF EGRESS TRAVEL. That portion of the *exit access* travel distance measured from the most remote point within a *story* to that point where the occupants have separate and distinct access to two *exits* or *exit access* doorways.

Common Path of Egress Travel
Sections 202, 1006.2, and 1006.3

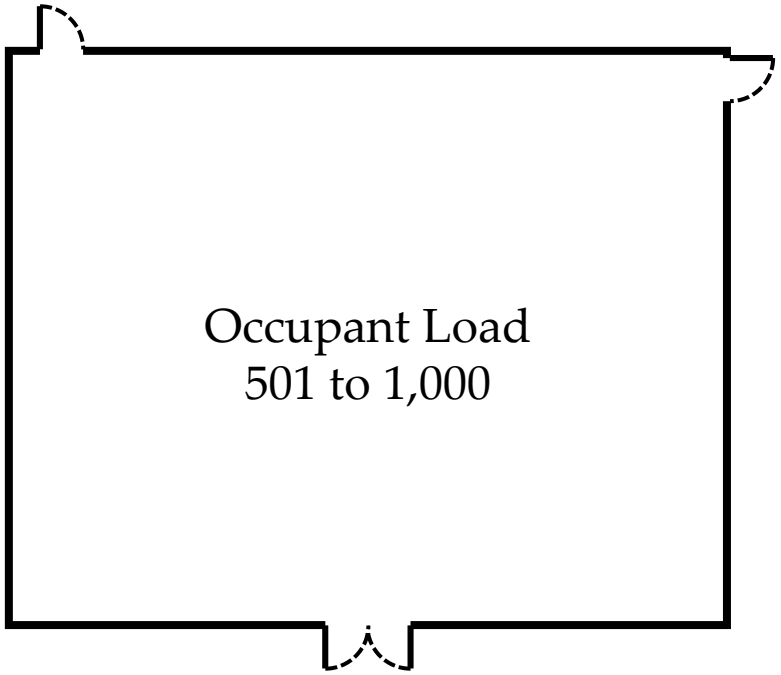
Common path of egress travel ends where there is choice of separate access to two exits or exit access doorways.

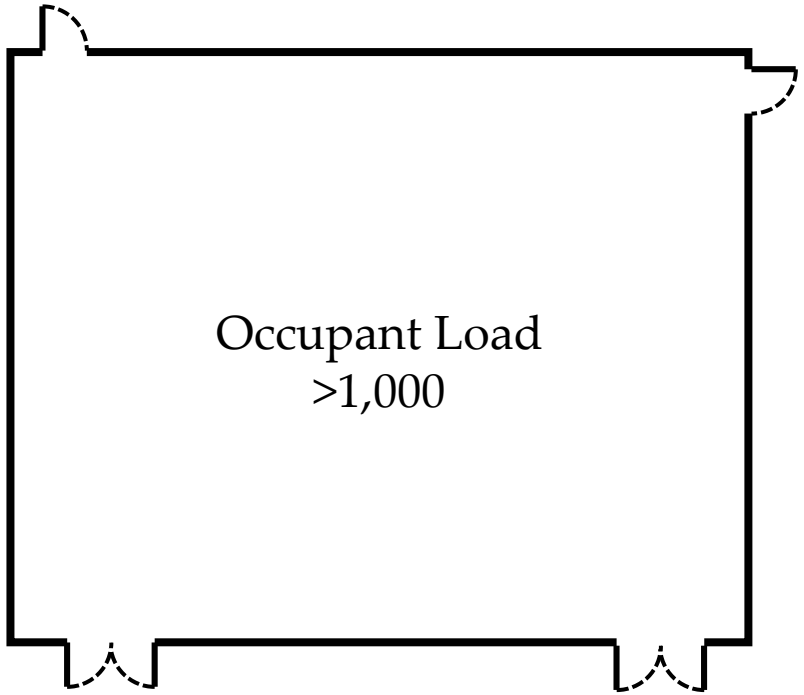


Minimum Number of Exits

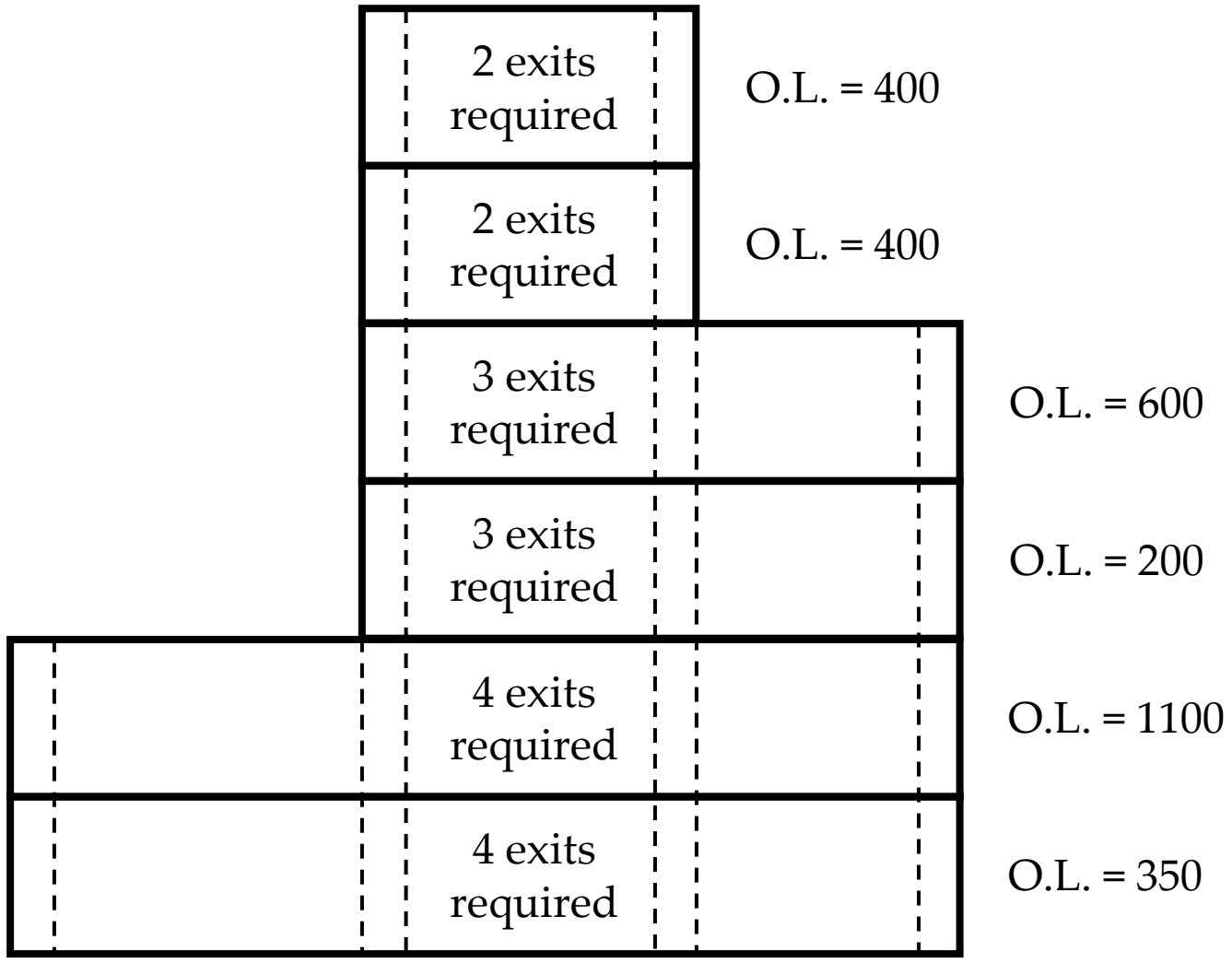
Section 1006.2.1.1

- Access to at least three exits when occupant load served is 501 to 1,000.
- 4 exits when > 1,000 occupants





Number of Exits per Story
Section 1006.3



- The required number of exits from any story, basement or individual space must be maintained until arrival at grade or the public way

Number of Exits per Floor 2
Section 1006.3

- No cumulative or contributing occupant load from adjacent levels needs to be considered.
- Illustrates that the 200 occupants from the second floor that pass through the first floor are not added to the 400 occupants on the first floor when determining the minimum number of required means of egress.

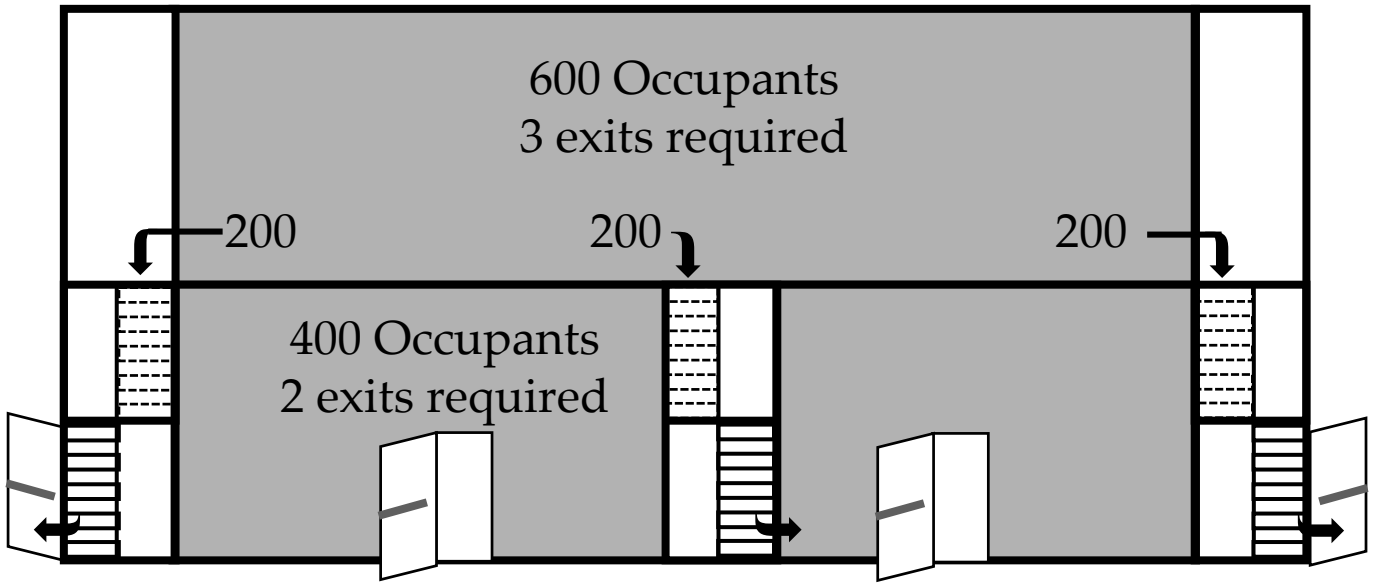


TABLE 1006.3.3(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM COMMON PATH OF EGRESS 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 = 3048 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 1030.

b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.3(2).

1006.3.2(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM COMMON PATH OF EGRESS 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], R-4	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 1030.

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 1006.3.2(1).

d. The length of *exit access* travel distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

Arrangement of M.O.E Elements

Exit or Exit Access Doorways Required

- 1007.1.1 – Two exits or exit access doors
- 1007.1.2 – Three or more exits or exit access doorways
- 1016.2 – Egress through intervening spaces
- 1017 – Exit access travel distance
- 1017.2 – Travel distance limitations
- 1020.4 – Dead-ends

Section 107.1.1.1

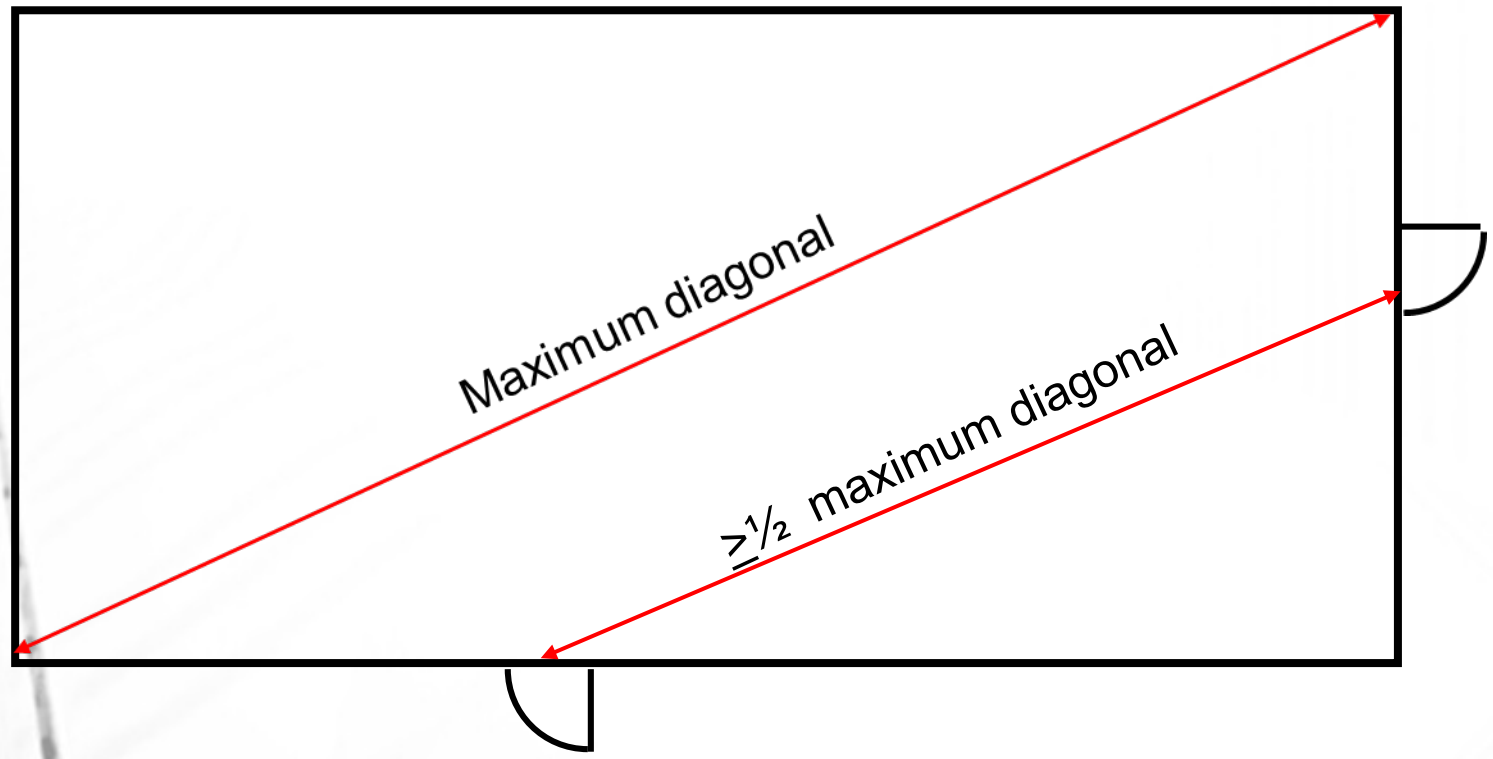
Measurement point. The separation distance required in Section 1007.1.1 shall be measured in accordance with the following:

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

2. The separation distance to exit access stairways shall be measured to the closest riser.

3. The separation distance to exit access ramps shall be measured to the start of the ramp run.

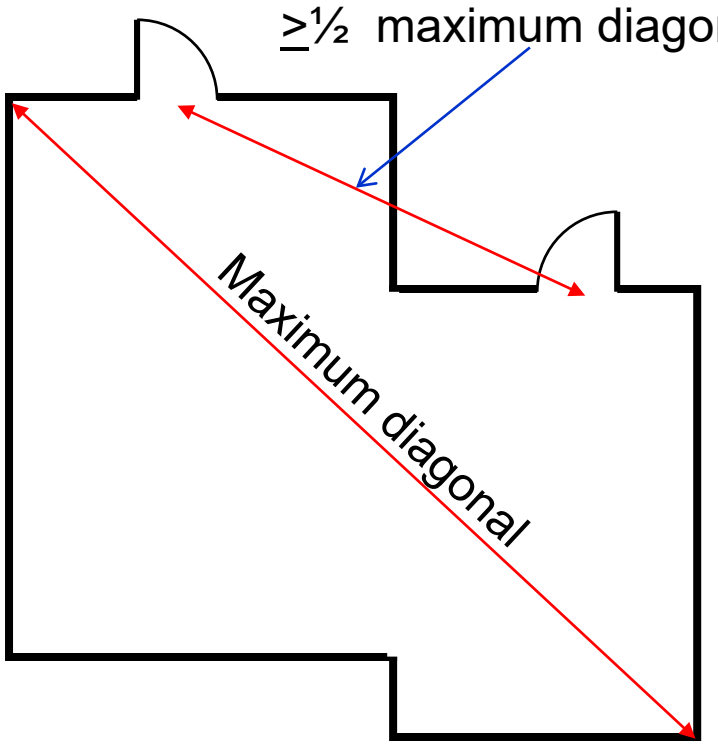
Exit or Exit Access Doorway Arrangement Section 1007.1.1

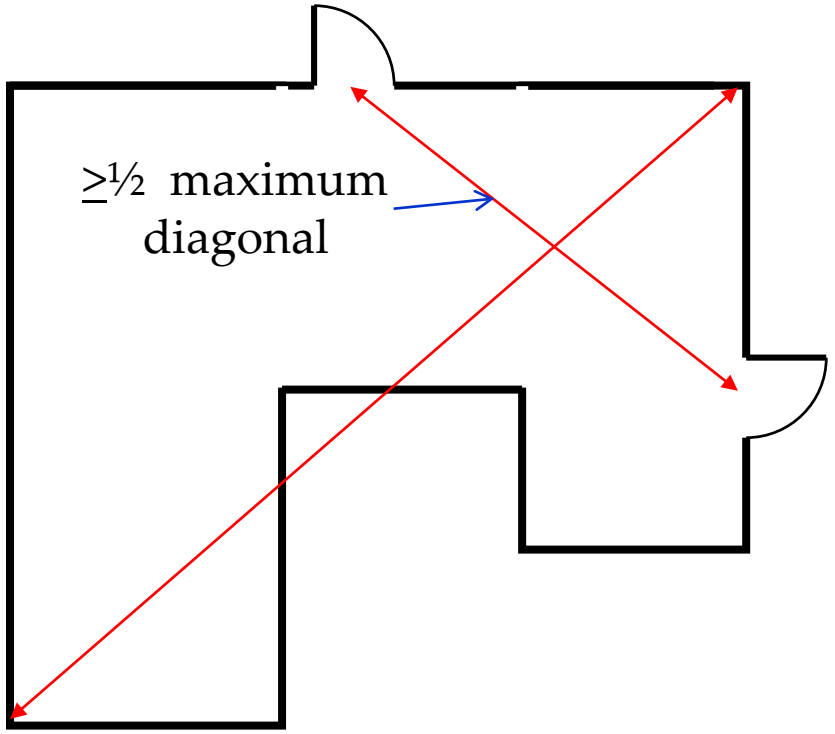


- Unenclosed Stairways, the remoteness measurement for doorways shall begin at the center of the top riser of the unenclosed stairways;

- Enclosure is provided, distances are measured to the door of the enclosure.

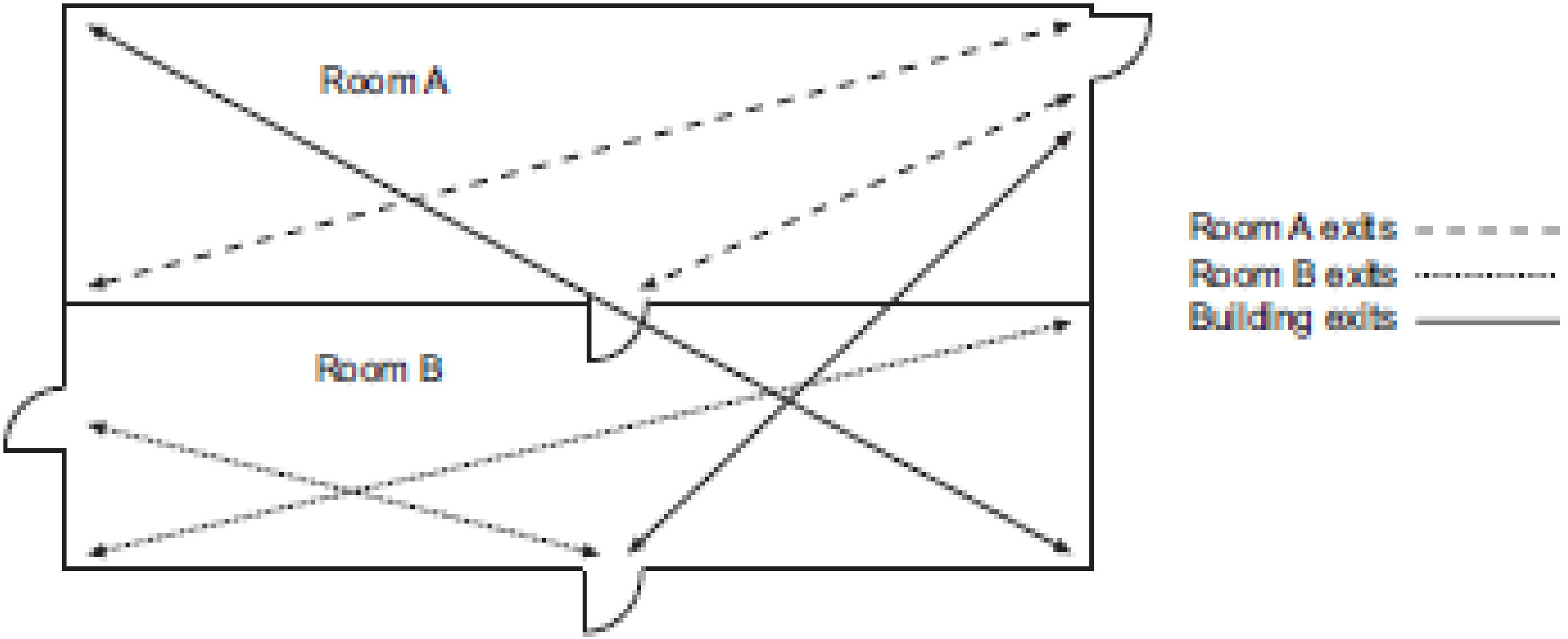
Exit or Exit Access Doorway Arrangement Section 1007.1.1



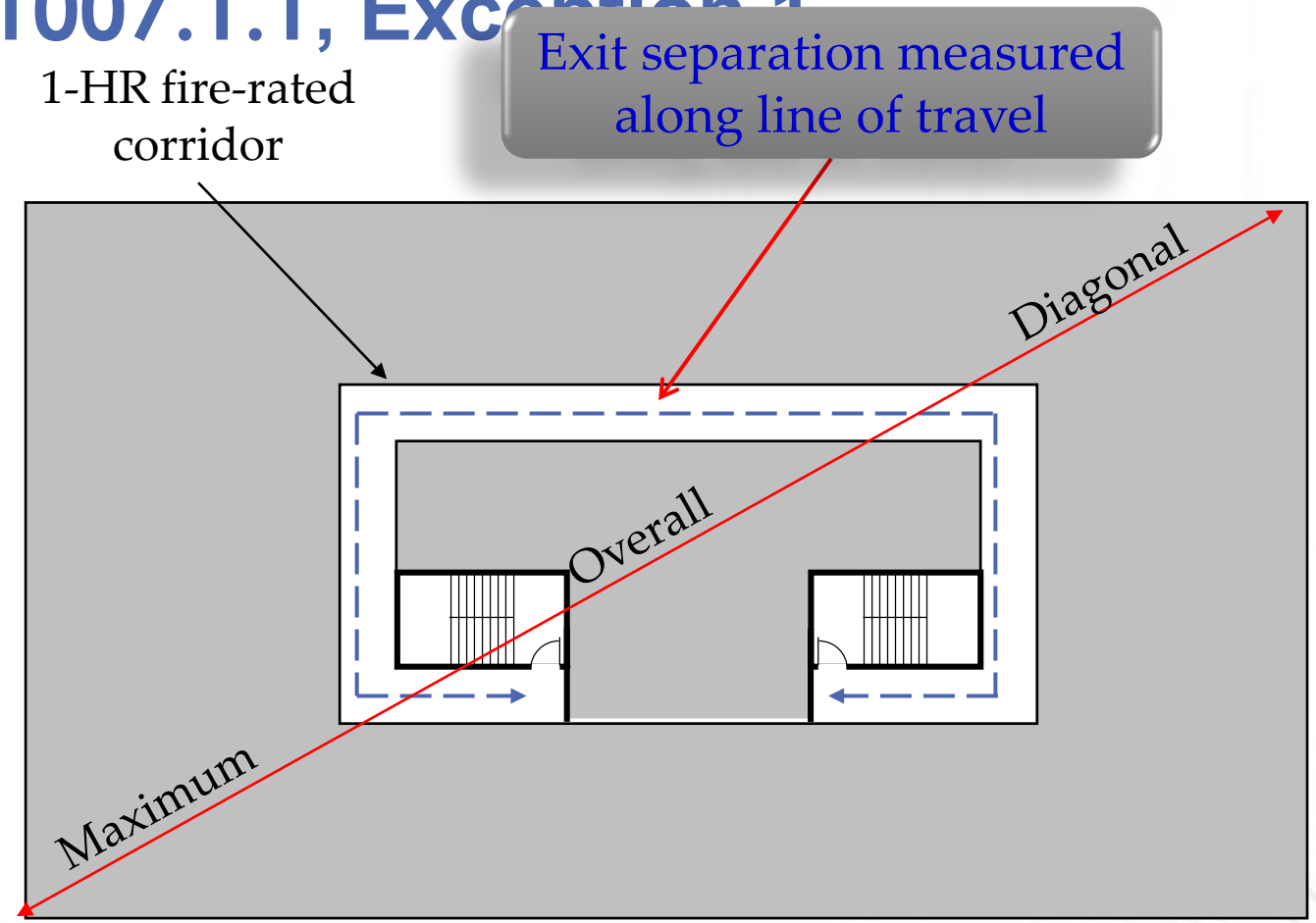


Maximum diagonal

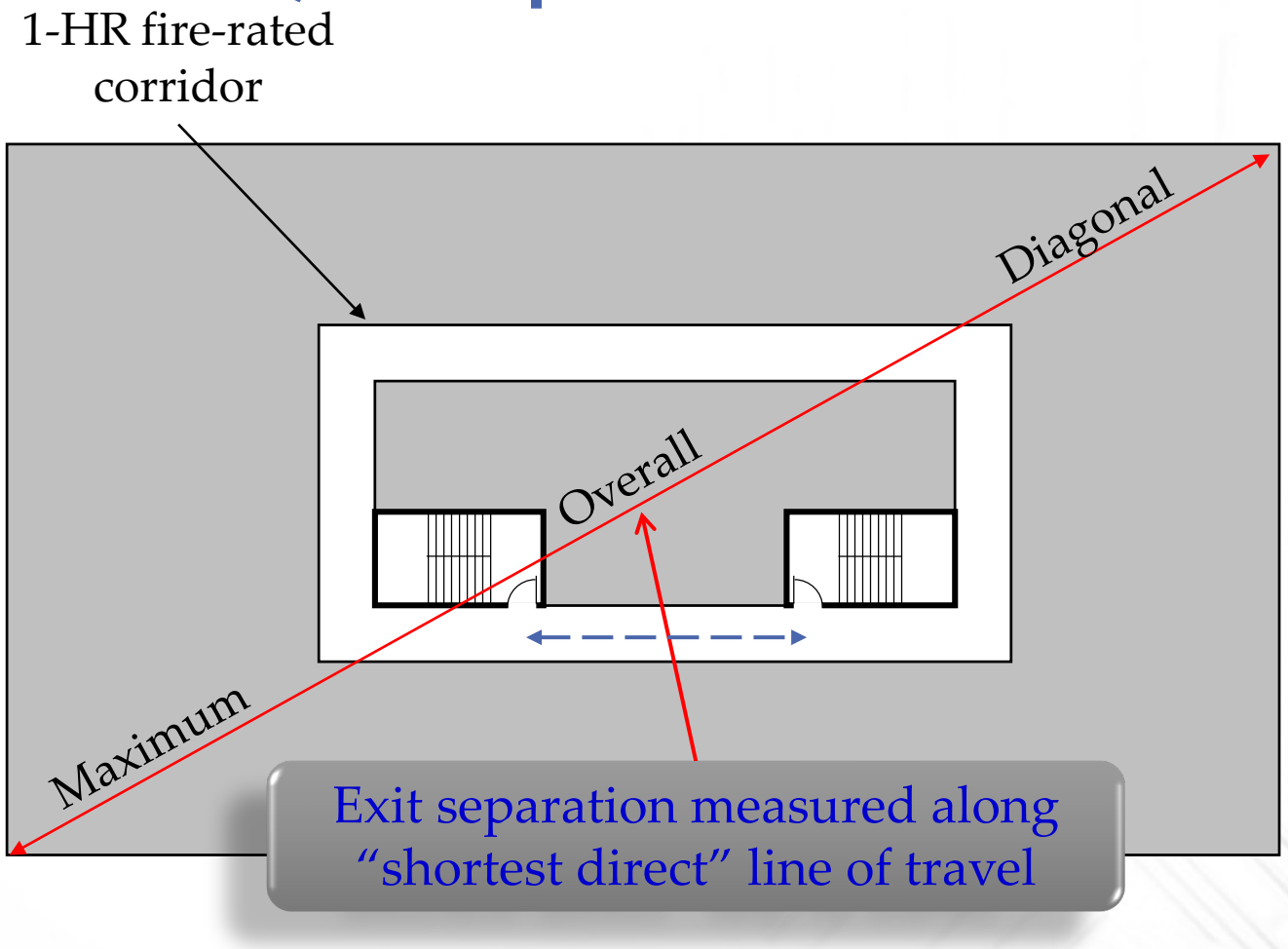
Exit or Exit Access Doorway Arrangement Section 1007.1.1



Exit or Exit Access Doorway Arrangement Section 1007.1.1, Exception 1

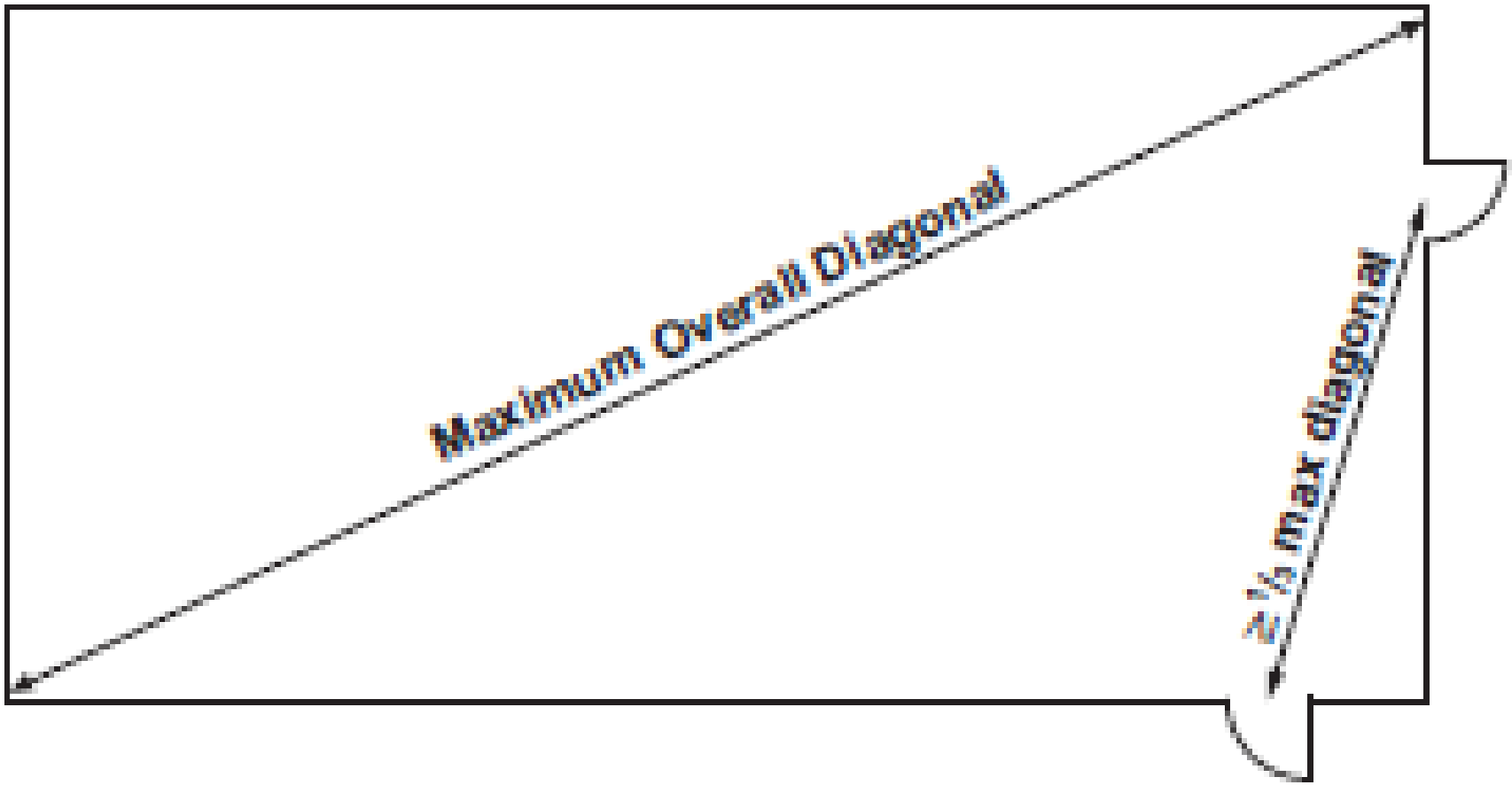


Exit or Exit Access Doorway Arrangement Section 1007.1.1, Exception 1



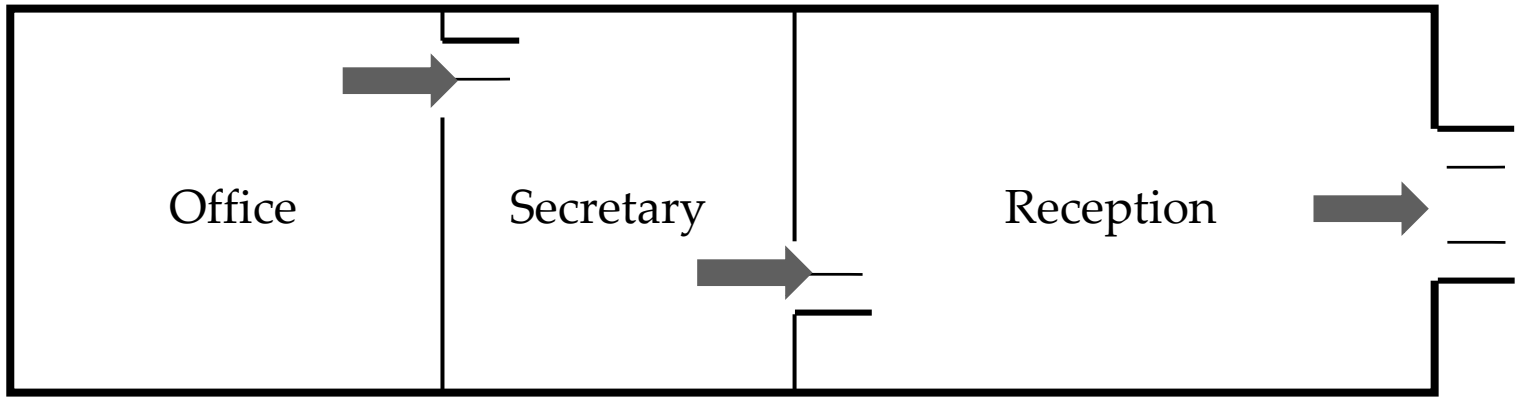
Exit or Exit Access Doorway Arrangement Section 1007.1.1, Exception 2

- When the building is sprinklered, the separation distance is 1/3 the maximum diagonal



Egress Through Intervening Spaces Section 1016.2

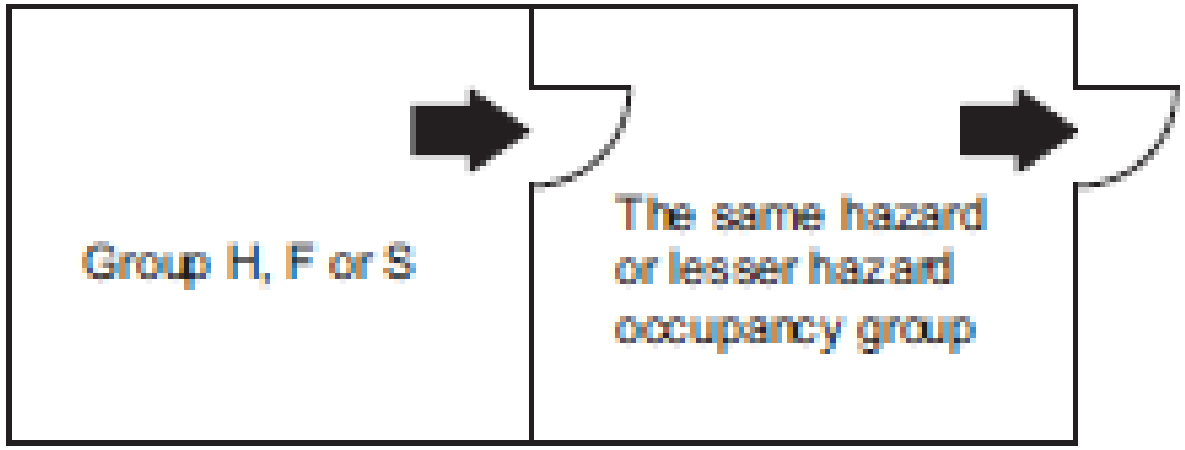
- Intervening rooms must be related to the area or room served
- Intervening room cannot be Group H
- Path of egress travel is clear and discernible to an exit
- Intervening rooms cannot be locked to prevent egress



Common Path of Egress Travel becomes limiting factor

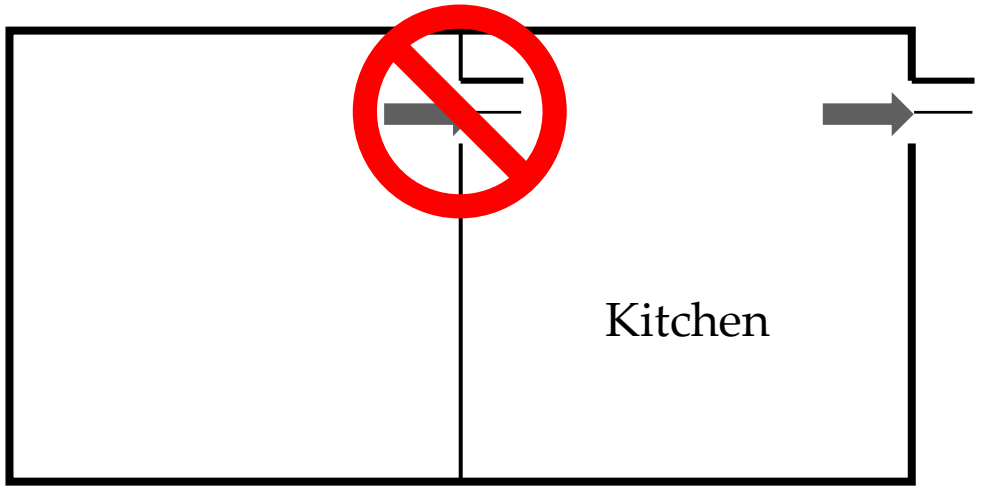
Egress Through Intervening Spaces
Section 1016.2

- In Group H, F or S, the intervening room must the same or lesser hazard occupancy



Egress Through Intervening Spaces
Section 1016.2

- Cannot travel through kitchens, storerooms, closets or spaces used for similar purposes

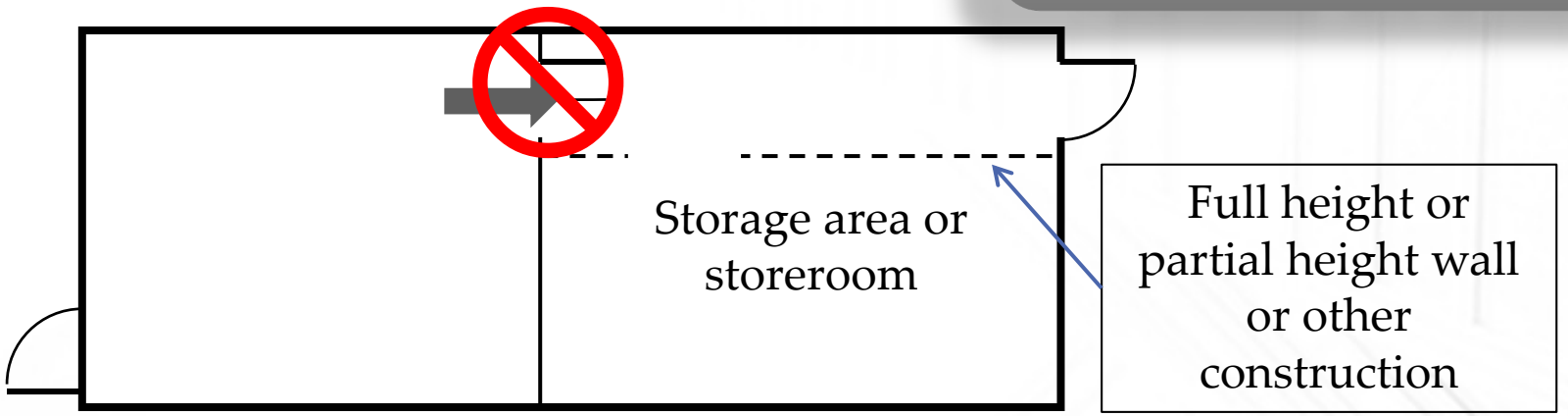


Only allowed *IF*
the kitchen is part of the dwelling unit or sleeping area

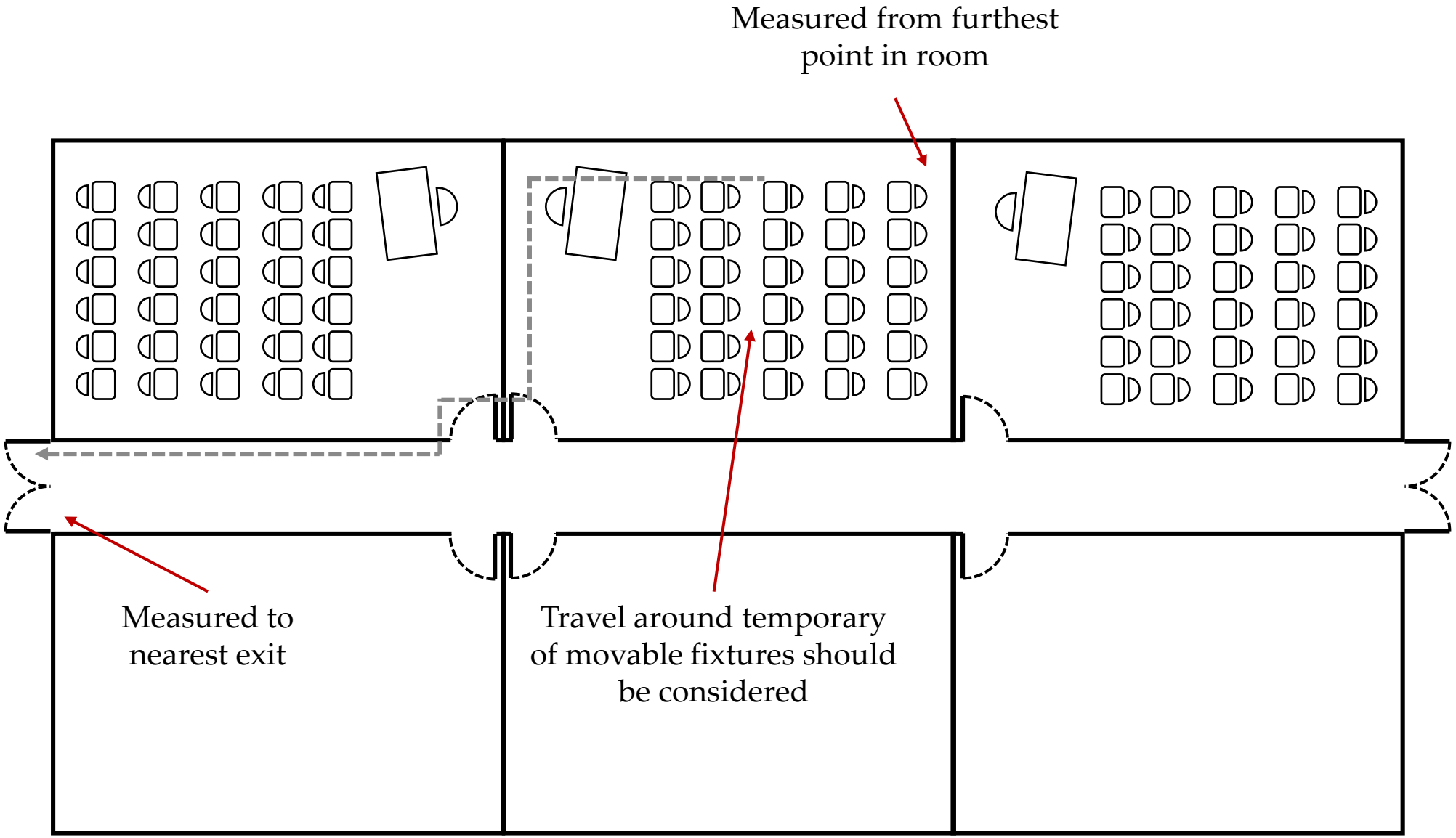
Egress Through Intervening Spaces
Section 1016.2

- Cannot pass through storage areas
  - **Exception:** Group M with conditions

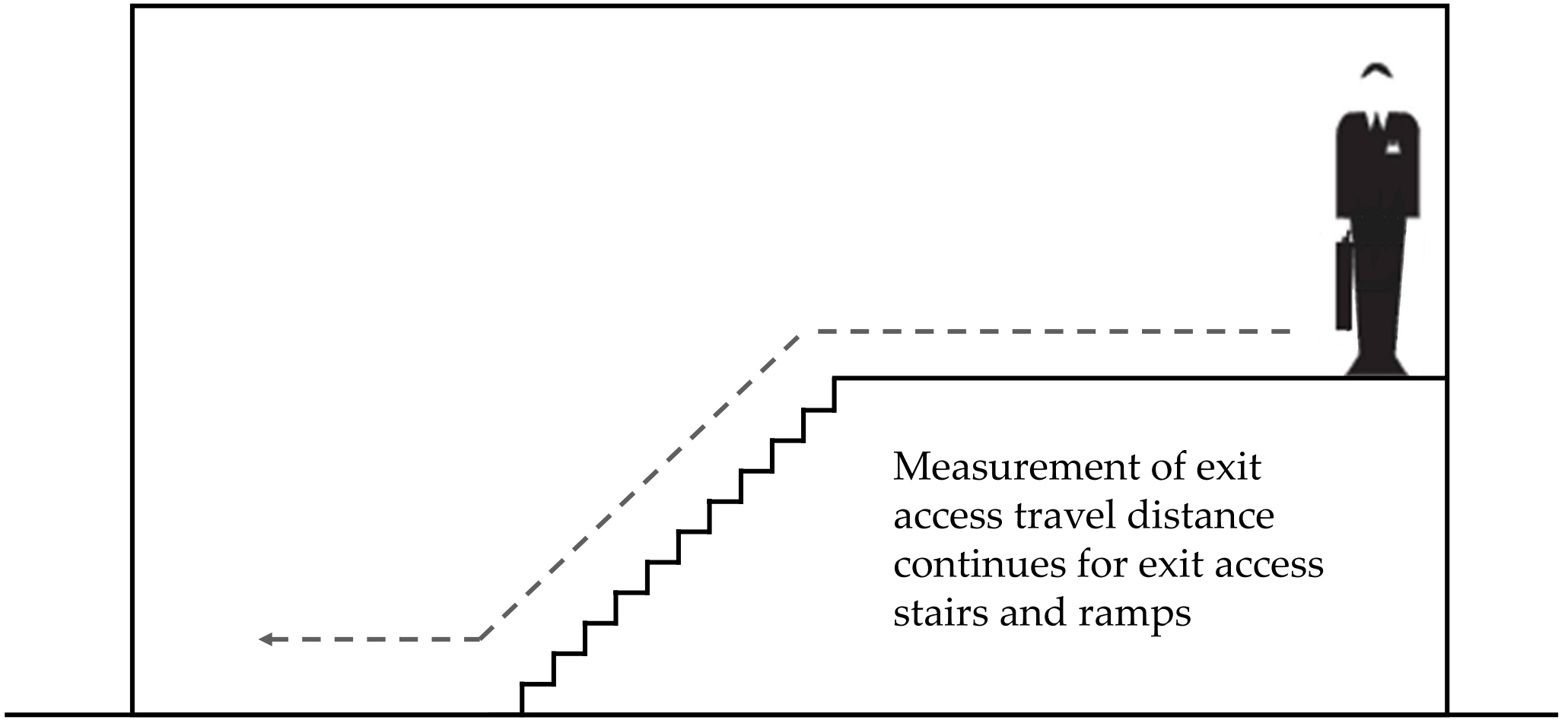
Only allowed in Group M if:
- not locked
- demarcation of egress path
- maximum 50% of exits



Exit Access Travel Distance
Section 1017

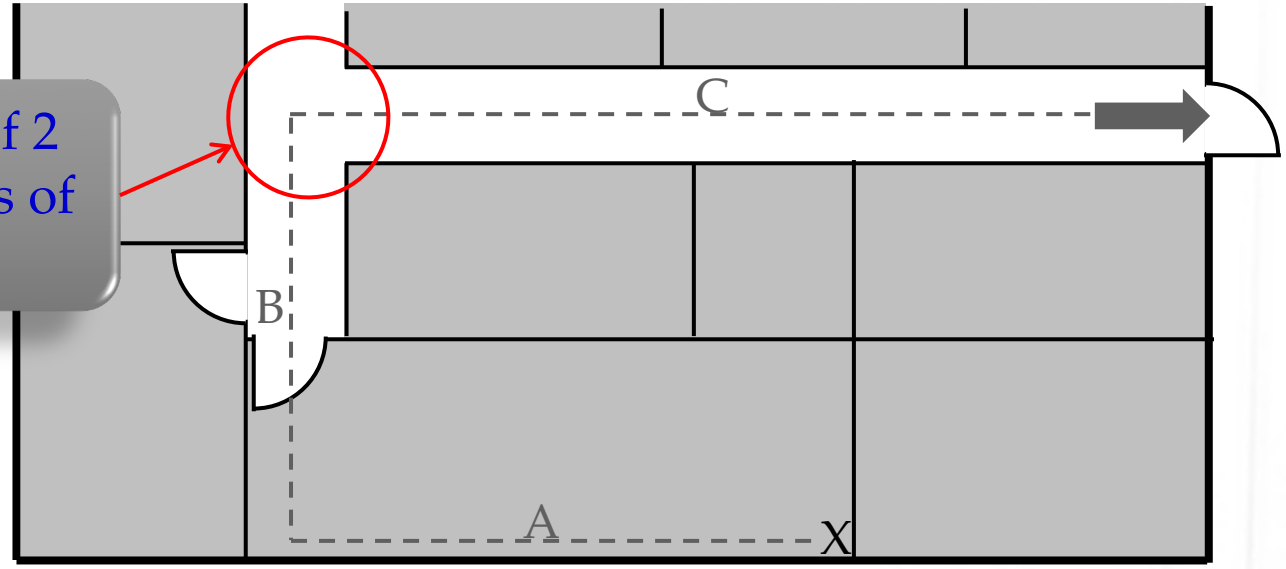


Exit Access Travel Distance
Section 1017



Travel Distance Measurement

- Measurement is to ''closest' exit



A = 40 feet
B = 30 feet
C = 75 feet
145 feet

Common path of travel = 70'

Travel Distance = 145'

TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE

Occupancy	Without Sprinkler System (feet)	With Sprinkler System (feet)
A, E, F-1, M, R, S-1	200	250[b]
I-1	Not Permitted	250[c]
B	200	300[c]
F-2, S-2, U	300	400[c]
H-1	Not Permitted	75[c]
H-2	Not Permitted	100[c]
H-3	Not Permitted	150[c]
H-4	Not Permitted	175[c]
H-5	Not Permitted	200[c]
I-2,I-3, I-4	Not Permitted	200[c]

Table 1017.2 Footnotes

a. See the following sections for modifications to *exit access* travel distance requirements:

Section 402.8: For the distance limitation in malls.

Section 404.9: For the distance limitation through an atrium space.

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 411.4: For the distance limitation in special amusement buildings.

Section 412.7: 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 1006.3.2: For buildings with one exit.

Section 1017.2.2: For increased distance limitation in Groups F-1 and S-1.

Section 1029.7: For increased limitation in assembly seating.

Section 3103.4: For temporary structures.

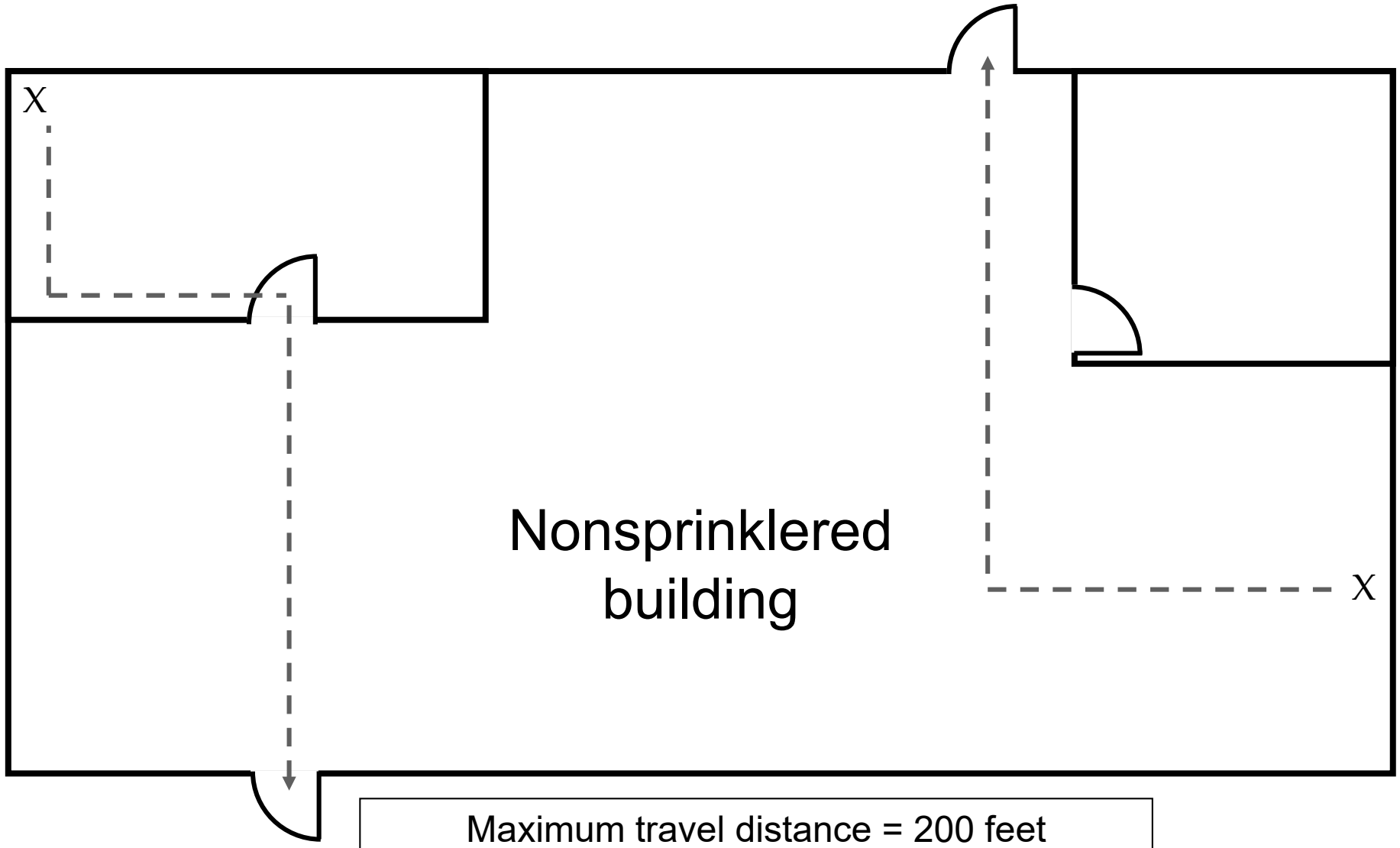
Section 3104.9: For pedestrian walkways.

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.

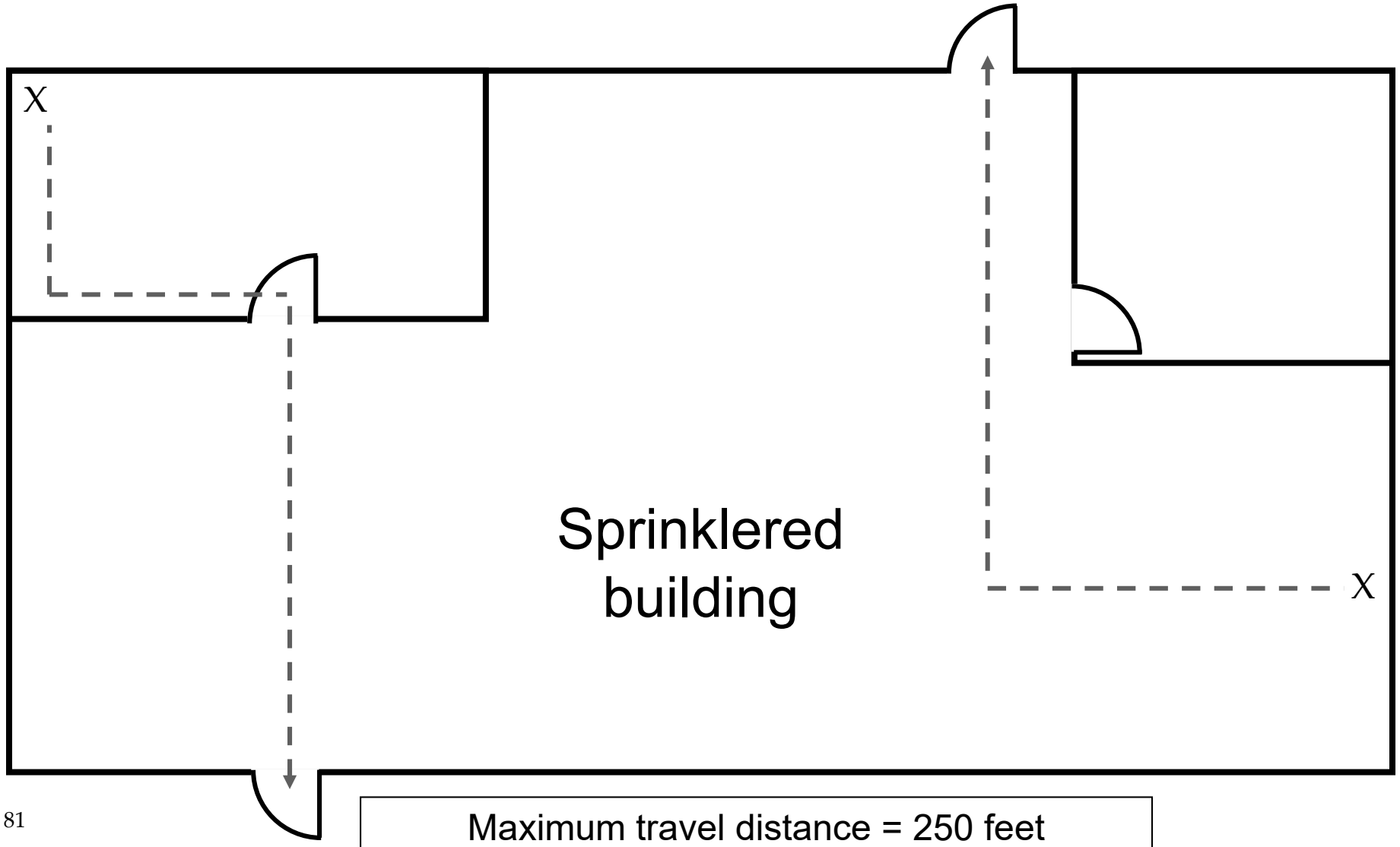
c. Buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

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

Travel Distance for: A, E, F-1, M, R and S-1

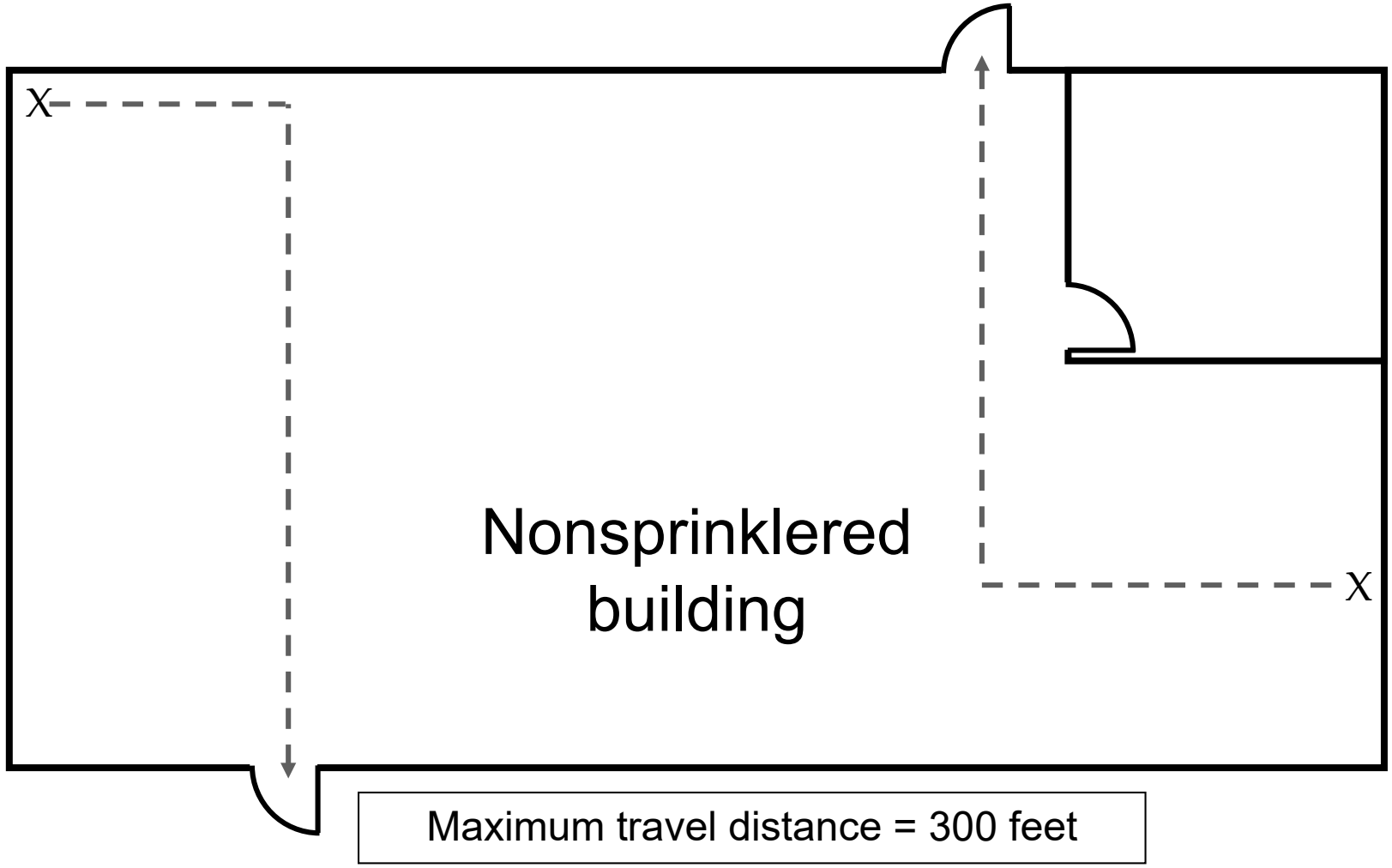


Travel Distance for: A, E, F-1, I-1, M, R and S-1

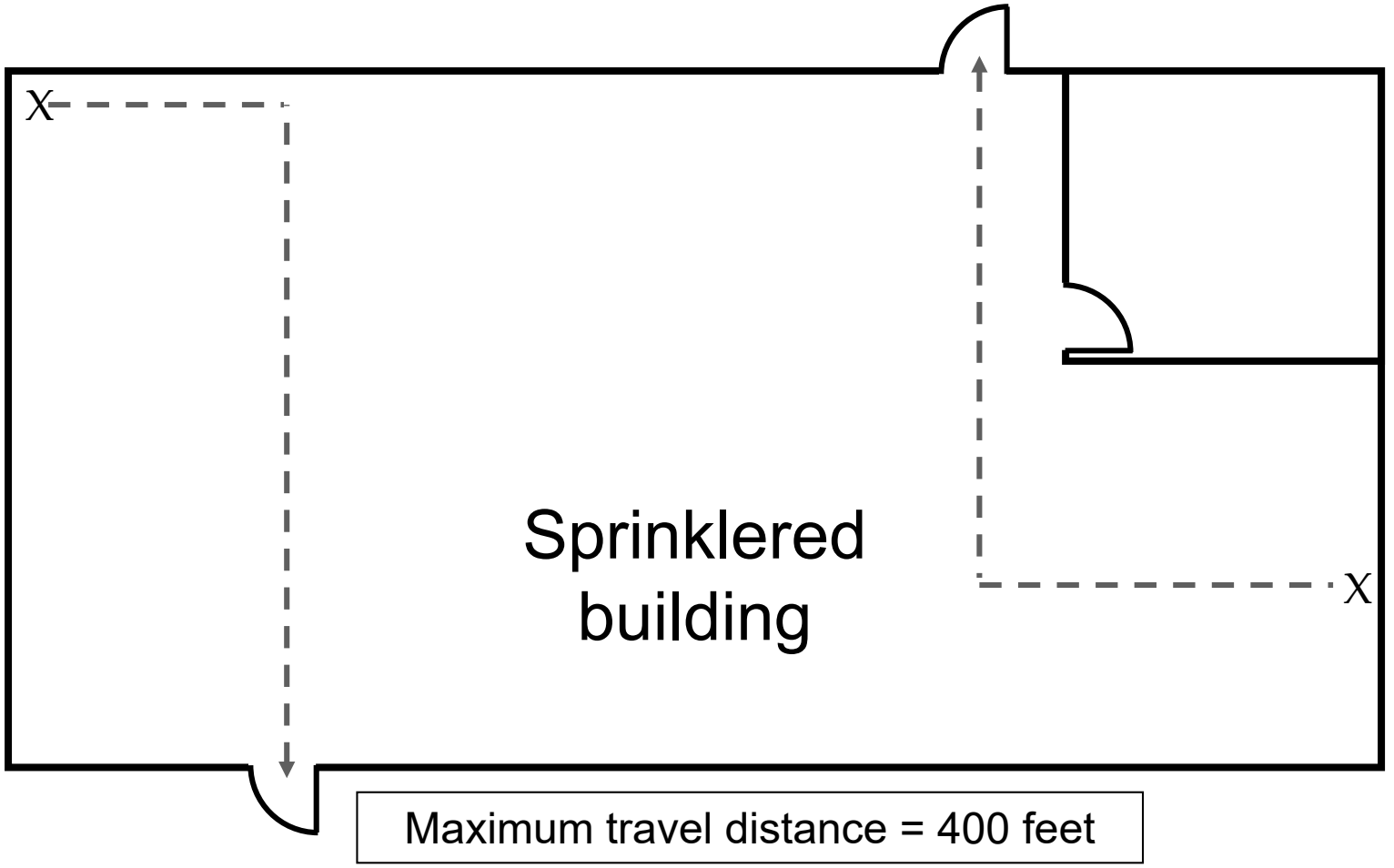


Maximum travel distance = 250 feet

Travel Distance for: F-2, S-2 and U



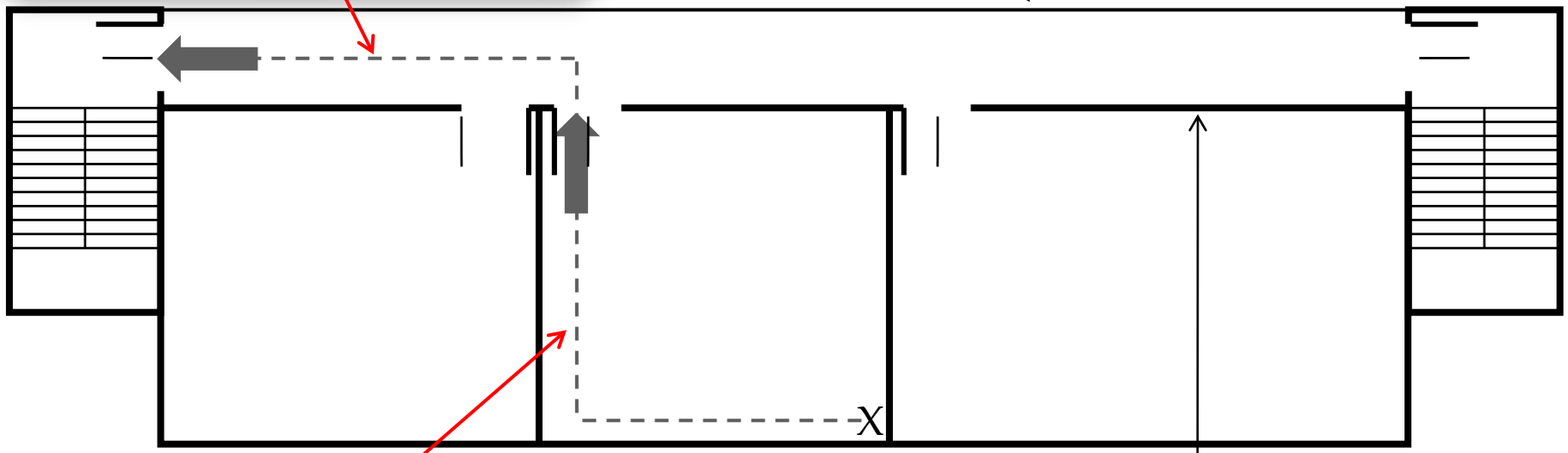
Travel Distance for: F-2, S-2 and U



Exterior Egress Balcony Increase
Section 1017.2.1

Increased (additional) travel distance on exterior egress balcony – maximum 100′

Balcony open ≥50% on the exterior side



Travel distance allowed by IBC §1017.2

Interior wall and opening protection may be required

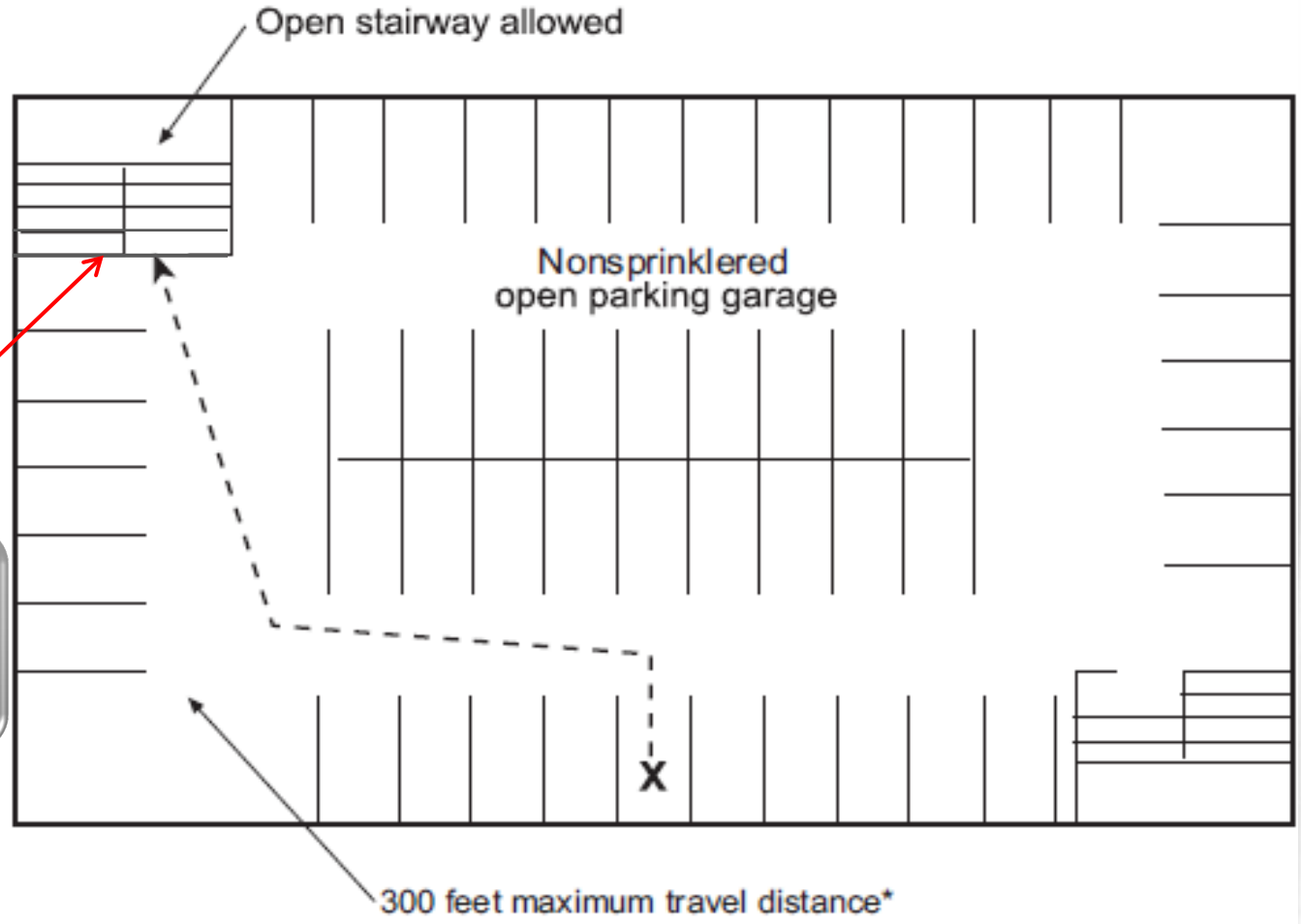
Group F-1 and S-1 Increase Section 1017.2.2

- Group F-1 and S-1 are limited to one story in height.
- The minimum floor to ceiling/roof deck height is 24 feet.
- The building is fully sprinklered.

Travel Distance - Section 1017.3

- Exception for Open Parking Garages

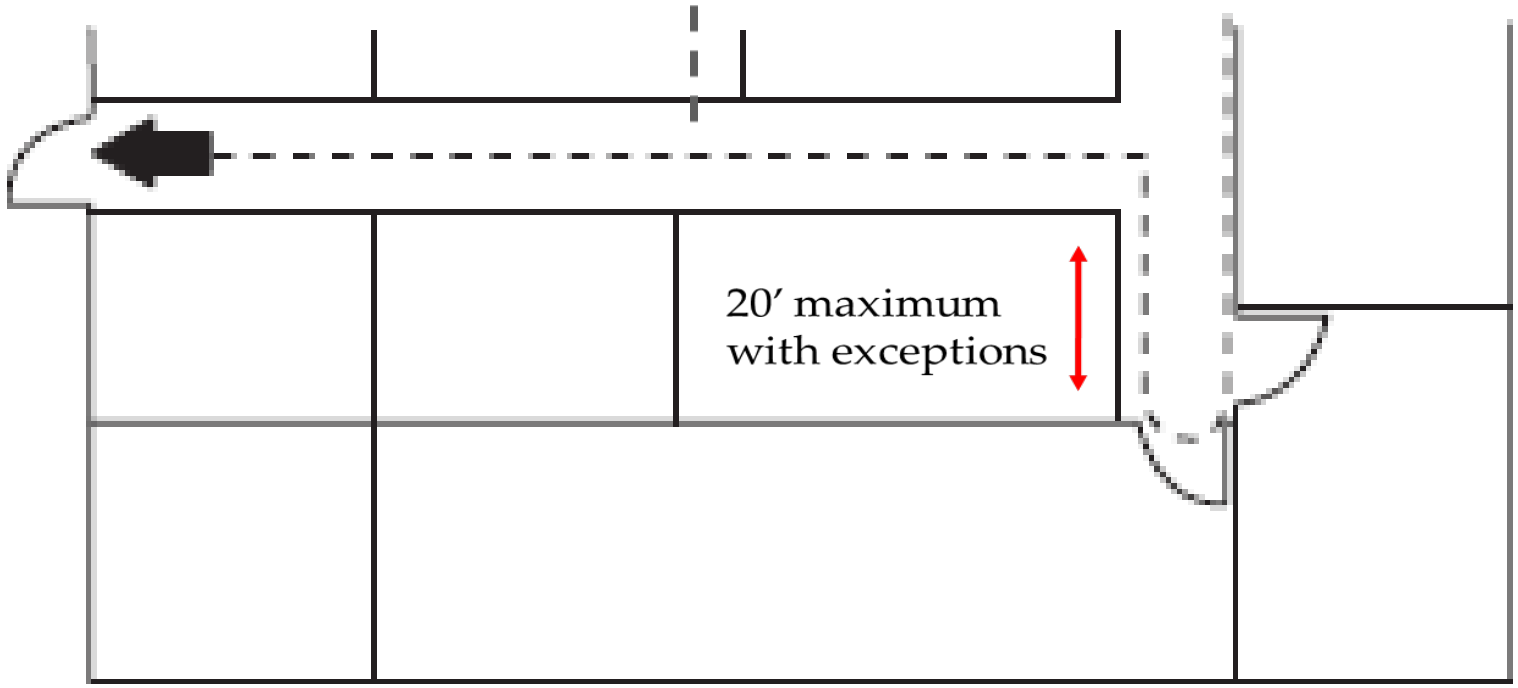
Travel distance measured to the closest riser of an exit access stairway



*400 feet maximum travel distance in a sprinklered open parking garage

Dead Ends
Section 1020.4

- Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors **>20'** in length



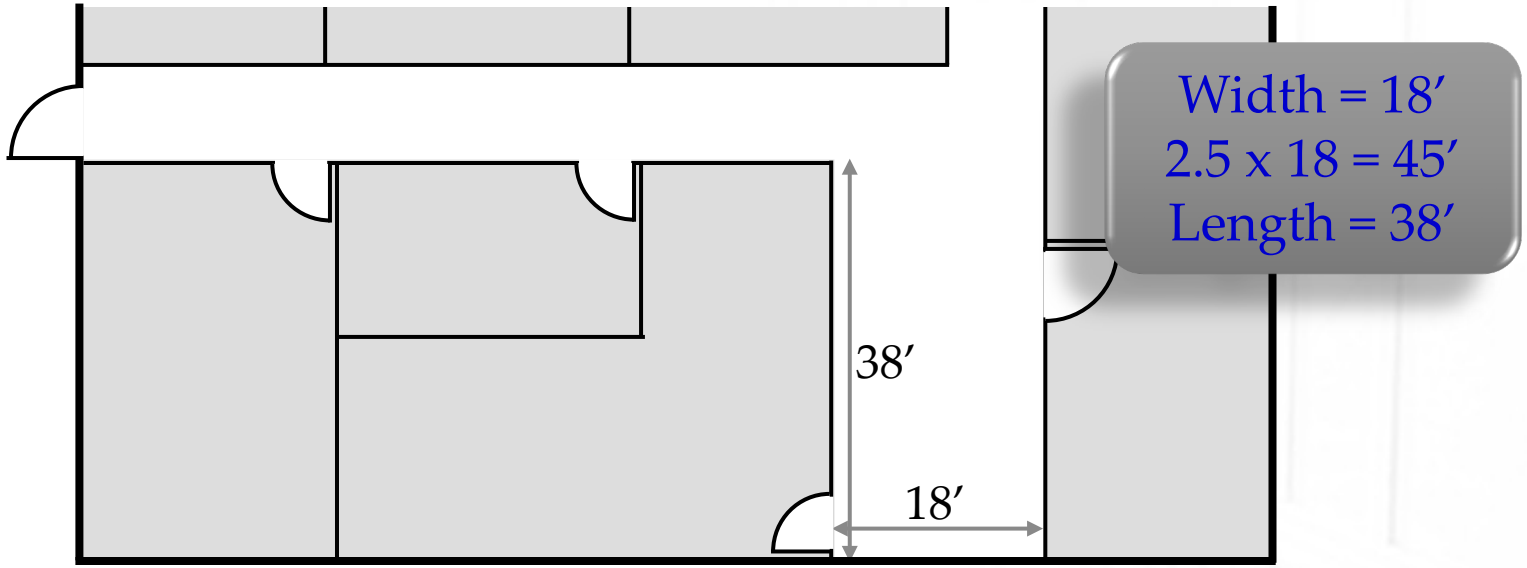
For SI: 1 foot = 304.8 mm.

Dead Ends
Section 1020.4, Exceptions

1. Maximum of 50’ in Group I-3, Condition 2, 3 or 4
2. Maximum of 50’ in Groups B, E, F, I-1, M, R-1, R-2, R-4, S and U occupancies ***IF*** sprinklered (NFPA 13 only)
3. Unlimited length where the **length** of the dead-end corridor is **less than 2.5 times the least width** of the dead-end corridor.

Dead Ends
Section 1020.4, Exception 3

- When $L \leq 2.5 \times W$ that portion of the corridor is not treated as a dead-end corridor

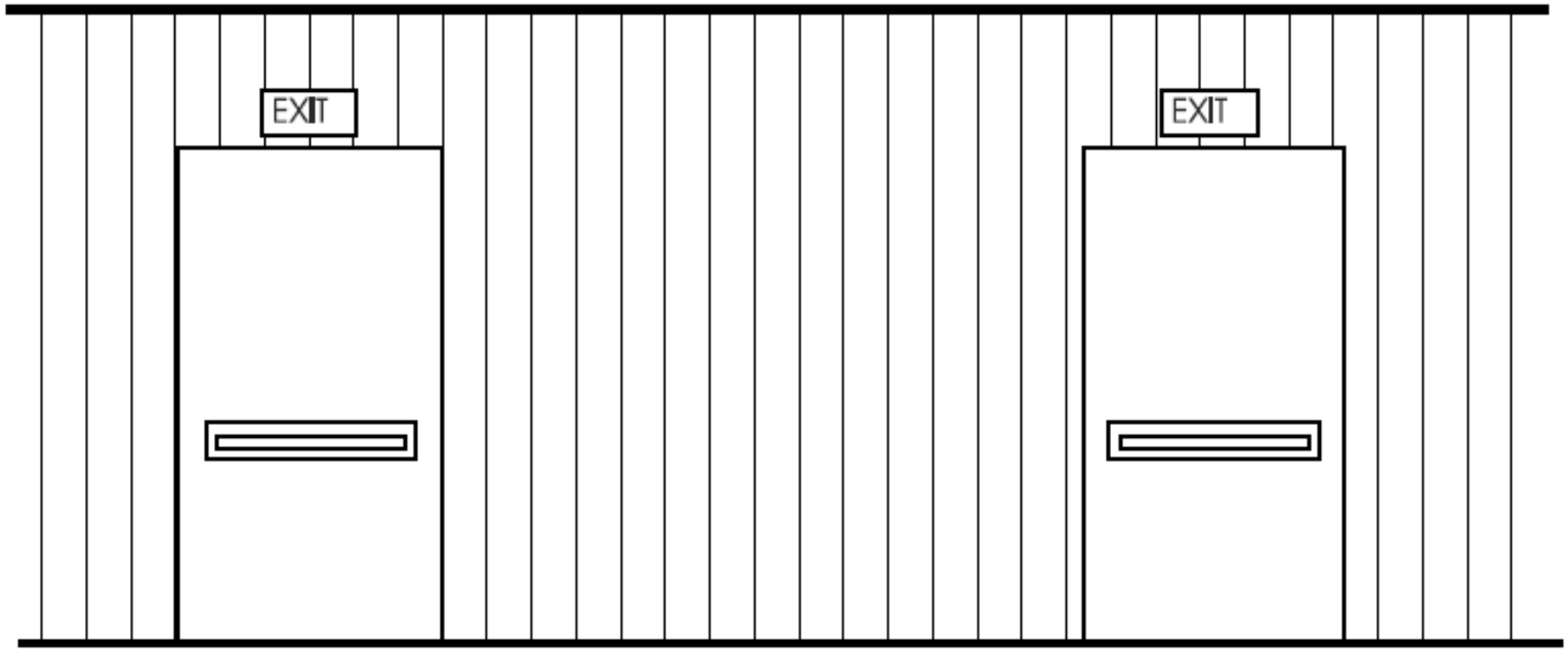


In this case, the length is ≤2.5 times the width. Dead-end corridor limitations do not apply.

Doors and Door Hardware

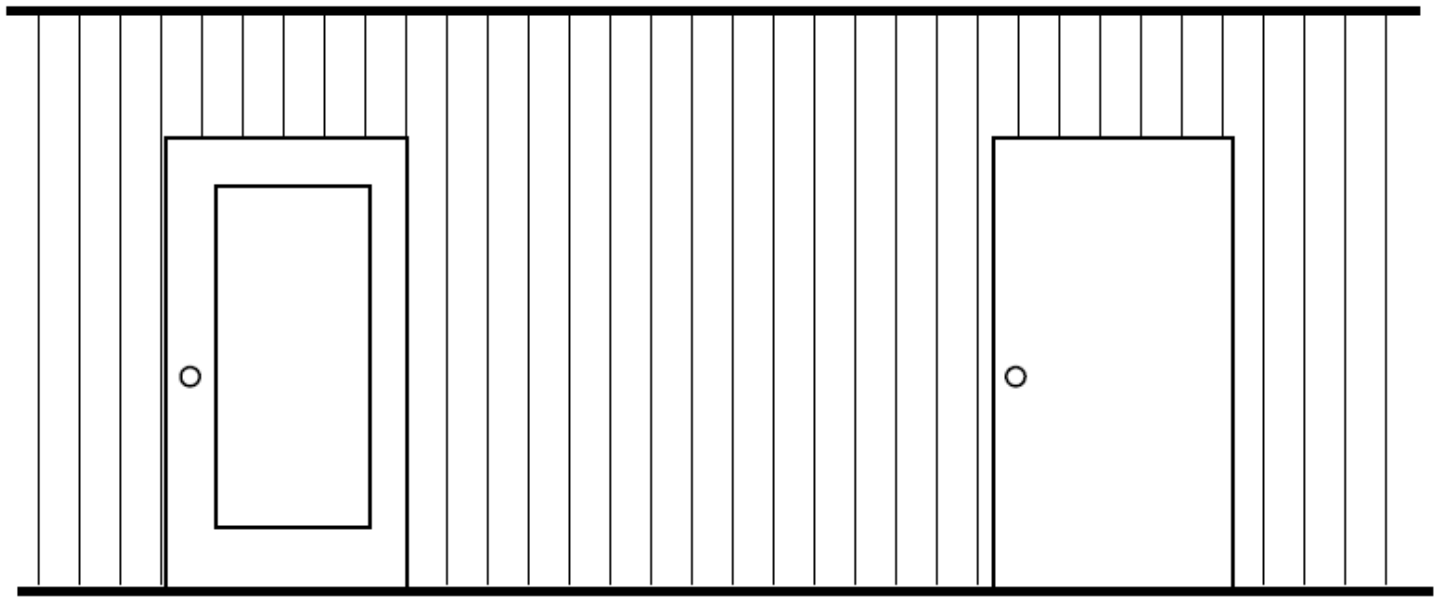
Doors
Section 1010.1

- Doors installed for egress purposes in numbers greater than those required by the code must conform to all provisions of the IBC 1010.



Doors
Section 1010.1

- Egress doors must be readily distinguishable from the adjacent construction and finish
- Mirrors or similar reflecting materials must not be used on egress doors.
- Egress doors must not be concealed by curtains, decorations or similar materials.



Readily Identifiable ??


EXIT
02.22.2007 12:32

Before

After


EXIT


EXIT


Before
After


DO NOT BLOCK
FIRE EXIT

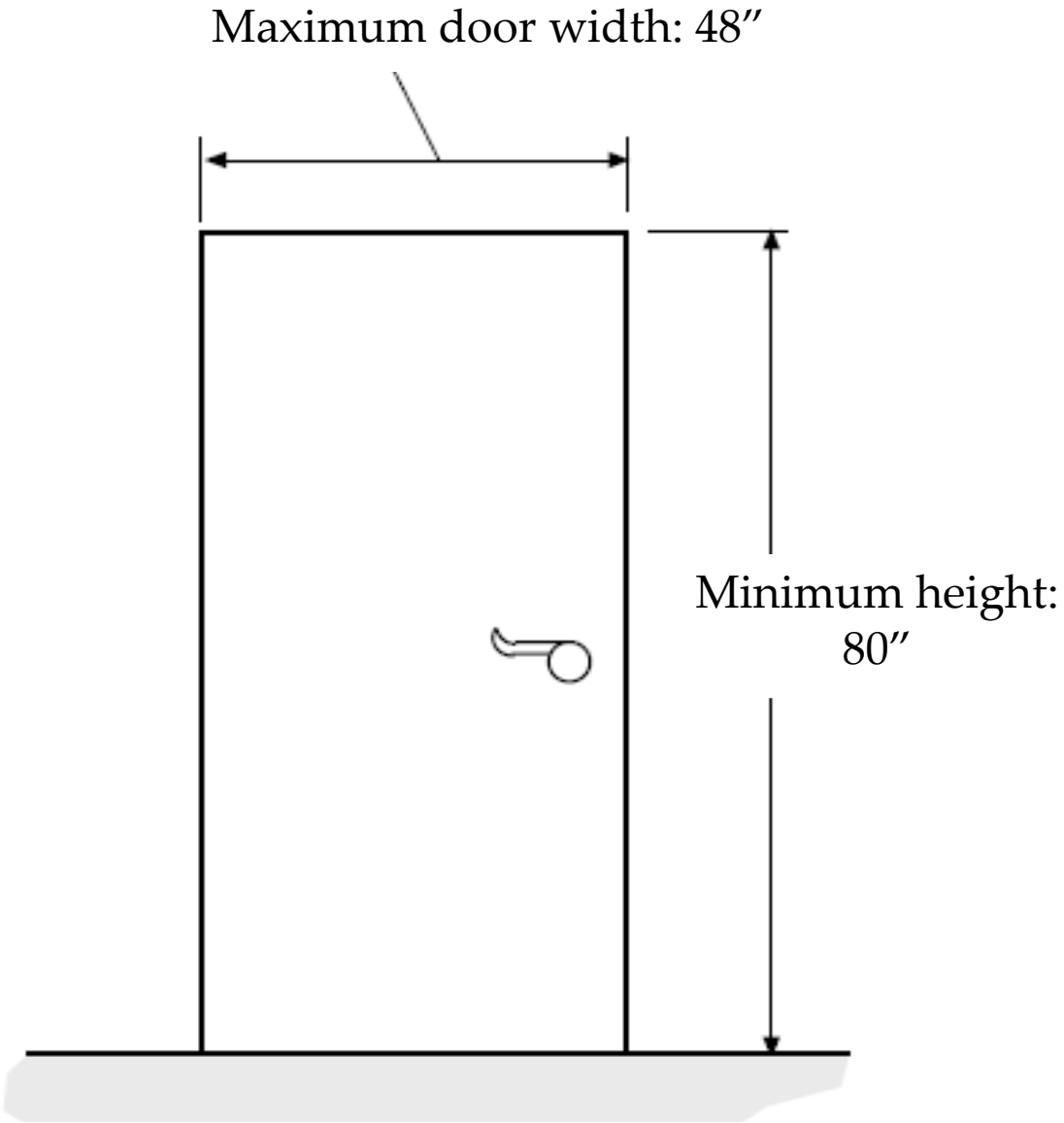

EXIT
STAIR B
ROOF ACCESS
1
1 THRU 5
FIRE EXIT
within
reach
20oz Dasani

Size of Doors
Section 1010.1.1

- **Exceptions to 32″ clear width:**
  - Non-egress doors in Groups R-2 and R-3
  - 28″ in Group I-3 resident sleeping areas <u>including required Accessible Units.</u>
  - Doors to storage closets less than 10 square feet
  - Revolving doors
  - Interior doors in a dwelling unit or sleeping unit, except Group R-1, that are not required to be adaptable or accessible
  - 31.75″ for <u>required accessible</u> doors in Type B dwelling units

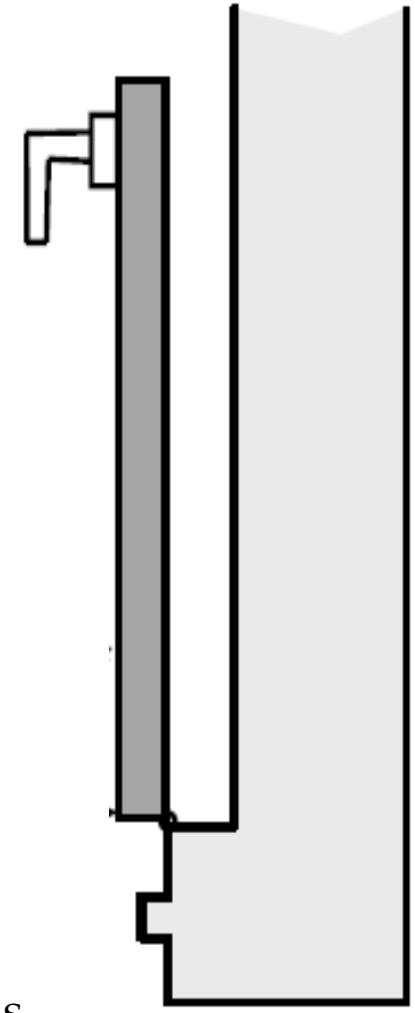
Size of Doors
Typical per Section 1010.1.1

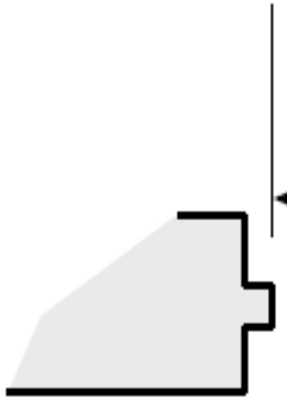
Door must provide a minimum clear width of 32″



Size of Doors
Section 1010.1.1

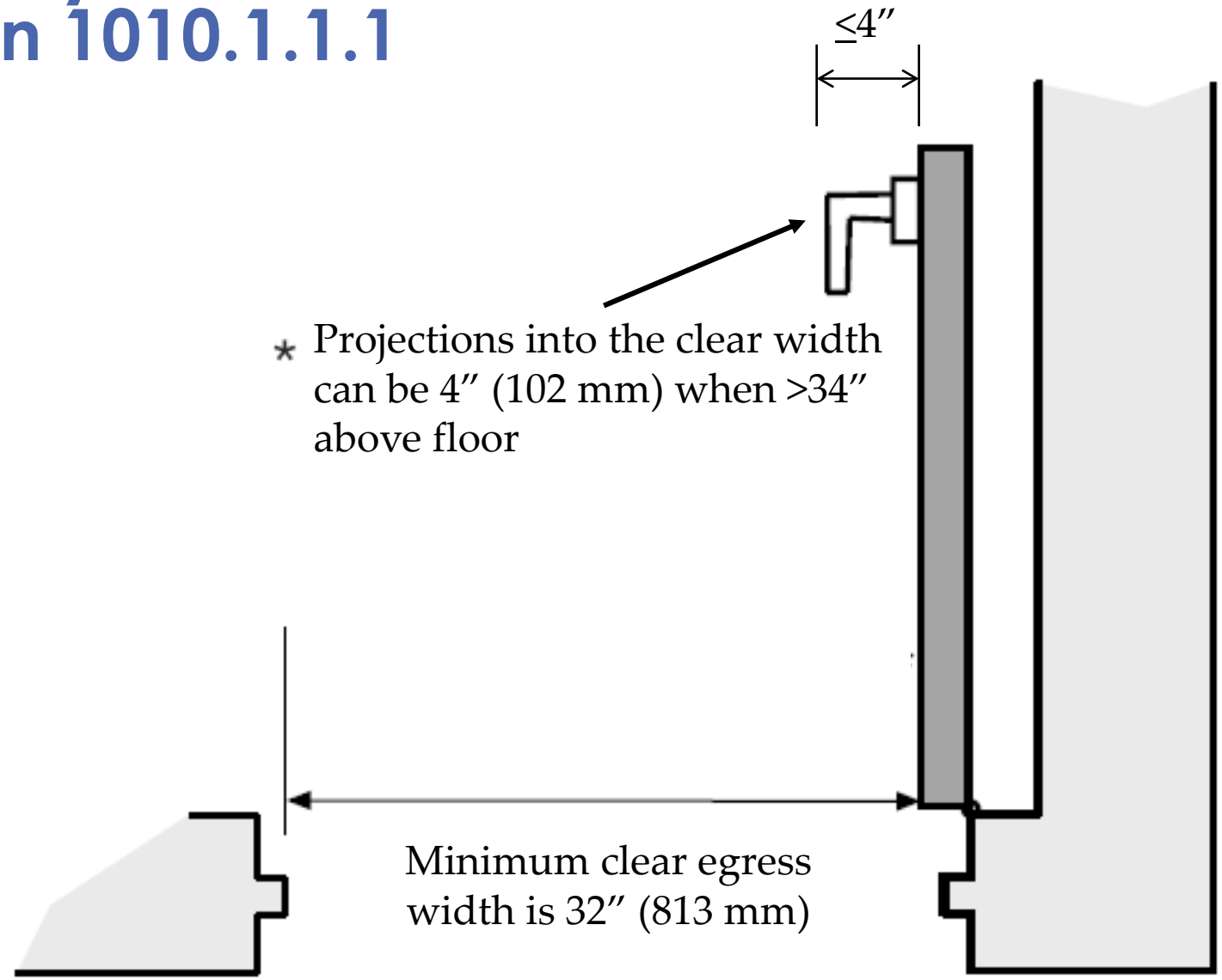
* Minimum width for required egress doors: 32″ (813 mm)



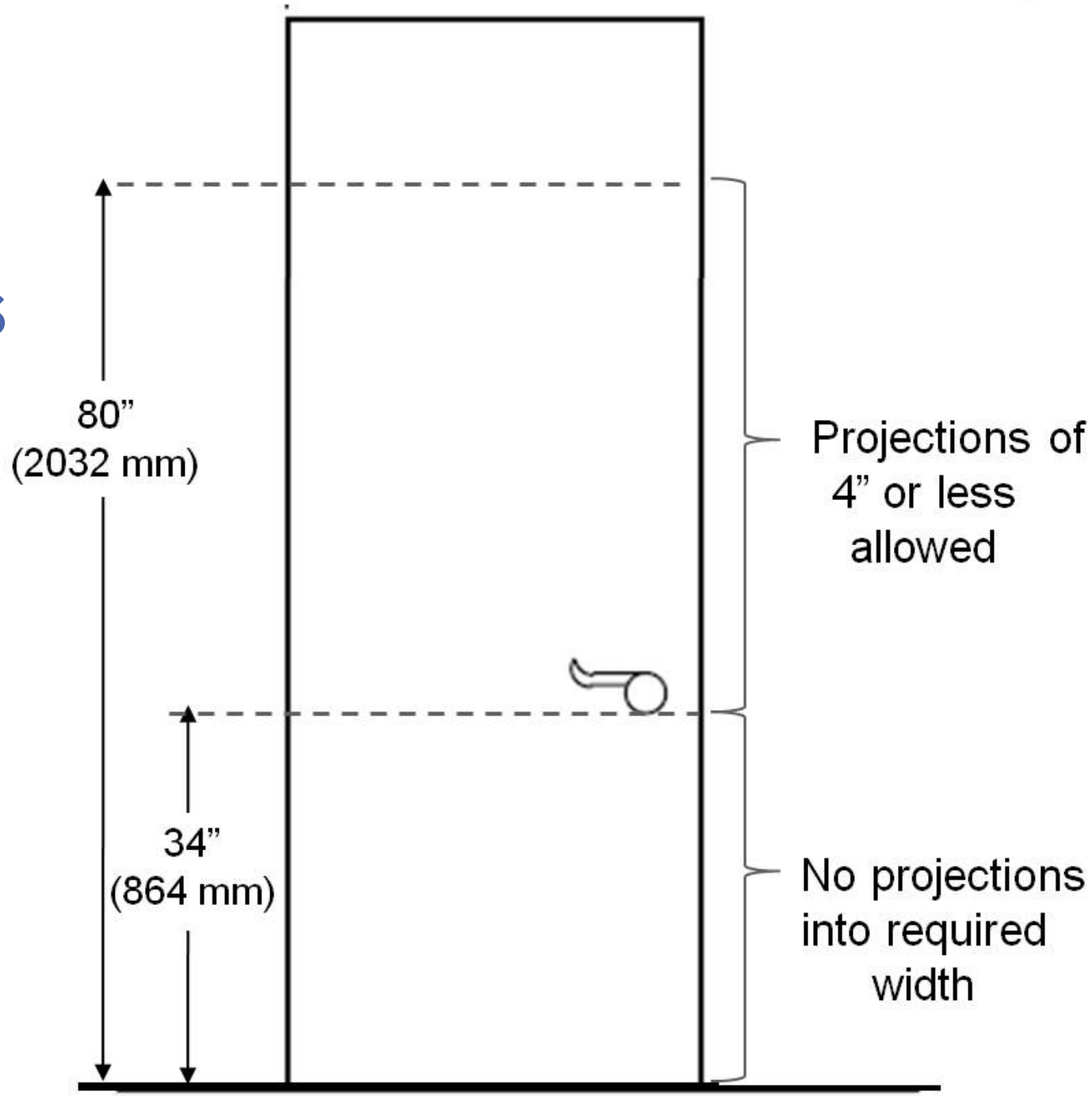


Egress width at doors is measured as clear width

Doorway Obstructions
Section 1010.1.1.1



Doorway Obstructions
Section 1010.1.1.1

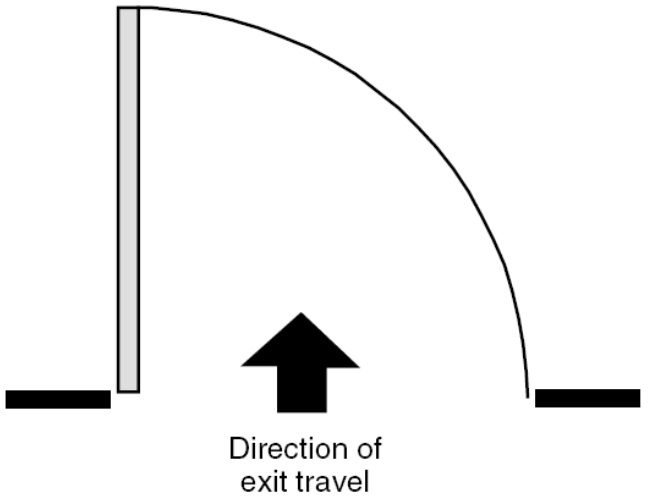


Door Swing
Section 1010.1.2

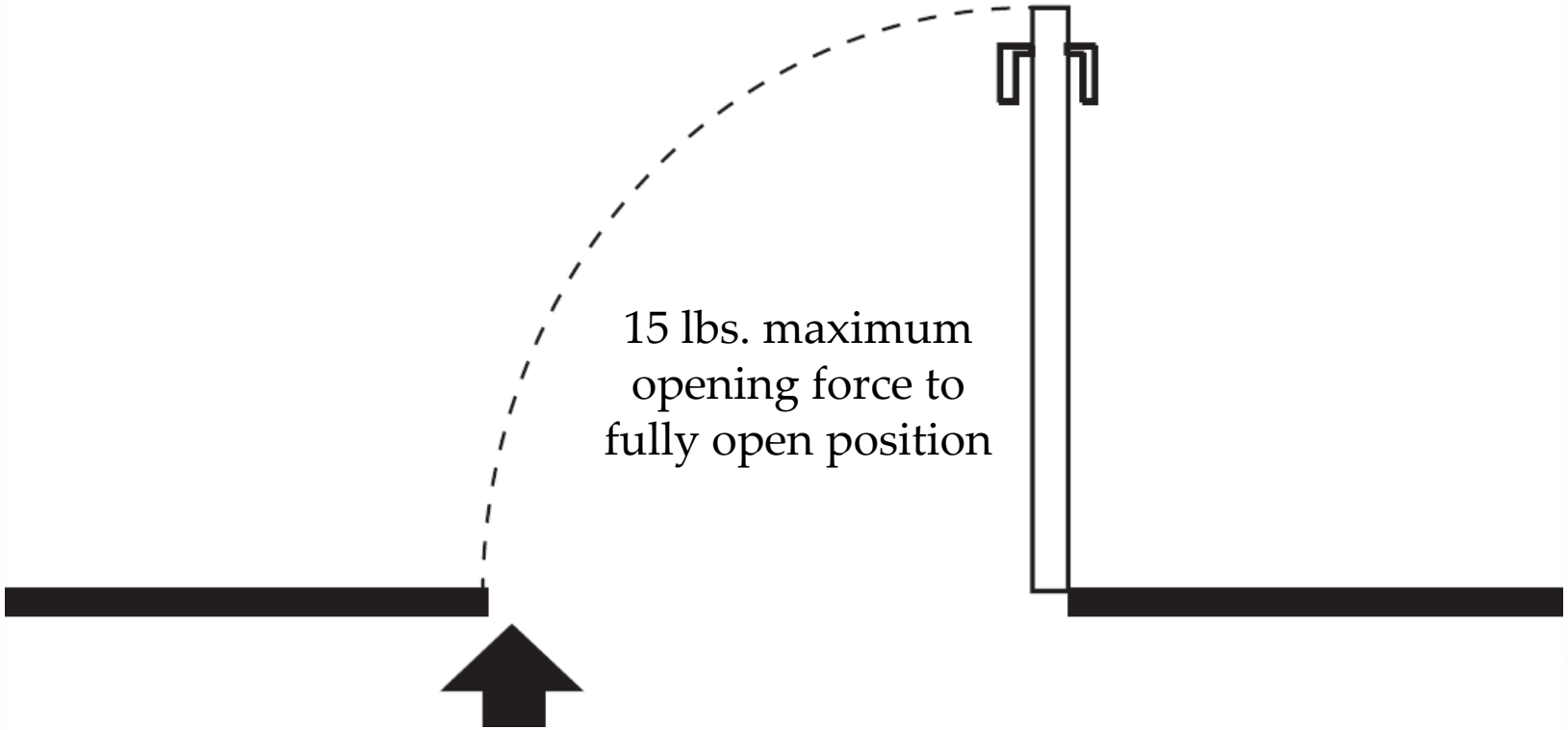
- Egress doors shall be side-hinged swinging-type
- **Exceptions:**
  - Private garages, office, factory and storage with an occupant load ≤10
  - Group I-3 occupancies
  - Critical or intensive care patient rooms in suites of health care facilities
  - Within individual units of Groups R-2 and R-3
  - Complying revolving doors
  - Complying horizontal sliding, accordion and folding doors
  - Power-operated doors
  - Bathroom doors in a sleeping unit in Group R-1
  - Manually operated, horizontal sliding doors permitted where an occupant load is ≤10 not in Group H

Door Swing
Section 1010.1.2

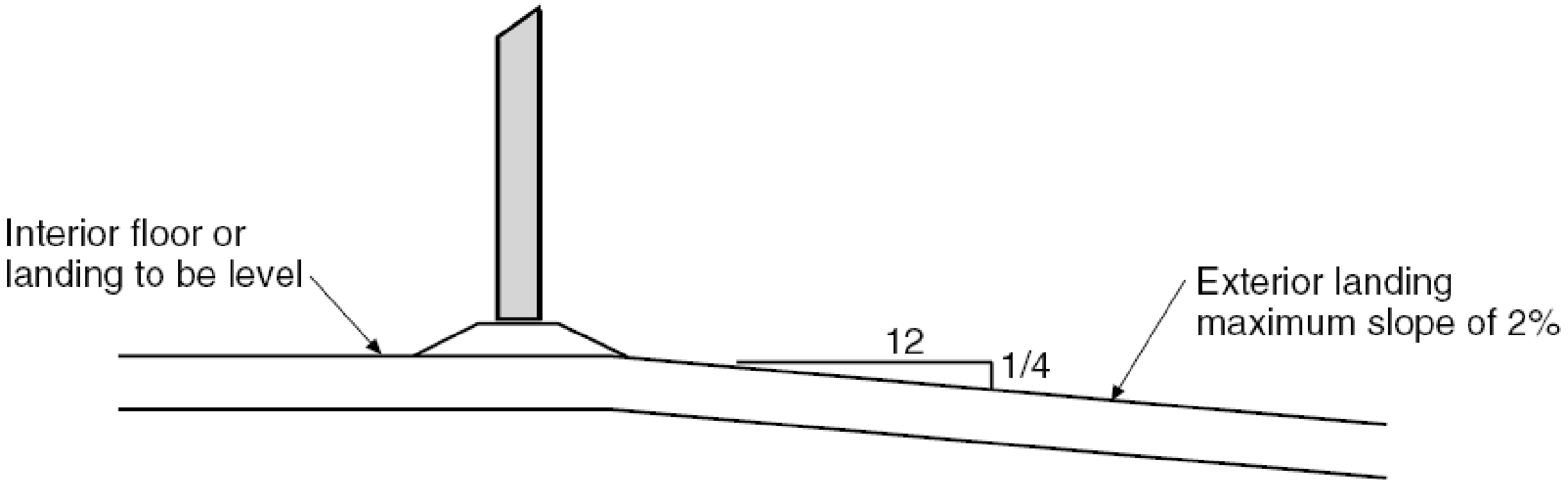
- Pivot and side-hinged doors must swing in the direction of exit travel where the:
  - Occupant load ≥50, or
  - High hazard occupancies
  - Electrical rooms >6’ wide with equipment rated ≥1,200 amperes and containing overcurrent devices, switching devices or control devices (Section 1010.1.10)



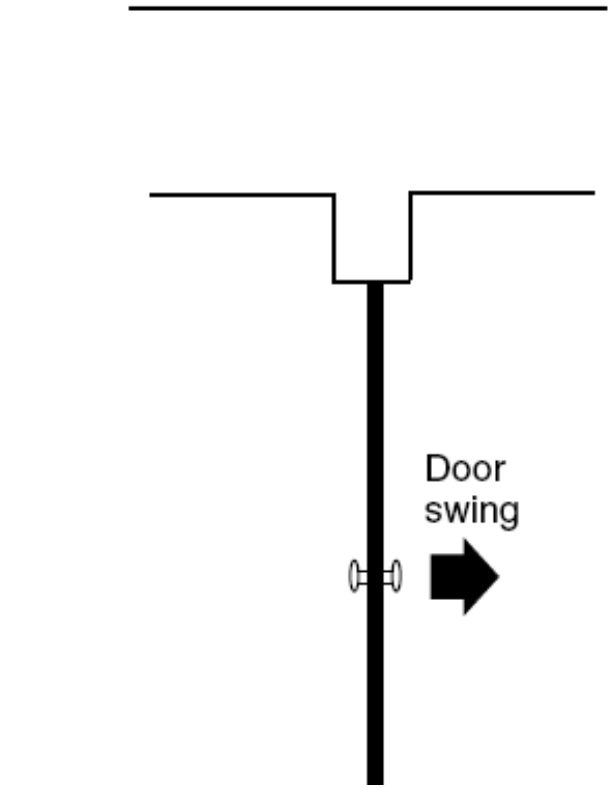
Door Opening Force
Section 1010.1.3



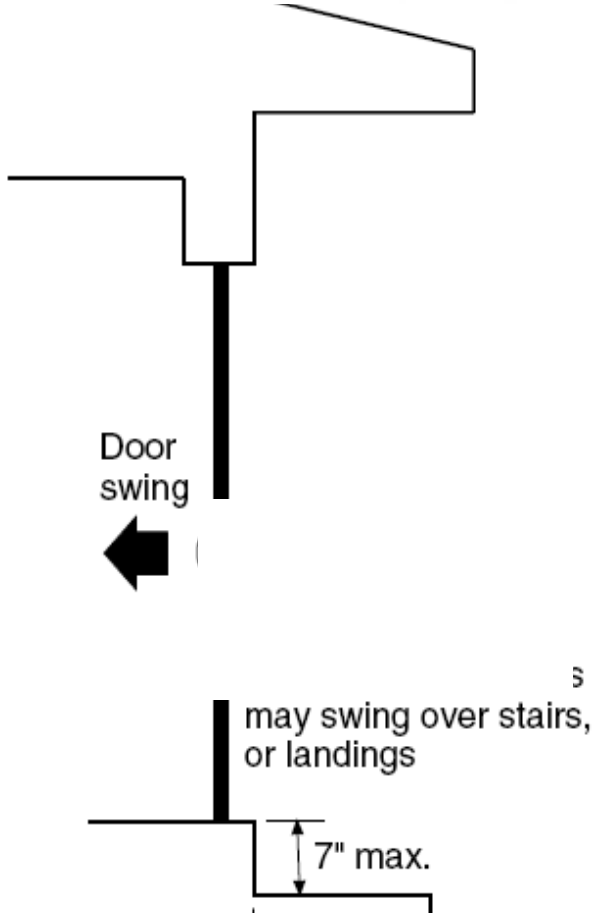
Floor Elevation
Section 1010.1.5



Section 1010.1.5
Exceptions 1.1 and 1.2



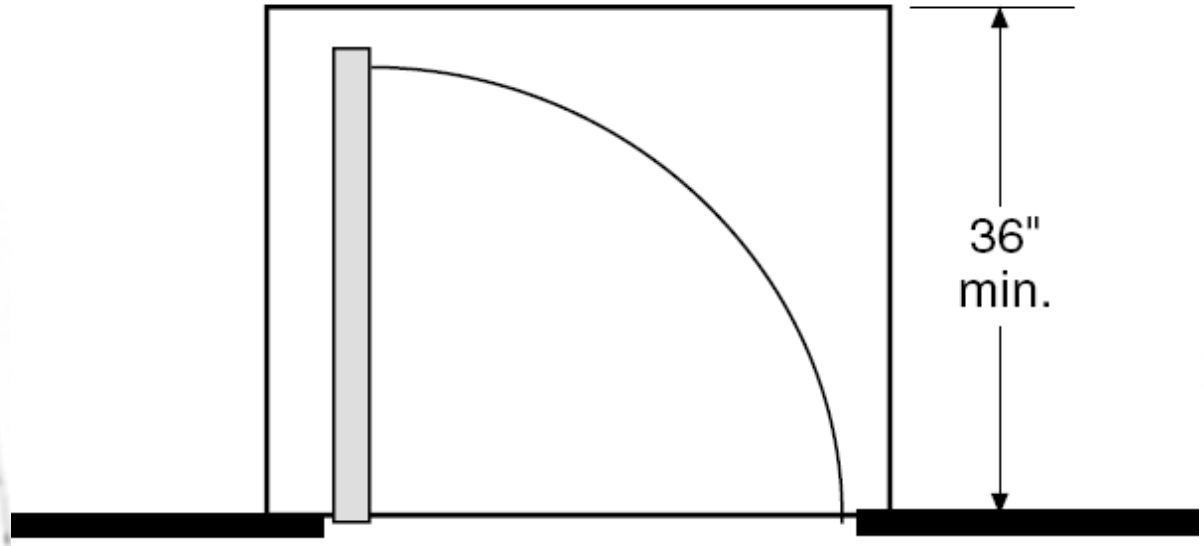
Exception 1.1:
Interior flight of stairs in R-2 or R-3 – door must not swing over the top step



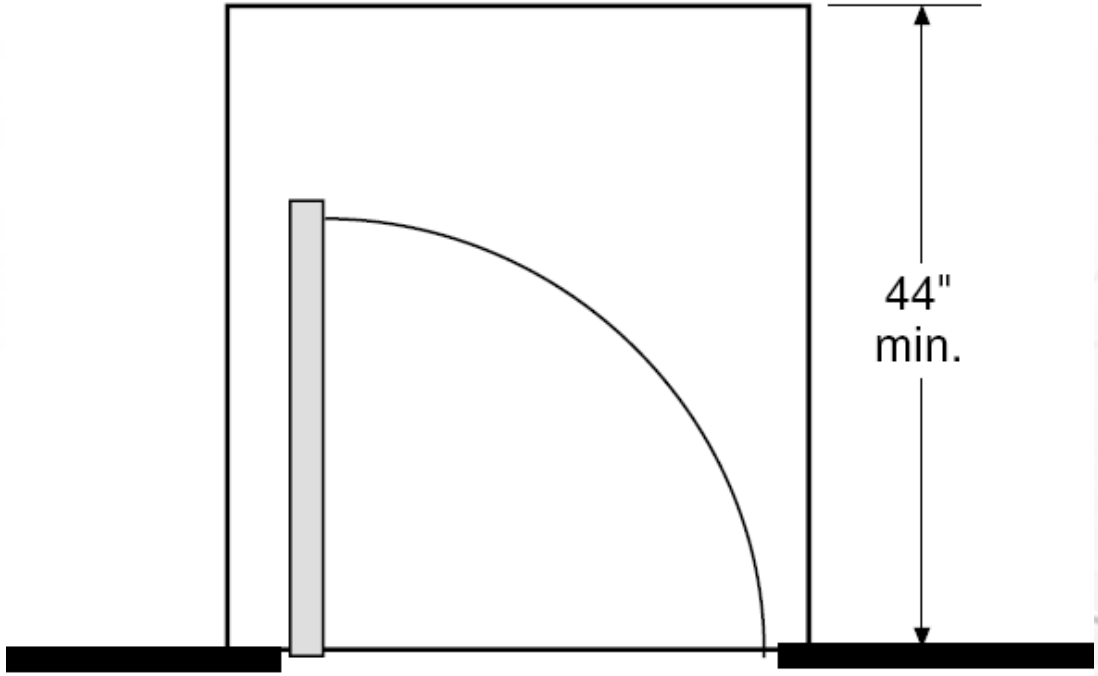
Exception 1.2:
In R-2 or R-3, screen doors or storm doors can swing over stairs or landing

Exterior stairways

Landings at Doors
Section 1010.1.6



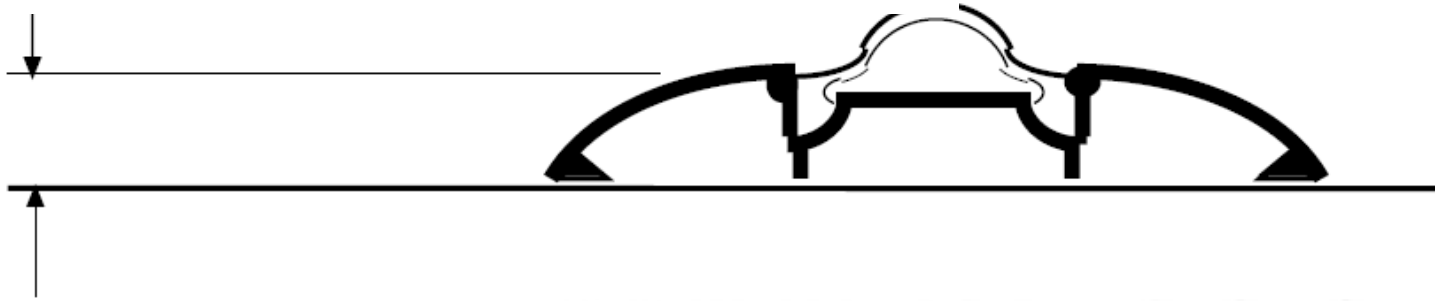
R-3, U and within individual dwelling units of R-2

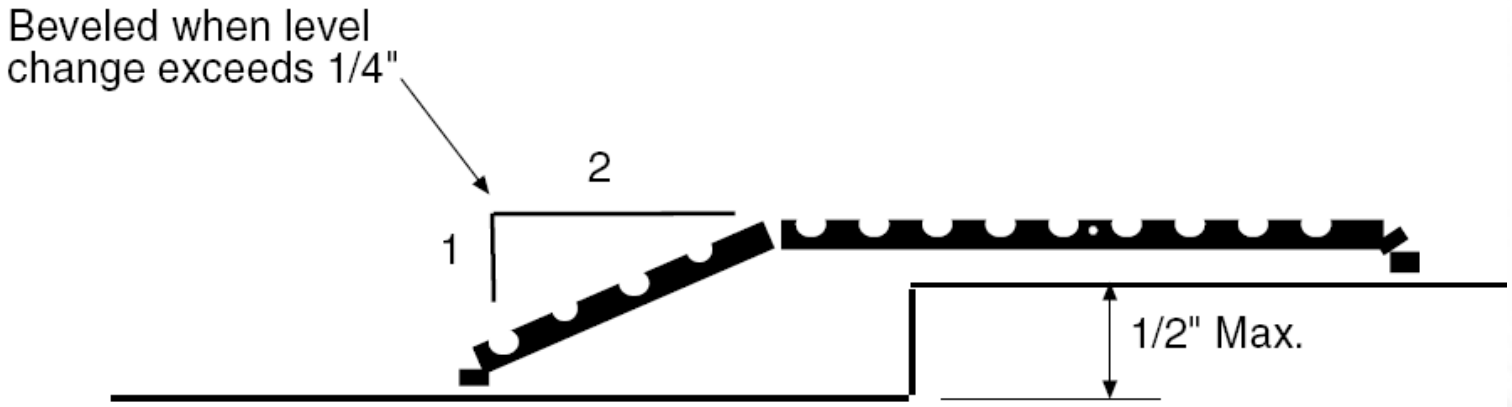


All other occupancies

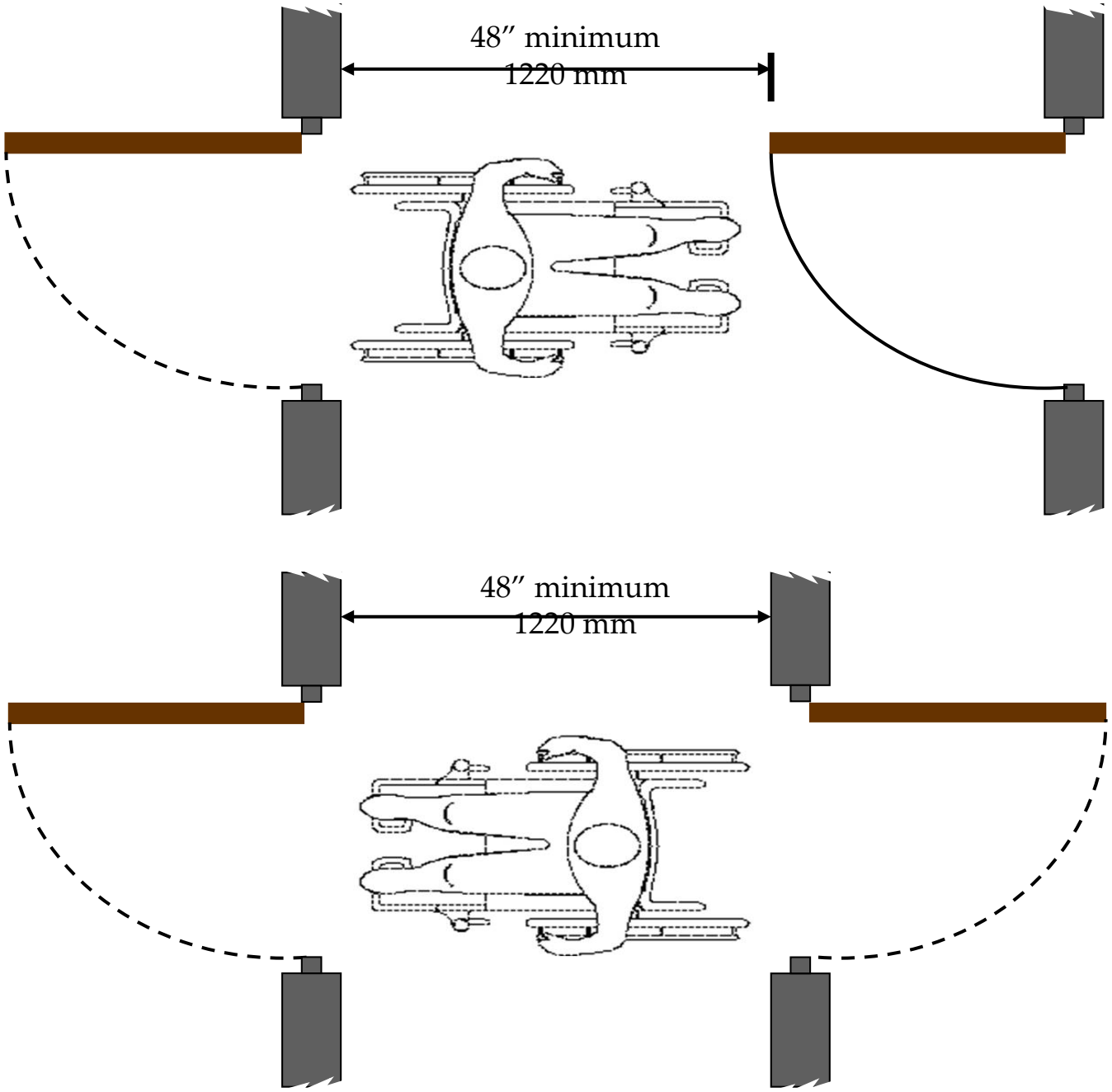
Thresholds
Section 1010.1.7

¾″ maximum for sliding doors in dwelling units
½″ maximum all other doors

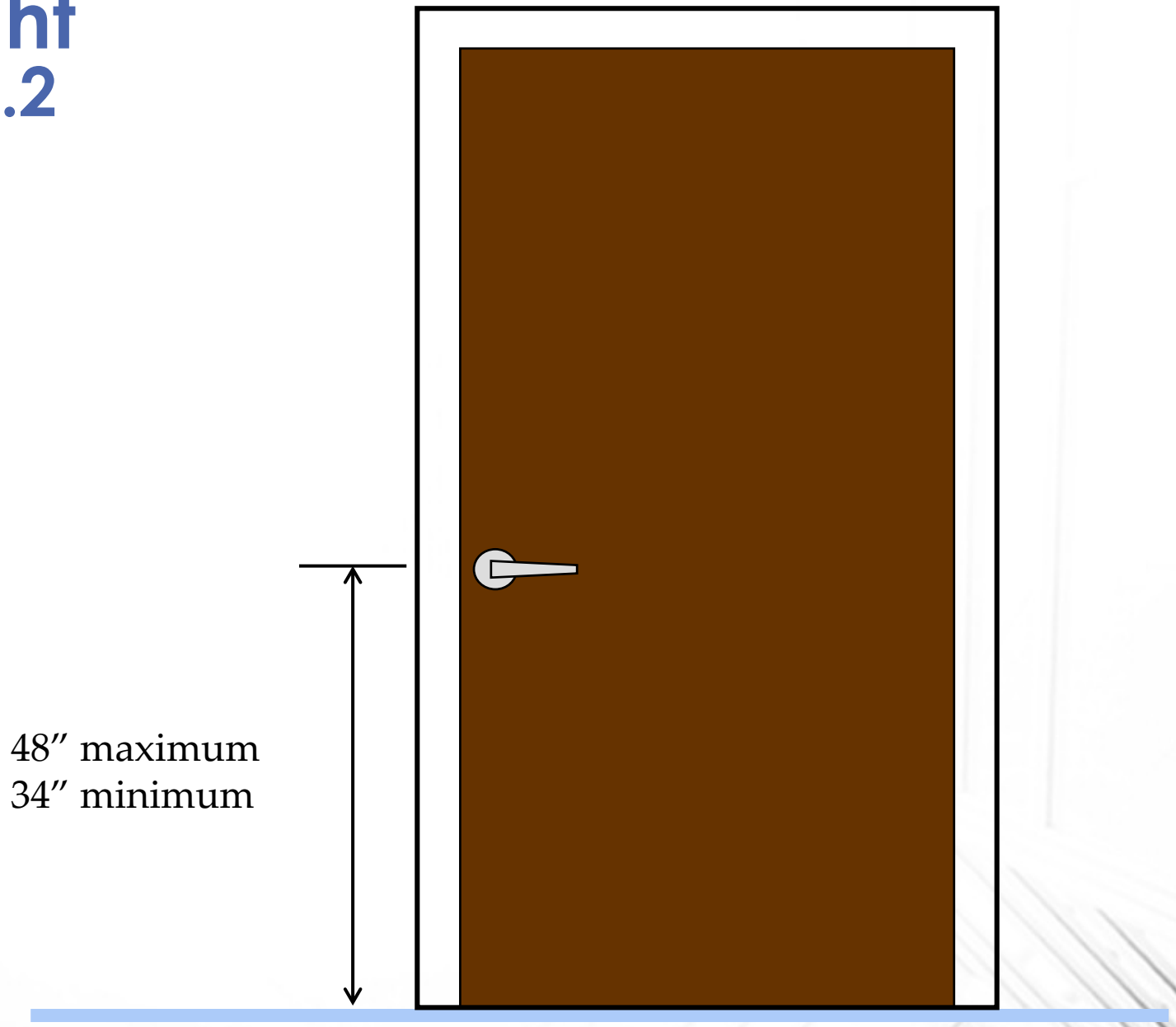




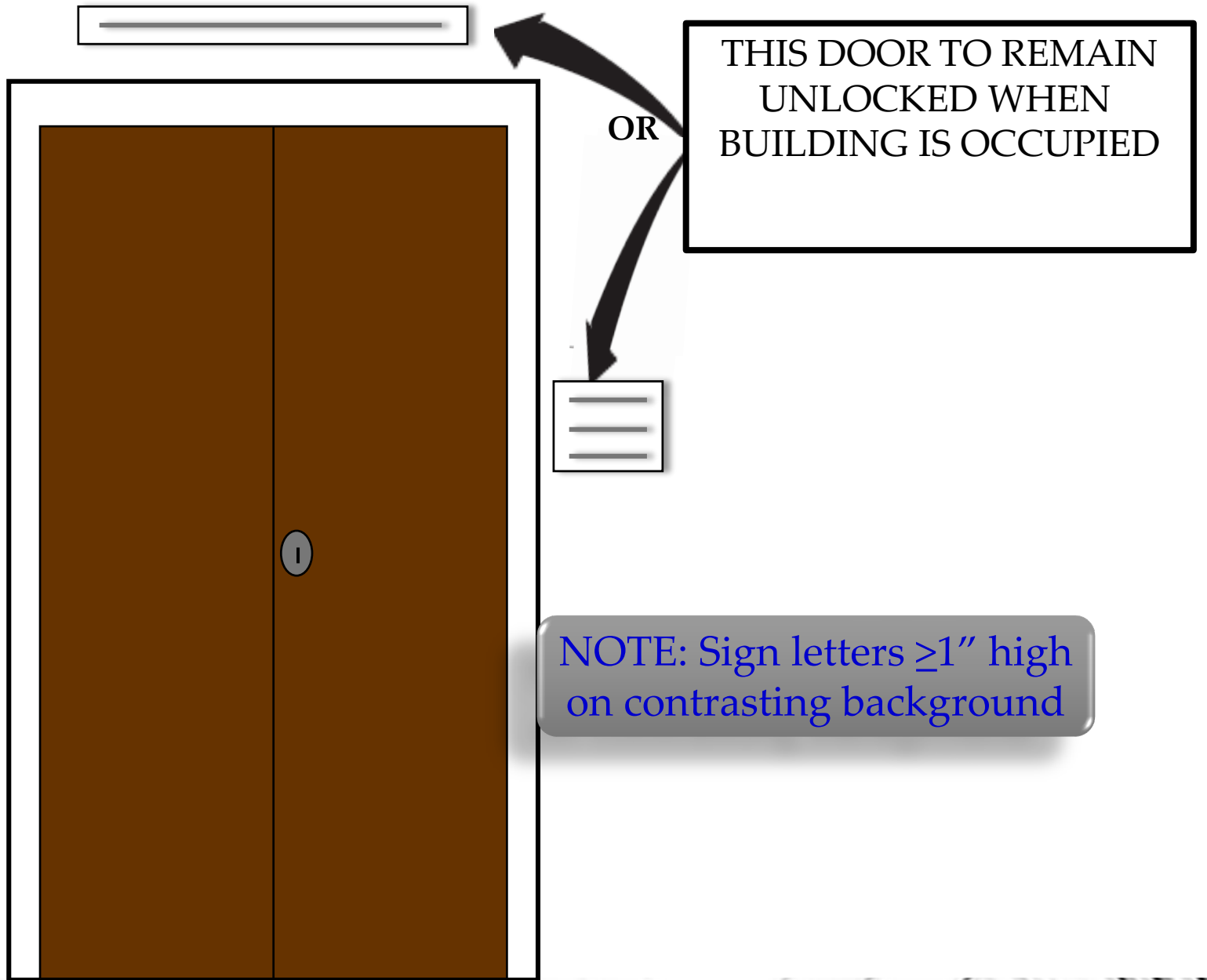
Door Arrangement
Section 1010.1.8



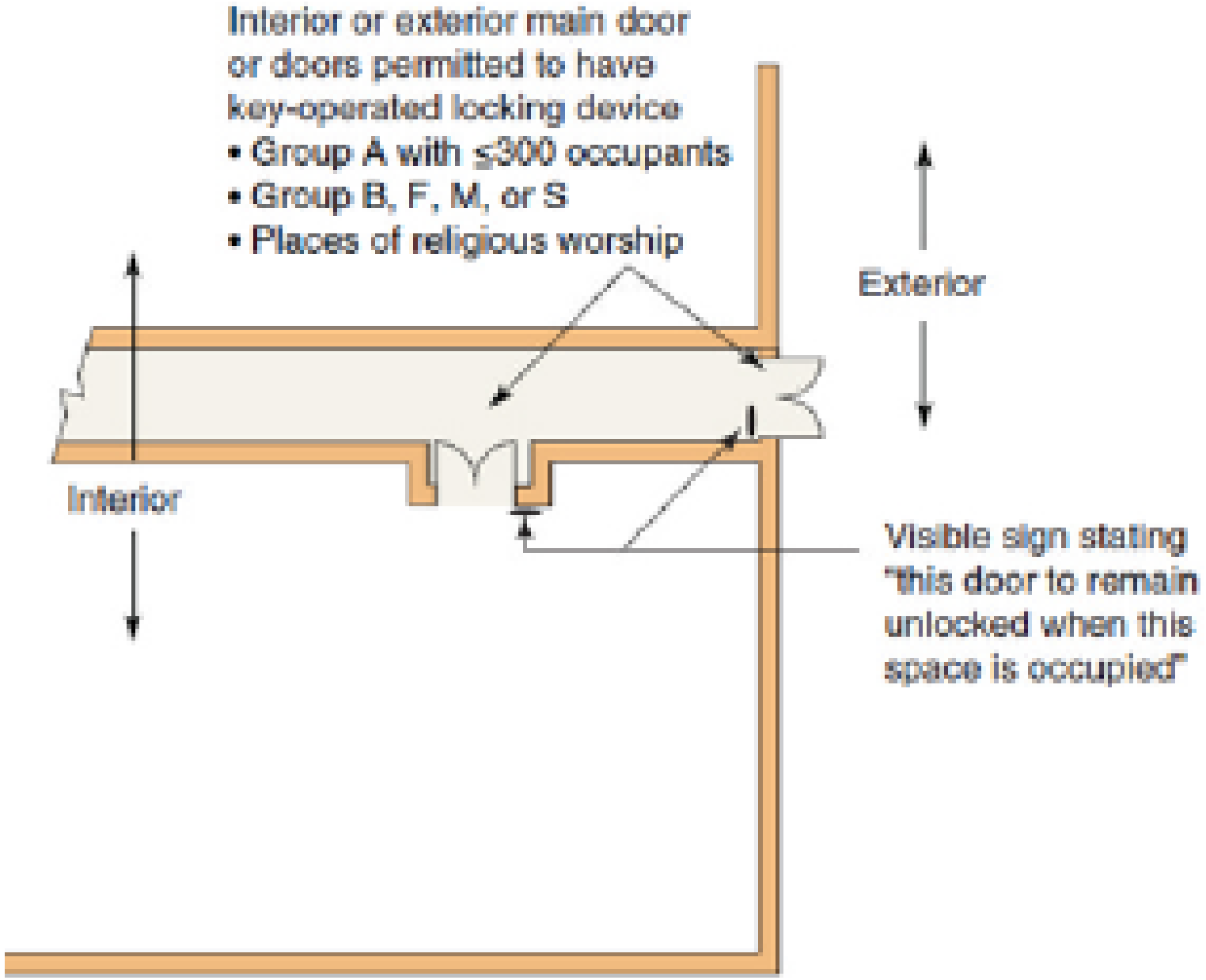
Hardware Height
Section 1010.1.9.2



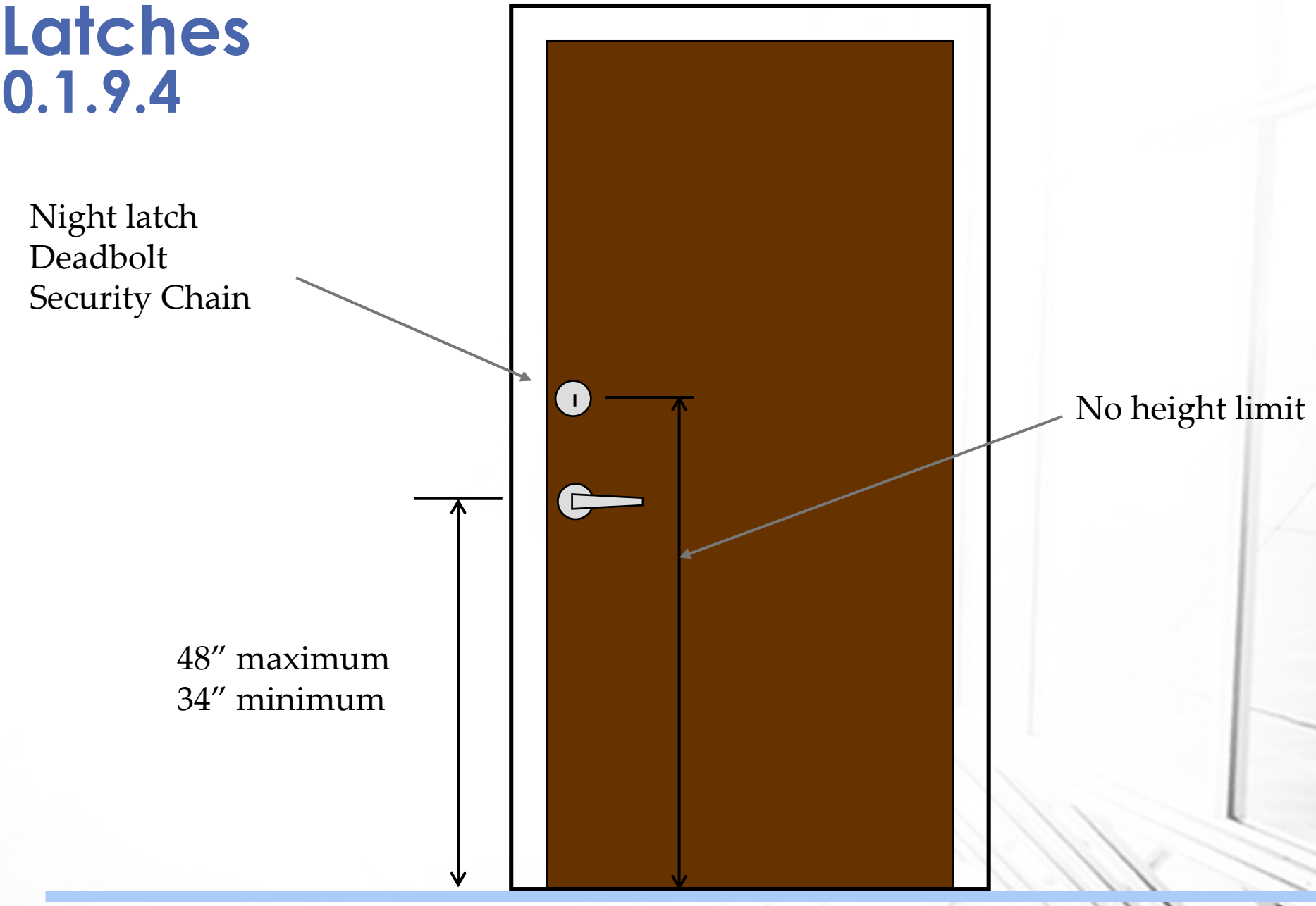
Locks and Latches
Section 1010.1.9.4



Locks and Latches
Section 1010.1.9.4



Locks and Latches
Section 1010.1.9.4



Bolt Locks
Section 1010.1.9.5

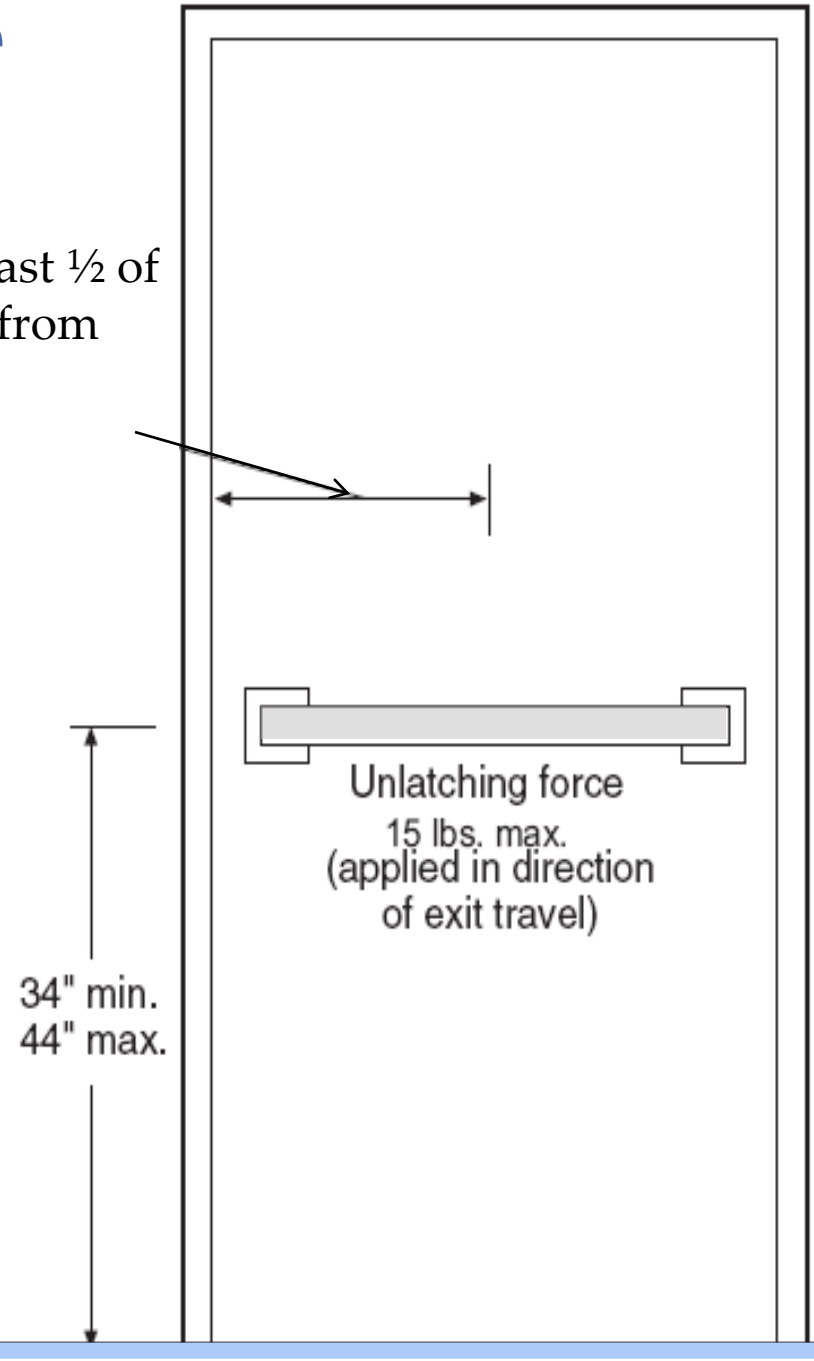
- Manually operated surface-mounted bolts and manually operated flush bolts are prohibited
- **Exceptions:**
  - Doors in individual dwelling units or sleeping units that are not required for egress
  - The “inactive” leaf of a pair of doors that serve a storage or equipment room
  - In Groups B, F or S with an occupant load <50, the “inactive” leaf in a pair of doors
  - The “inactive” leaf of a pair of doors in Groups B, F or S which are fully sprinklered in accordance with NFPA 13
  - The “inactive” leaf serving patient care rooms in Groups I-2

Panic and Fire Exit Hardware
Section 1010.1.10

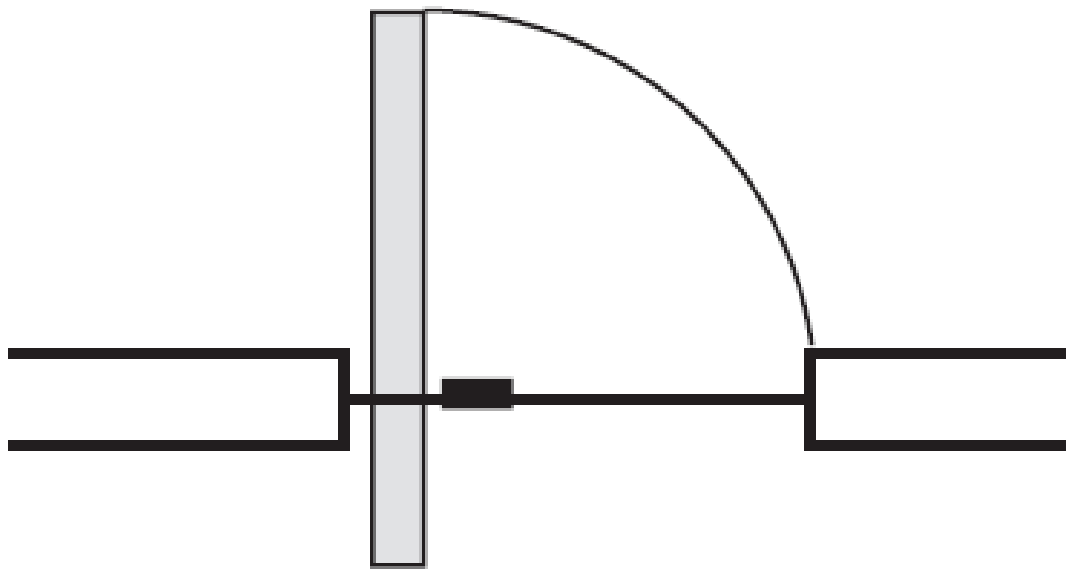
- Panic hardware or fire exit hardware is required in:
  - Group H occupancies
  - Group A with an occupant load of ≥50
    - Exception for main exit when the OL <300, or it is a place of worship
  - Group E with an occupant load of ≥50
  - Doors to electrical rooms >6’ wide with equipment rated ≥1,200 amperes and containing over-current devices, switching devices or control devices

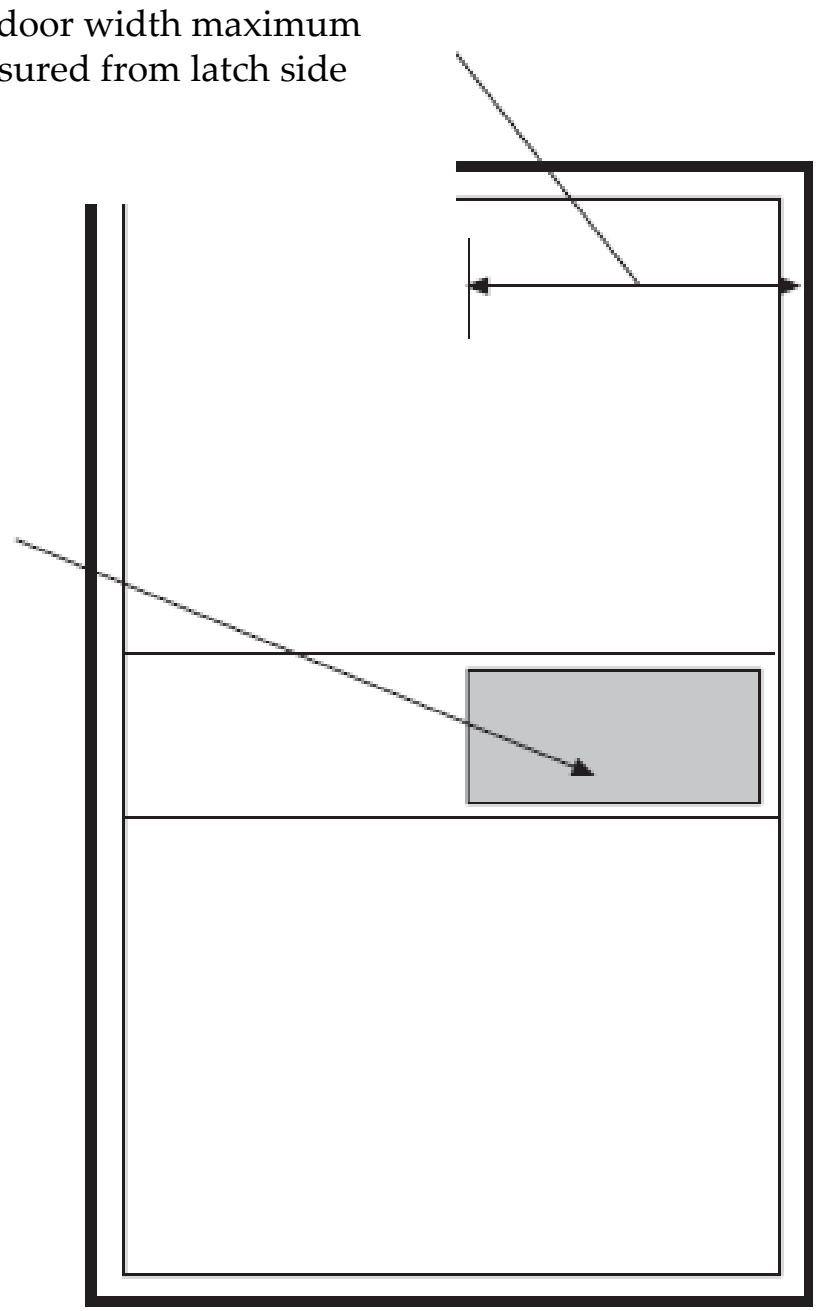
Courtesy of
ASSA ABLOY Door Hardware

Panic and Fire Exit Hardware
Section 1010.1.10



Panic and Fire Exit Hardware
Section 1010.1.10.2





Delayed Egress Locking Systems
Section 1010.1.9.7

New to 2018

1010.1.4.4 Locking arrangements in educational occupancies. In Group E and Group B educational occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

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

1010.1.4.4.1 Remote operation of locks. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

Sensor Release of Electronically Locked Egress Doors Section 1010.1.9.9

Sensor release of electronically locked egress doors shall have the following components:

1. A sensor on the egress side.
2. Unlock by loss of power sensor.
3. A manual unlocking device located 40”-48” above the floor and within 5’ of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads “PUSH TO EXIT.”
4. Unlock by activation of fire alarm system.
5. Unlock by activation of sprinkler system.
6. The door locking system units shall be listed in accordance with UL 294.

Electromagnetic Locks
Section 1010.1.9.9

- Electromagnetically locked egress doors allowed in Groups A, B, E, I-1, I-2, I-4, M, R-1 or R-2
- Door hardware must:
  - Be readily operable under all building lighting conditions
  - Be capable of being operated by one hand
  - Immediately release the lock upon activation
  - Automatically unlock upon power loss
  - Shall release by the panic hardware where panic or fire exit hardware is required.

New to 2018

1010.1.9.10 Door hardware release of electrically locked egress doors. Door hardware release of electric locking systems shall be permitted on doors in the means of egress in any occupancy except Group H where installed and operated in accordance with all of the following:

1. The door hardware that is affixed to the door leaf has an obvious method of operation that is readily operated under all lighting conditions.

2. The door hardware is capable of being operated with one hand and shall comply with Section 1010.1.9.6.

3. Operation of the door hardware directly interrupts the power to the electric lock and unlocks the door immediately.

4. Loss of power to the electric locking system automatically unlocks the door.

5. Where panic or fire exit hardware is required by Section 1010.1.10, operation of the panic or fire exit hardware also releases the electric lock.

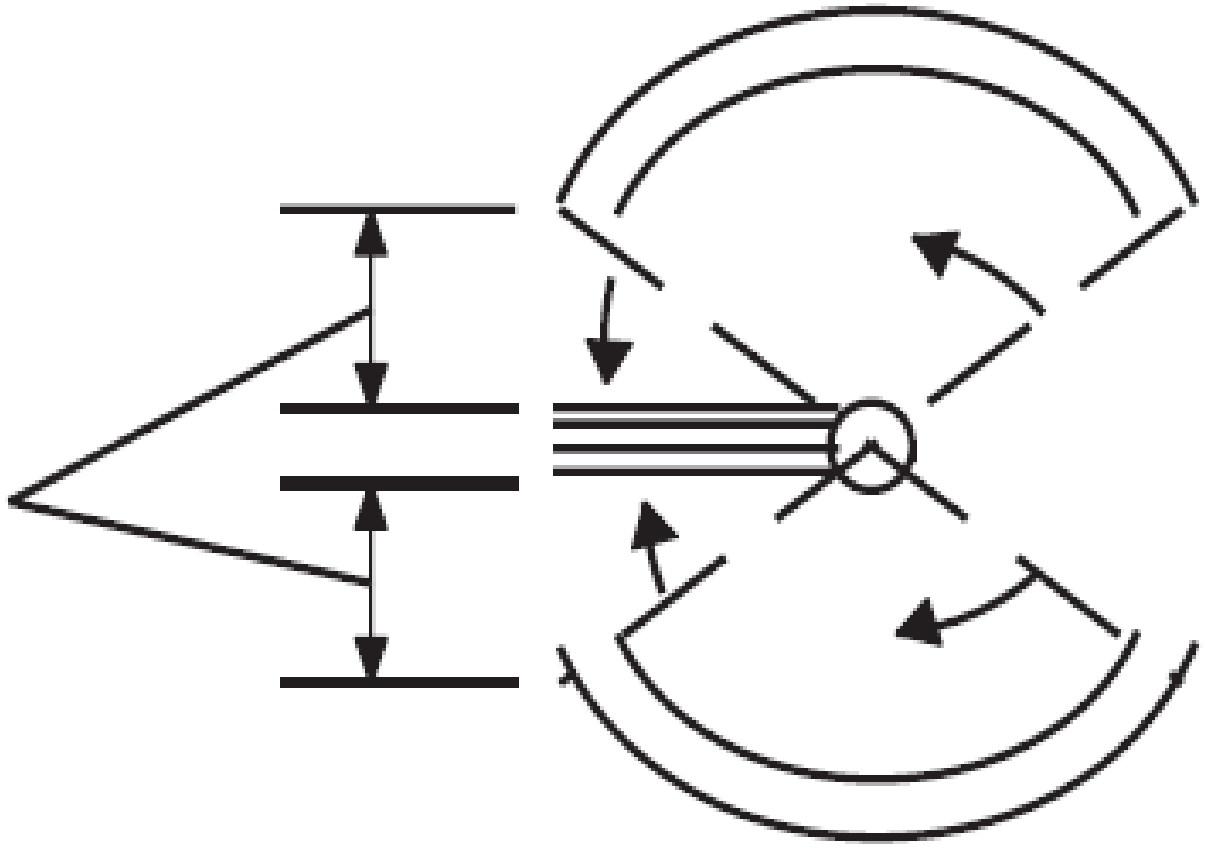
6. The locking system units shall be listed in accordance with UL 294.

Controlled Egress Doors in Group I-1 and I-2 Section 1010.1.9.7

- Doors must operate as follows:
  - Unlock upon actuation of the automatic sprinkler system or automatic fire detection system
  - Doors unlock upon loss of power
  - Door can be unlocked by a signal from the fire command center, a nursing station or other approved location
  - Occupants cannot pass through >1 door equipped with a special egress lock before reaching an exit
  - Door operating procedures shall be described and approved as part of the emergency planning and preparedness required by IFC
  - Clinical staff shall have the keys, codes or other means necessary to operate the locking devices
  - Emergency lighting shall be provided at the doors where the special locking arrangements are located
  - Door locking system units are listed in accordance with UL294

Revolving Doors
Section 1010.1.4.1

Door collapses to provide an aggregate 36" for egress paths



RPM Speed based on size and manual or automatic performance.

Table 1010.1.4.1(1)
Revolving Door Speeds

TABLE 1010.1.4.1(1)
MAXIMUM DOOR SPEED MANUAL REVOLVING DOORS

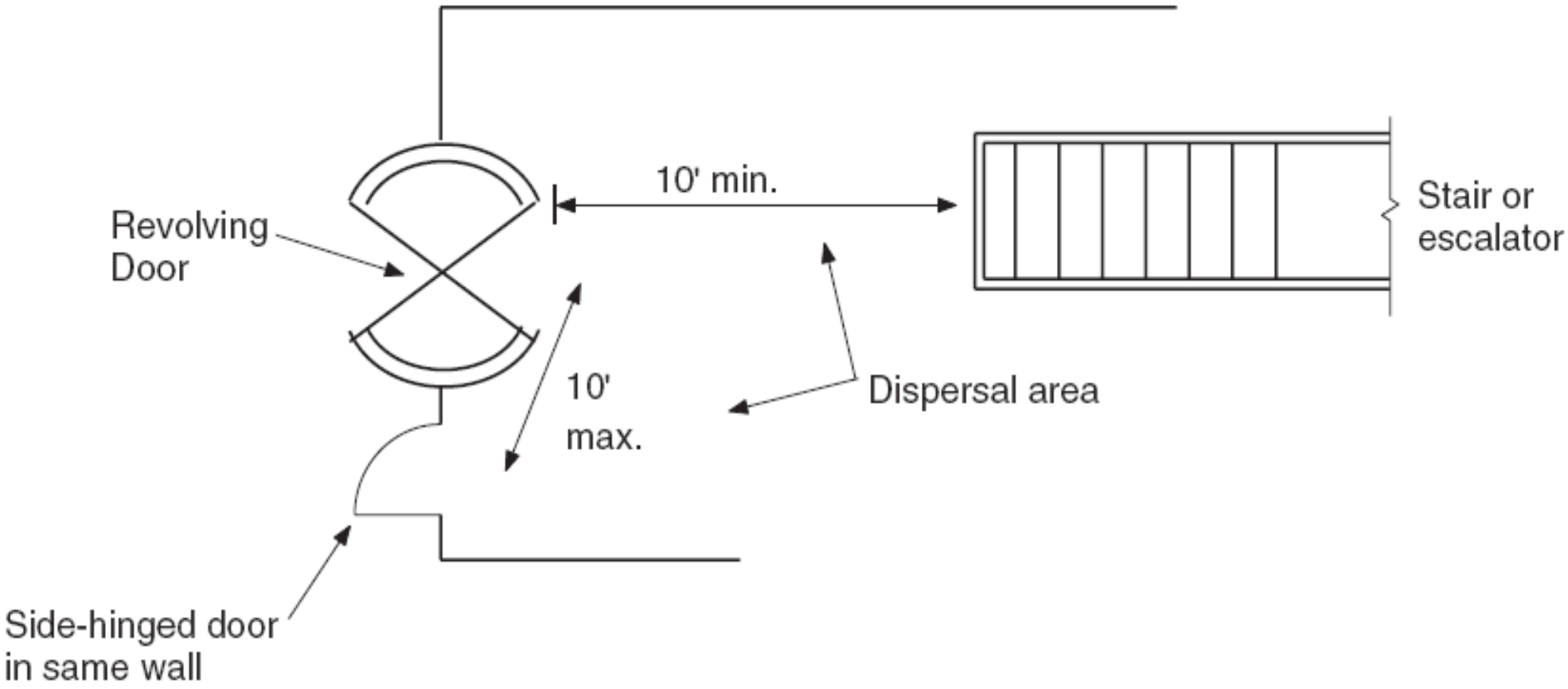
REVOLVING DOOR MAXIMUM NOMINAL DIAMETER (FT-IN)	MAXIMUM ALLOWABLE REVOLVING DOOR SPEED (RPM)
6-0	12
7-0	11
8-0	10
9-0	9
10-0	8

Maximum Revolving Door Speed Table 1010.1.4.1(2)

TABLE 1010.1.4.1(2)
MAXIMUM DOOR SPEED AUTOMATIC OR POWER-OPERATED REVOLVING DOORS

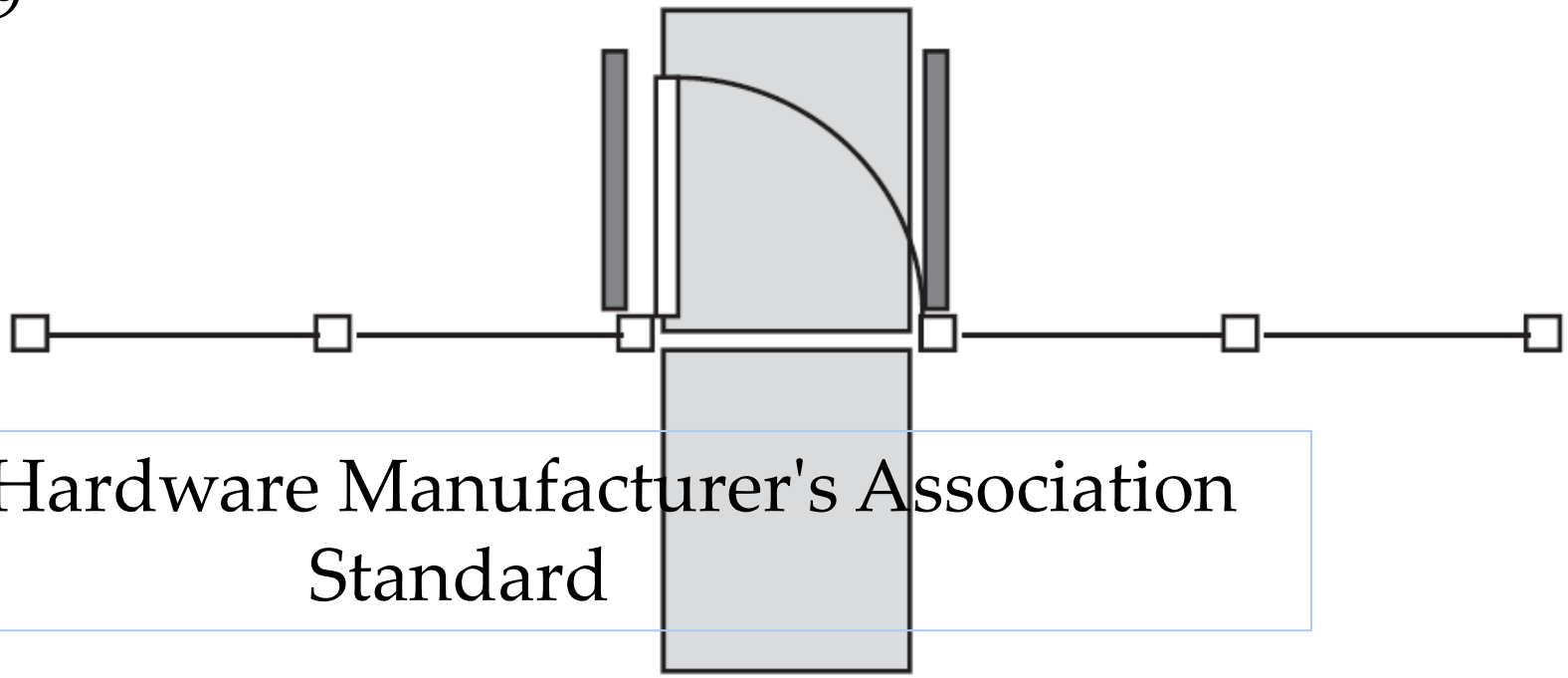
REVOLVING DOOR MAXIMUM NOMINAL DIAMETER (FT-IN)	MAXIMUM ALLOWABLE REVOLVING DOOR SPEED (RPM)
8-0	7.2
9-0	6.4
10-0	5.7
11-0	5.2
12-0	4.8
12-6	4.6
14-0	4.1
16-0	3.6
17-0	3.4
18-0	3.2
20-0	2.9
24-0	2.4

Revolving Doors
Section 1010.1.4.1



Power-operated Doors
Section 1010.1.4.2

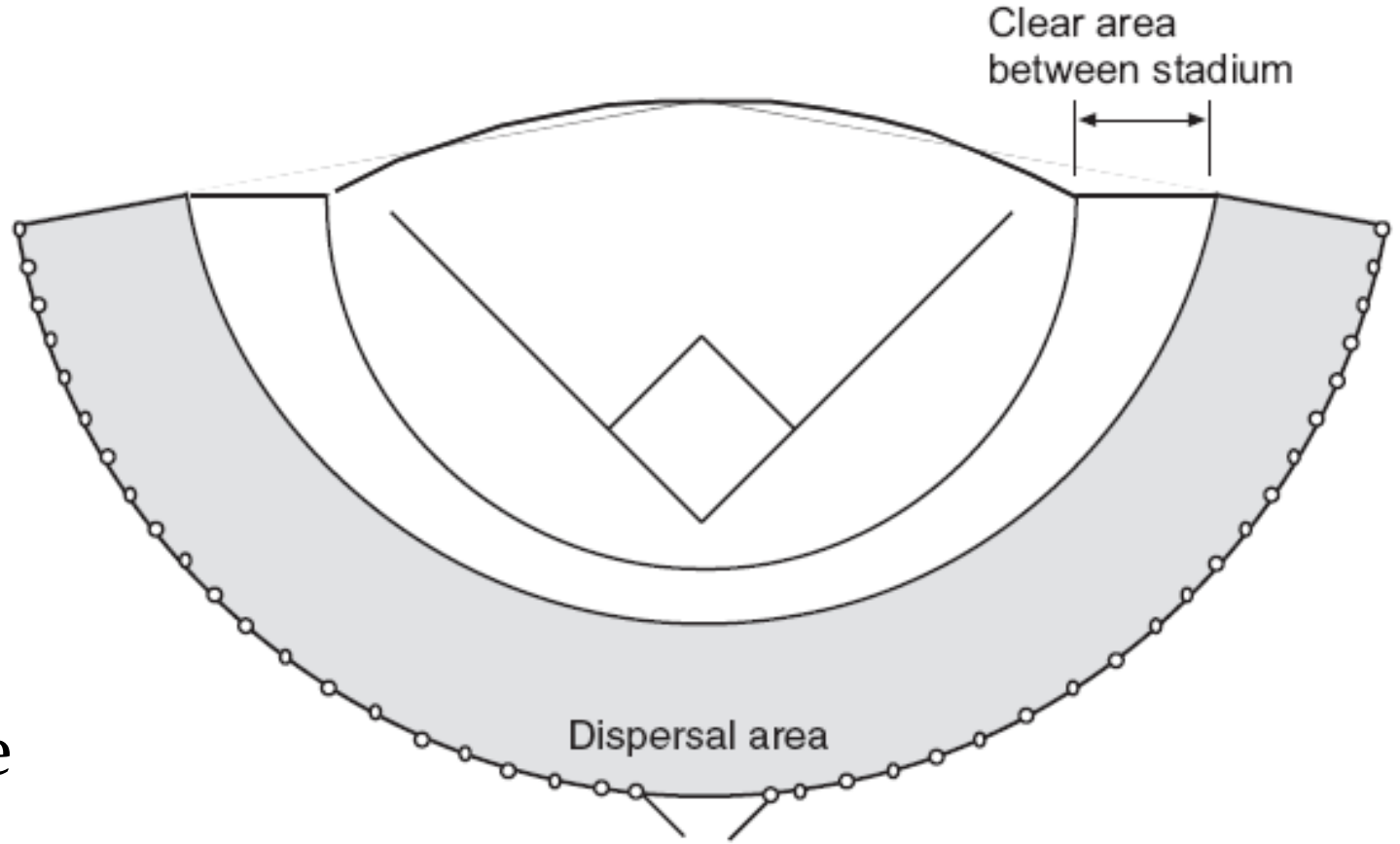
- Power-operated doors must comply with one of the following standards to be acceptable for egress purposes:
  - Full-power doors—BHMA A156.10
  - Power-assisted/low-energy swinging doors—BHMA A156.19



Building Hardware Manufacturer's Association Standard

Gates
Section 1010.2

This section specifies that all requirements for doors also apply to gates, except that gates surrounding a stadium are allowed to exceed 4 feet (1219 mm) in width. Usually a large gate is required to adequately serve a stadium crowd for egress purposes.



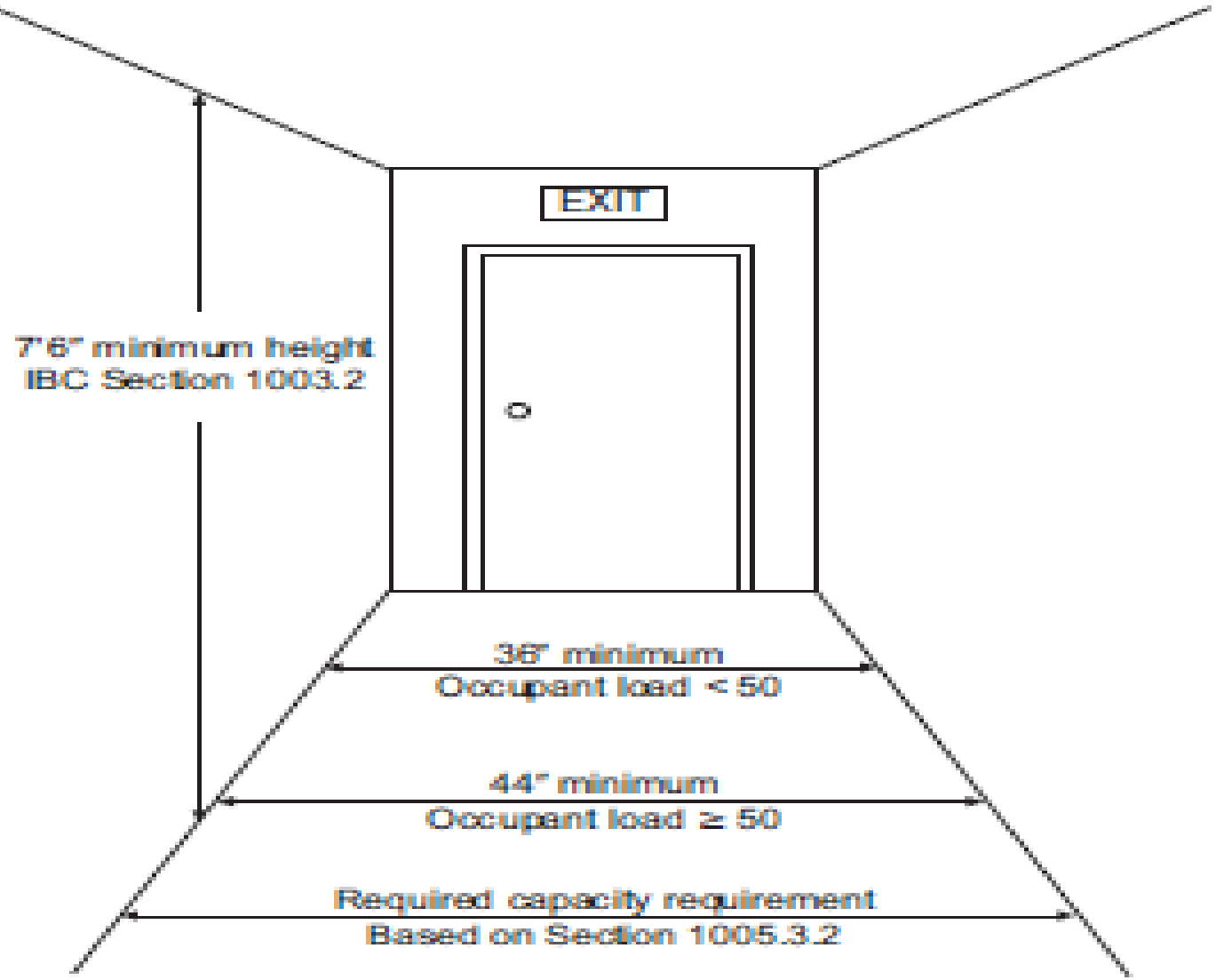
Corridors and Exit Passageways

Module 7:

Corridors vs. Exit Passageways

Feature	Corridor	Exit Passageway
Component of egress	Exit access	Exit
One direction of travel	Possibly (limitations based on length and number of persons served)	Yes (single directional travel typically permitted)
Fire-resistance-rated construction	Possibly (constructed as fire partition)	Yes (constructed as fire barrier)
Provides access to storage areas, mechanical rooms, etc.	Yes	No (except in covered mall buildings)
Travel distance regulated	Yes	No
Openings	No limitations (protected as applicable)	Limited to egress doors from normally occupied spaces

Width and Capacity (of Corridors and Exit Passageways) Section 1020.2



Additional provisions in IBC Table 1020.2

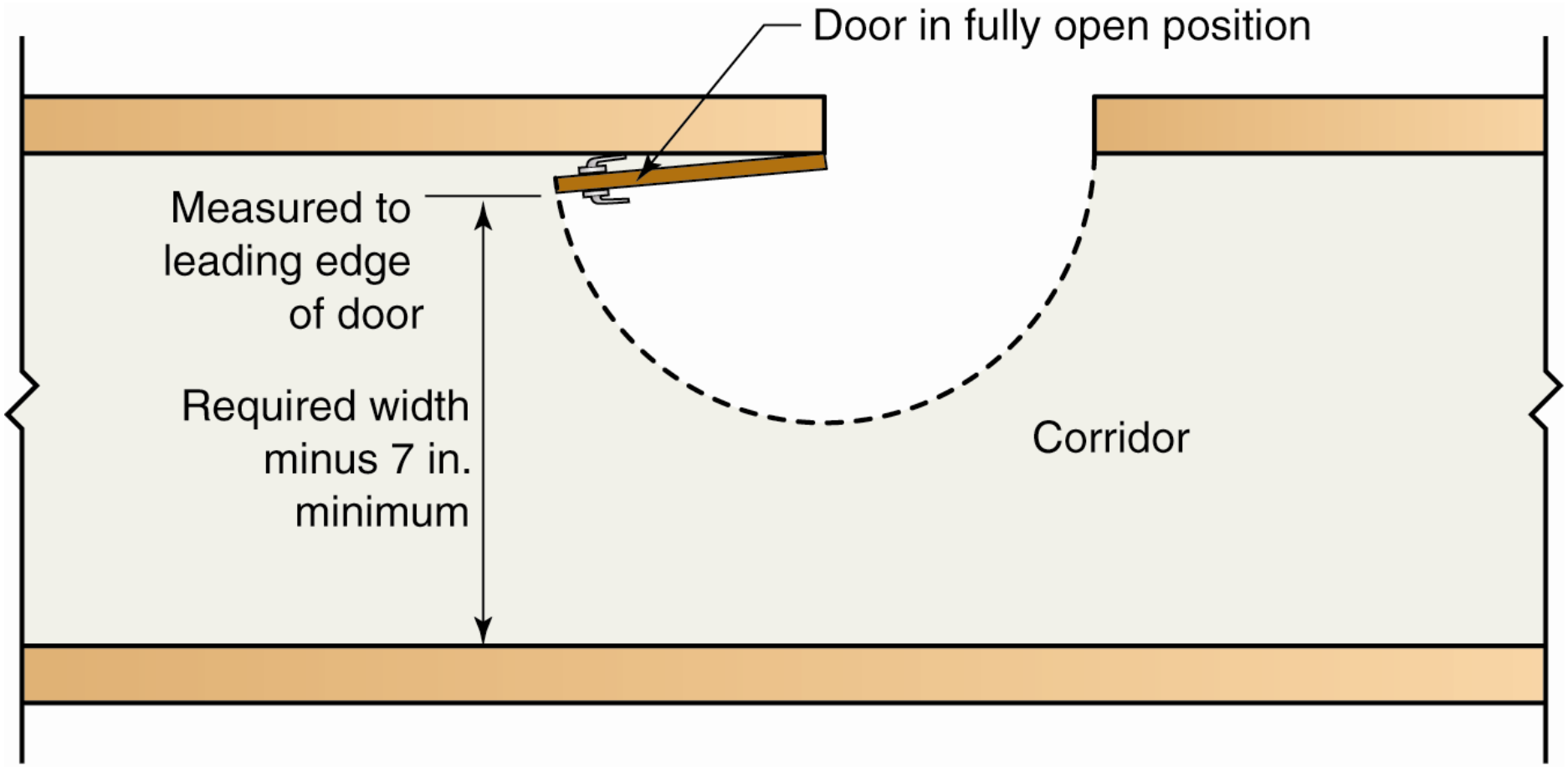
TABLE 1020.2
MINIMUM CORRIDOR WIDTH

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

Encroachment
Section 1005.7

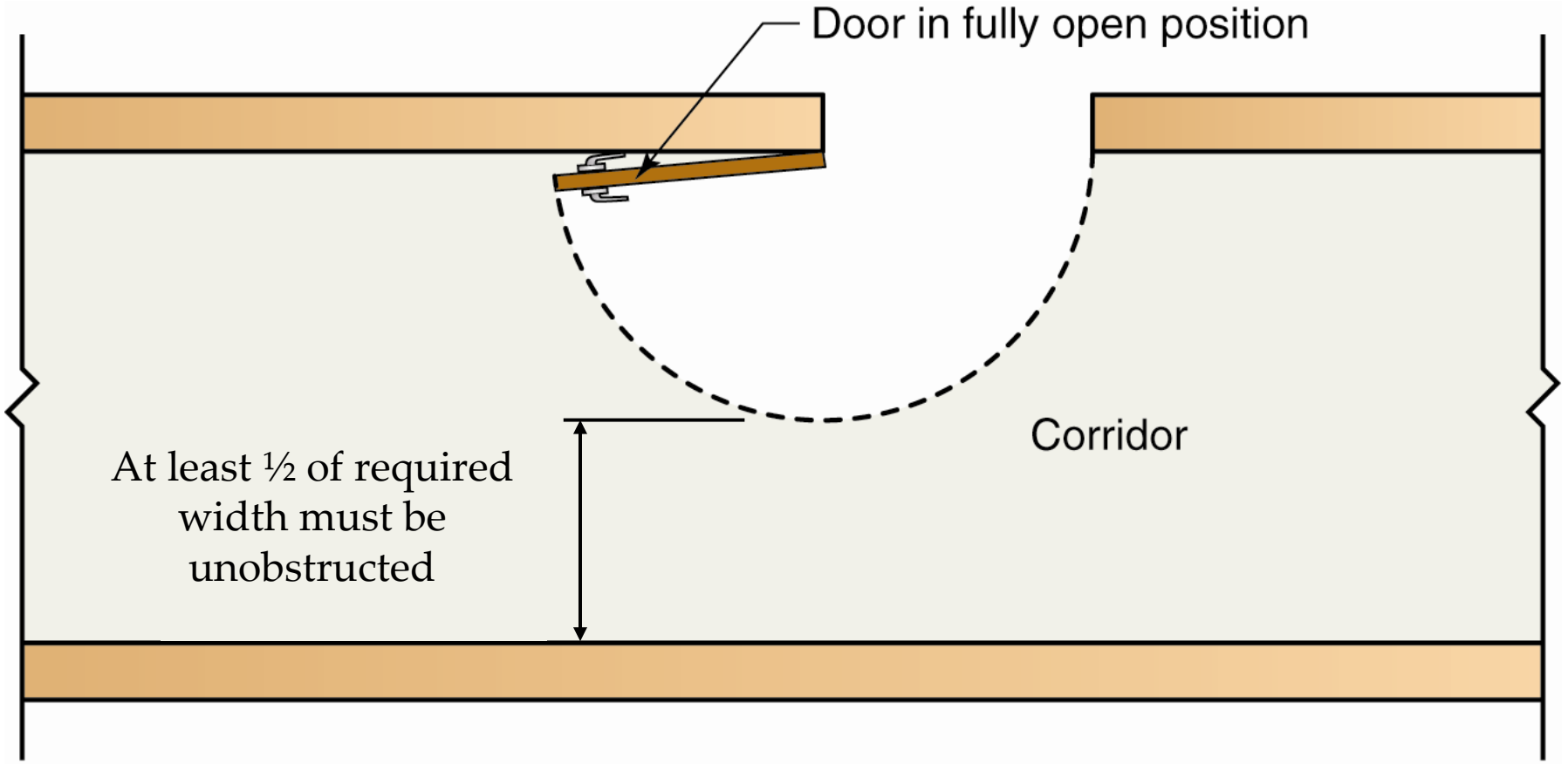
- Doors, when fully opened, and handrails shall not reduce the required means of egress width by more than 7".
- Doors in any position shall not reduce the required width by more than ½.
- Other nonstructural projections such as trim and similar decorative features shall be permitted to project into the required width a maximum of 1½" on each side.
  - **Exception:** The restrictions on a door swing shall not apply to doors within individual dwelling units and sleeping units of Groups R-2 and R-3.

Encroachment
Section 1005.7



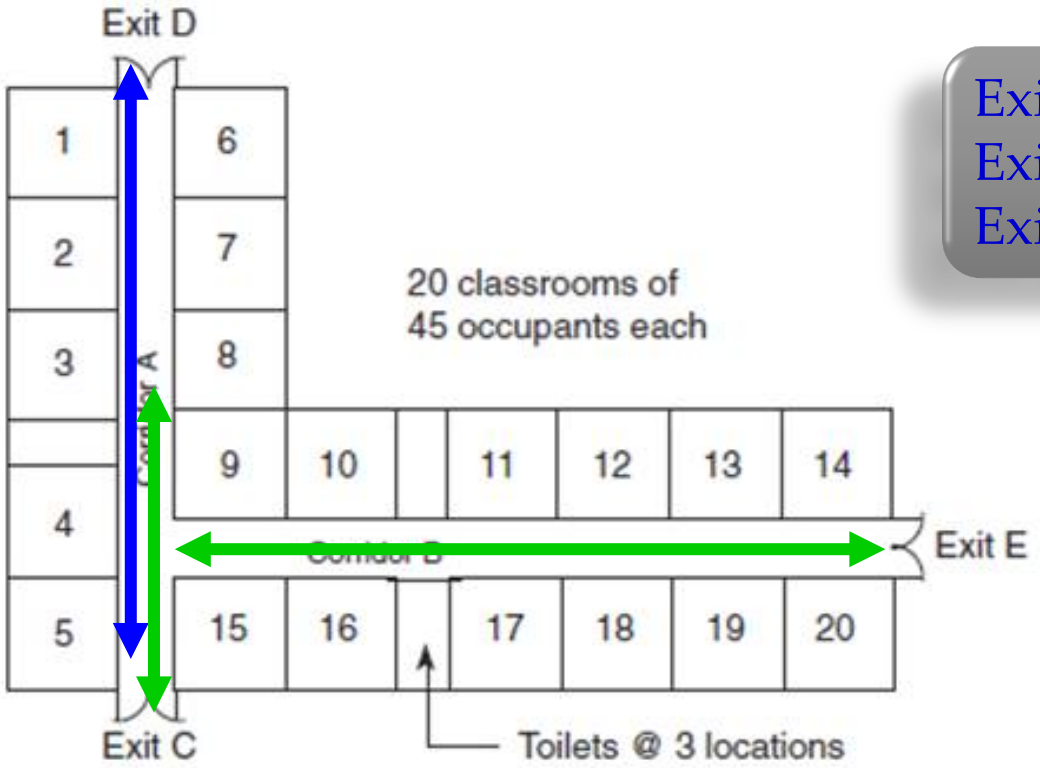
Does not apply to dwelling units and sleeping units

Encroachment
Section 1005.7



Does not apply to dwelling units and sleeping units

Corridor Width/Capacity Activity



Exit C = 63″
Exit D = 63″
Exit E = 54″

$$\text{Corridor B} = \frac{(12 \times 45) \times .2}{2} = \frac{108}{2} = 54''$$

$$\text{Corridor A} = \frac{[(8 \times 45) + (12 \times 45)/2] \times .2}{2} = \frac{126}{2} = 63''$$

TABLE 1020.1
CORRIDOR FIRE-RESISTANCE RATING

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

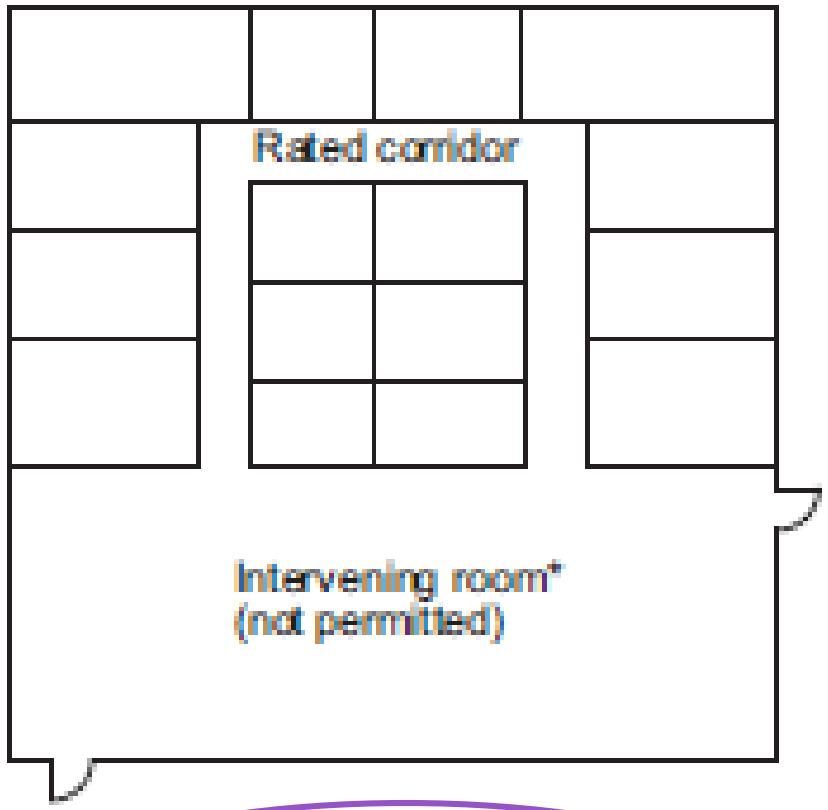
a. For requirements for occupancies in Group I-2, see Sections 407.2 and 407.3.

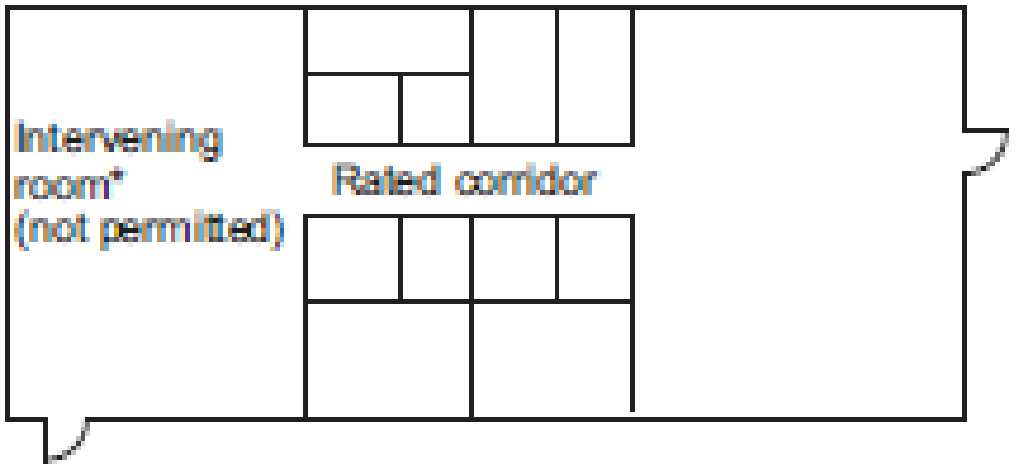
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.8.

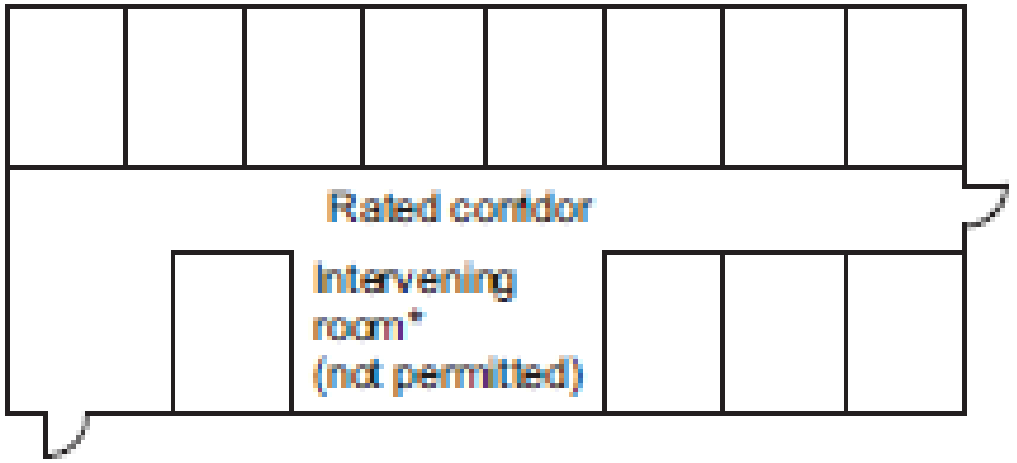
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.

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.

Corridor Continuity
Section 1020.6



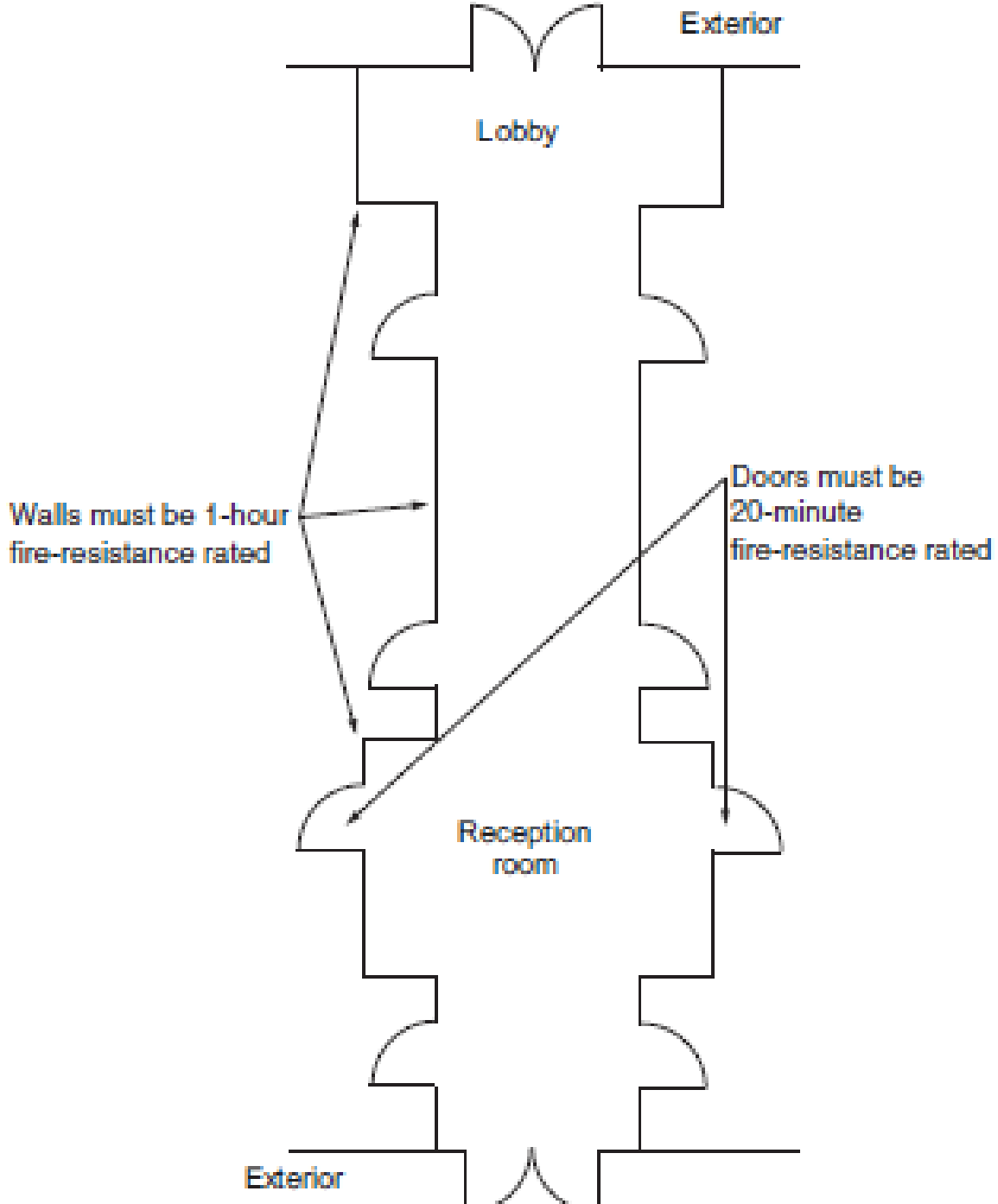




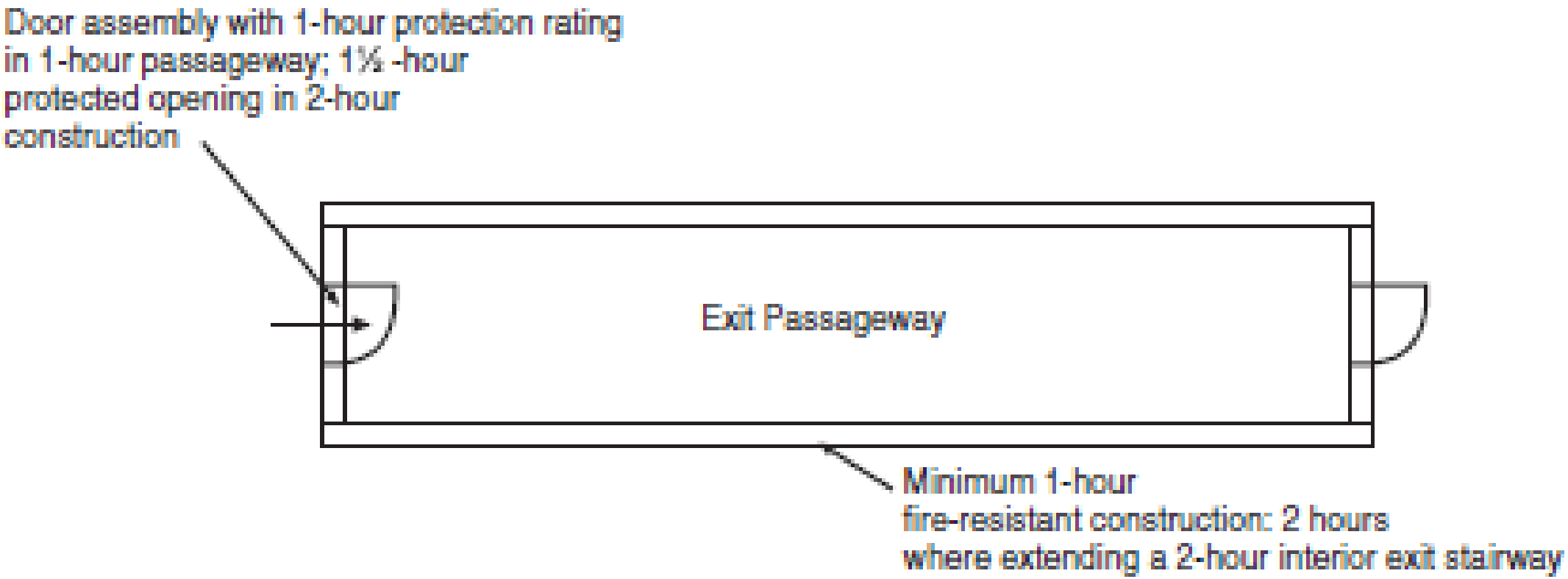
* Foyers, lobbies or reception areas that are constructed as corridors are not considered intervening rooms

Corridor Continuity
Section 1020.6

- 1-hour fire-resistance-rated corridor

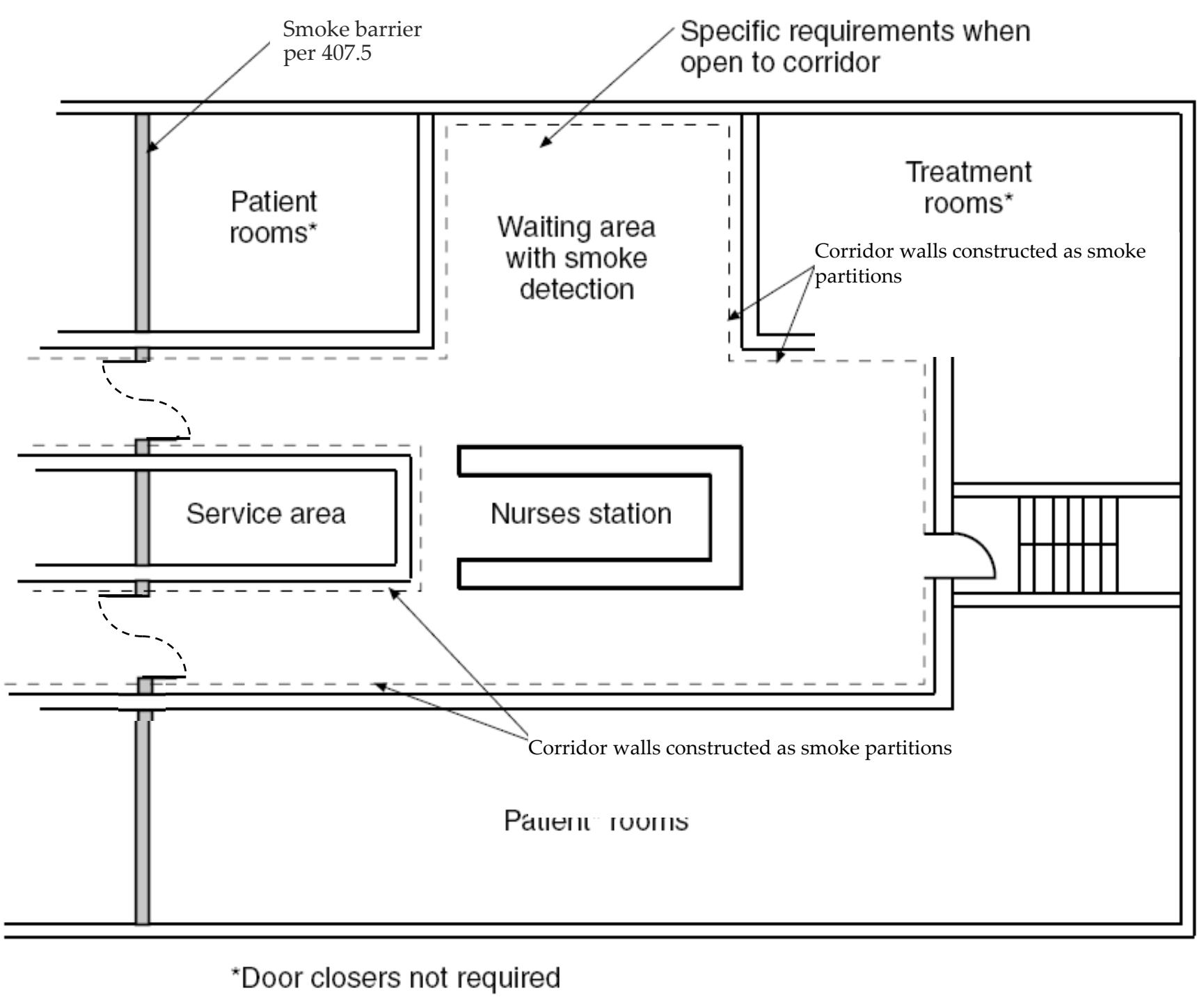


Exit Passageways
Section 1024



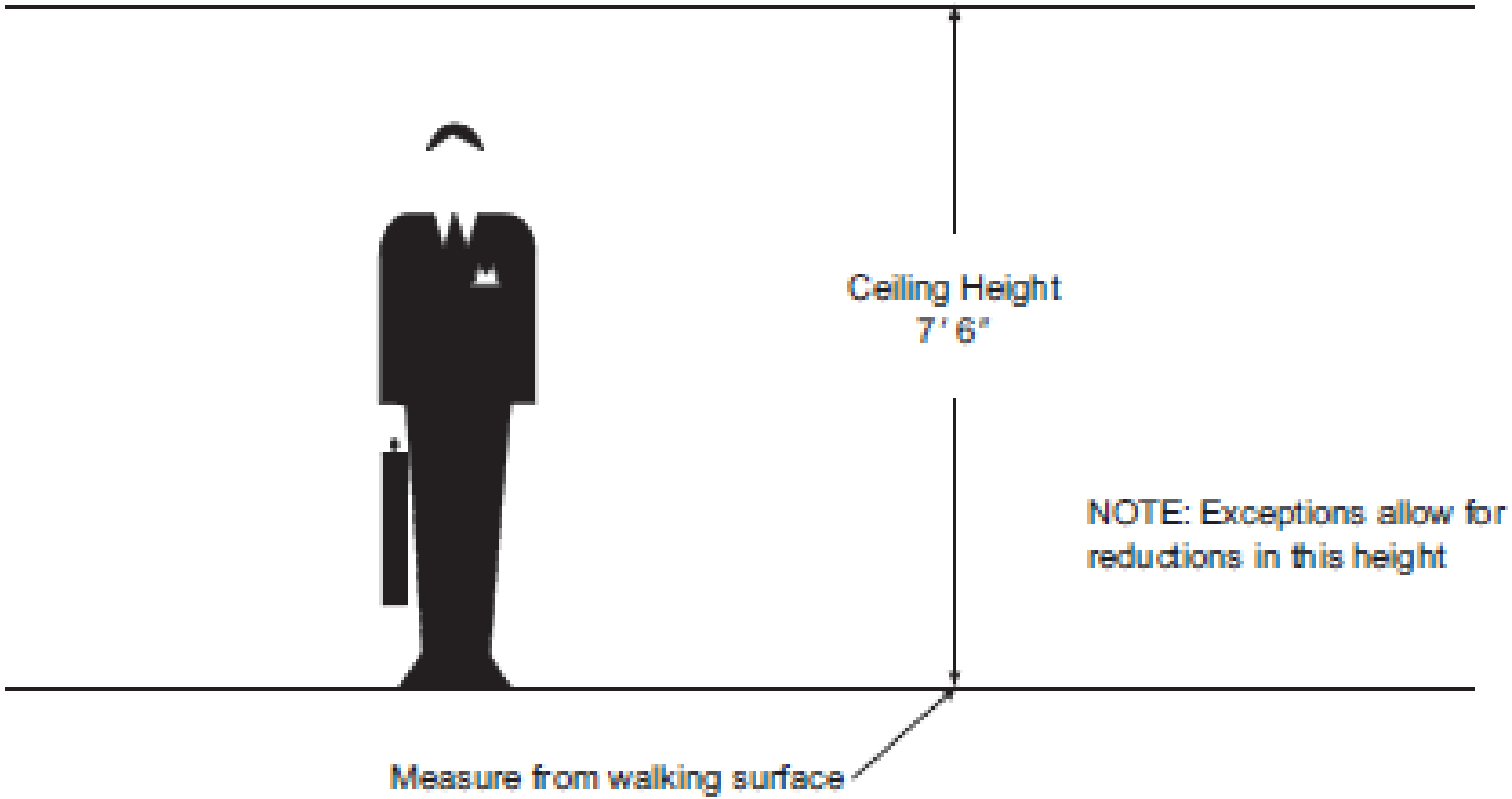
*Maximum transmitted temperature ≤ 450°F above ambient at end of 30 minutes of fire test. (Temperature rise not regulated in sprinklered building.)

Corridors Continuity and Separation (Group I-2)
Section 407.2



Stairways, Ramps and Elevators

Ceiling Height
Section 1003.2



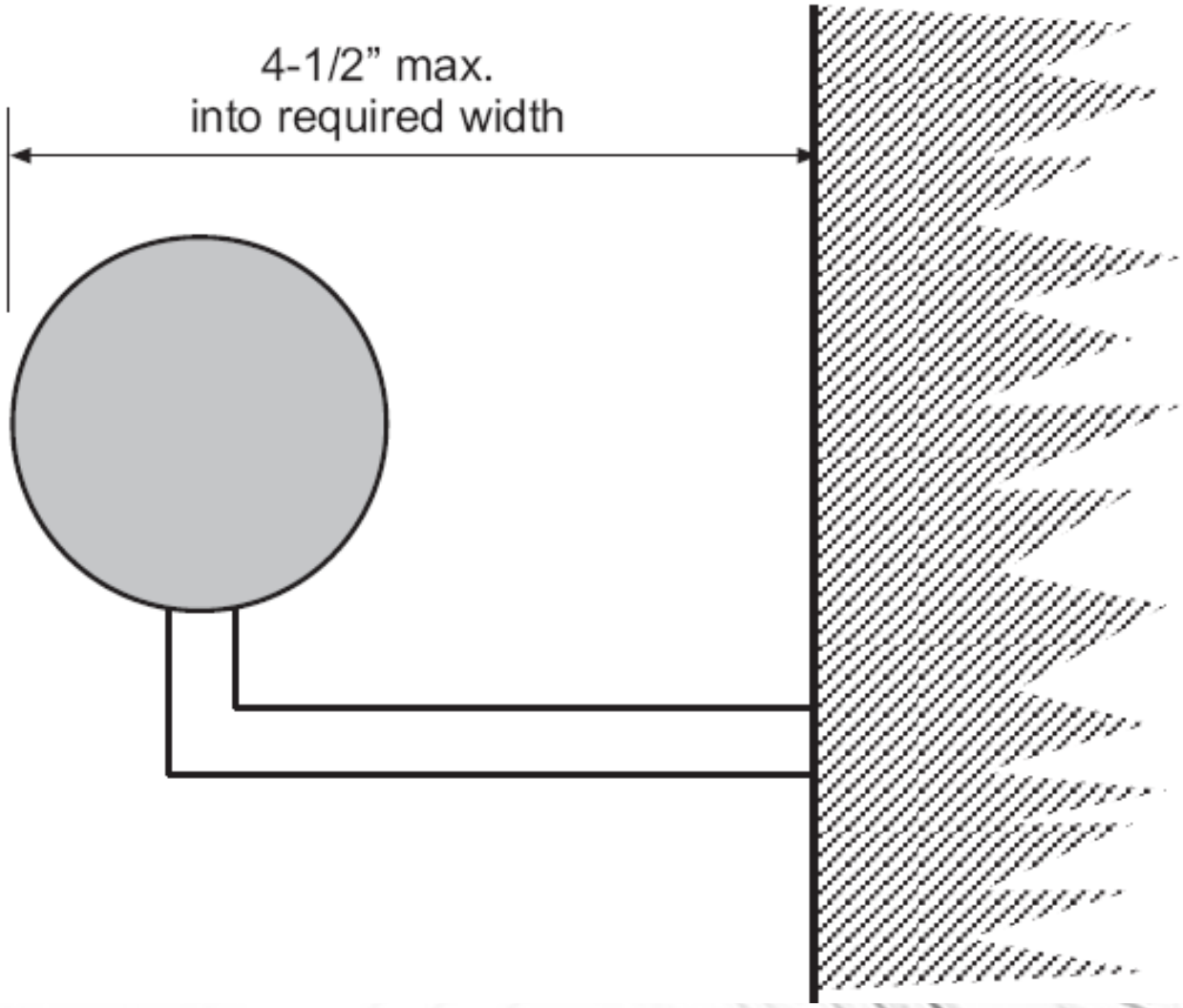
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure 84: Ceiling Height

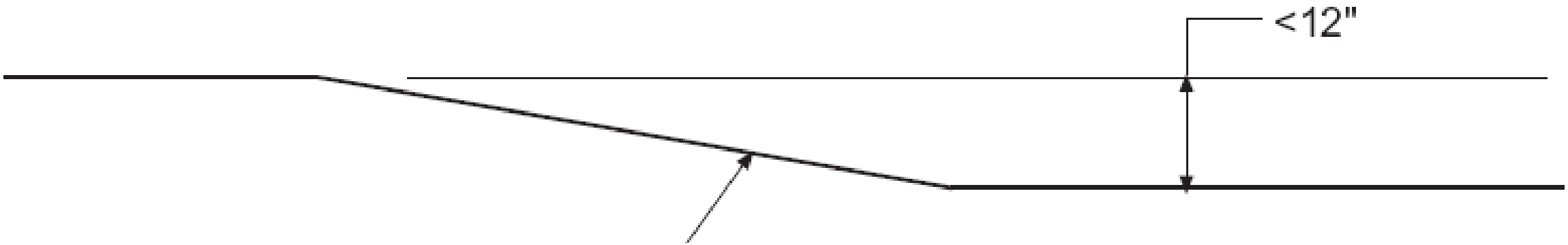
Horizontal Projections
Section 1003.3.3

- No projections >4″ over any walking surface between the heights of 27″ and 80″
- Handrails can

  project up to 4½″



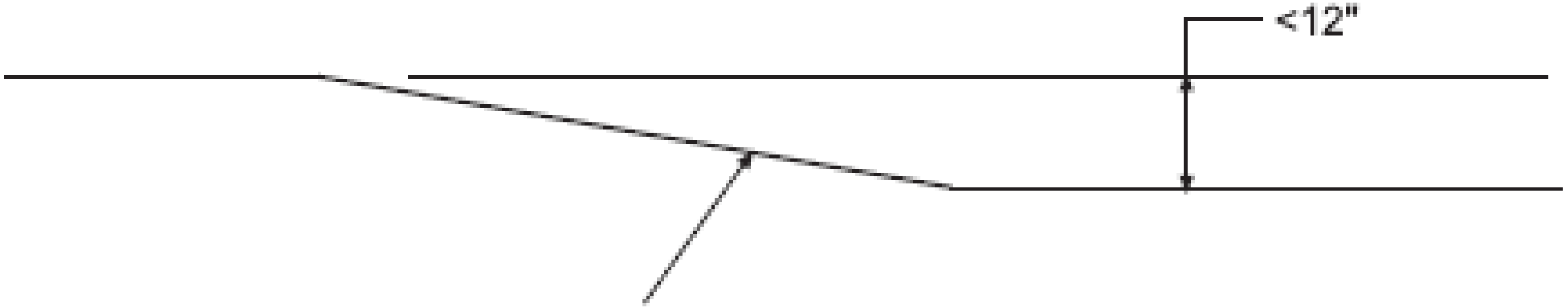
Elevation Change
Section 1003.5



Change required to made by a ‘sloped surface’.
Ramp complying with Section 1012 if slope >1:20
Handrails or contrasting floor finish to provide visual recognition if the change in elevation ≥6”

For SI: 1 inch = 25.4 mm

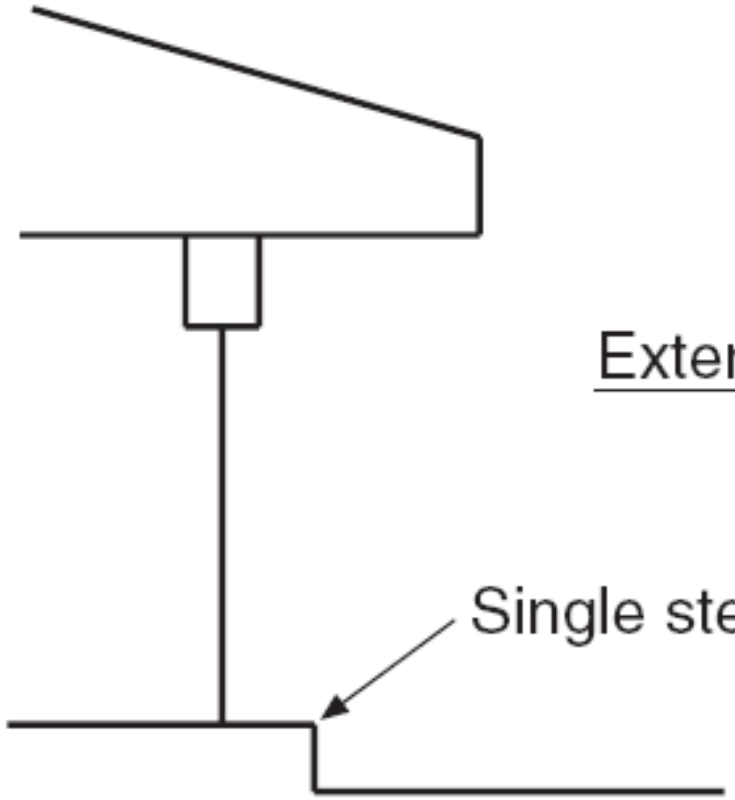
Elevation Change
Section 1003.5, Exception 1



Change required to be made by a 'sloped surface'.
Ramp complying with Section 1012 if slope >1:20
Handrails or contrasting floor finish to provide visual recognition if the change in elevation ≥ 6"

For SI: 1 inch = 25.4 mm.

Elevation Change
Section 1003.5, Exception 2



Exterior door which is not required to be accessible

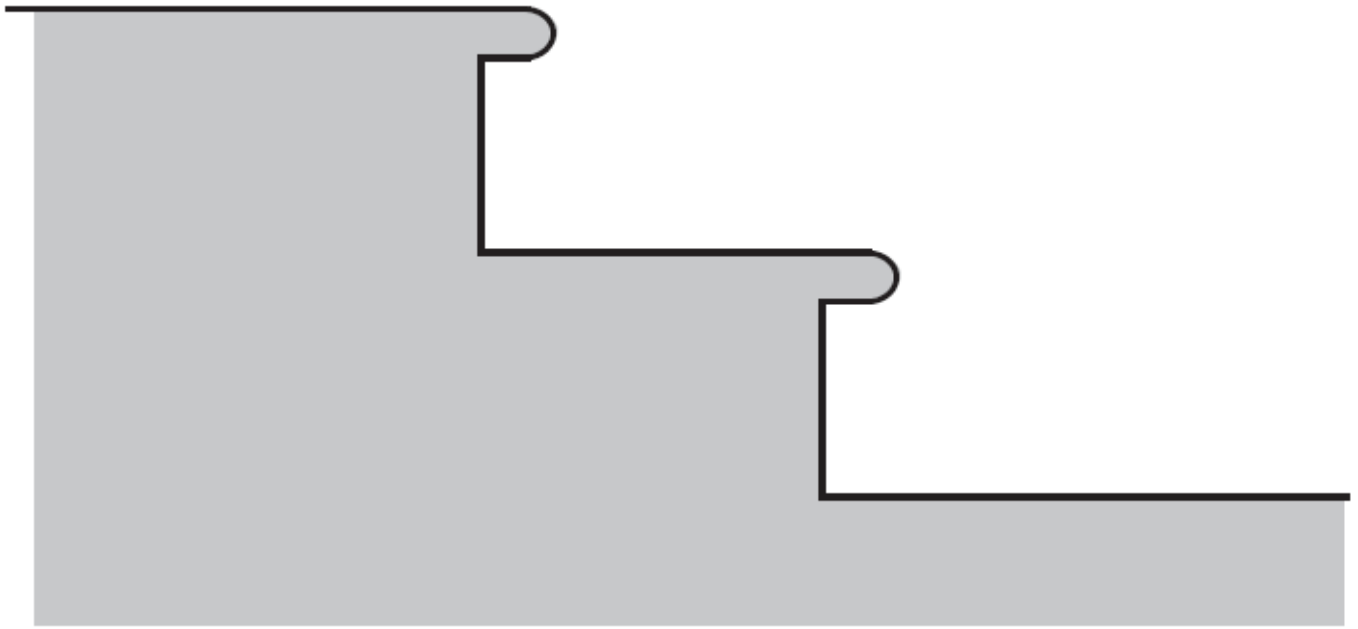
Exterior

Single step with max. 7" riser

Group F, H, R-2, R-3, S or U

Stairways
Section 1011

- **Stair.** A change in elevation, consisting of one or more risers.
- **Stairway.** One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

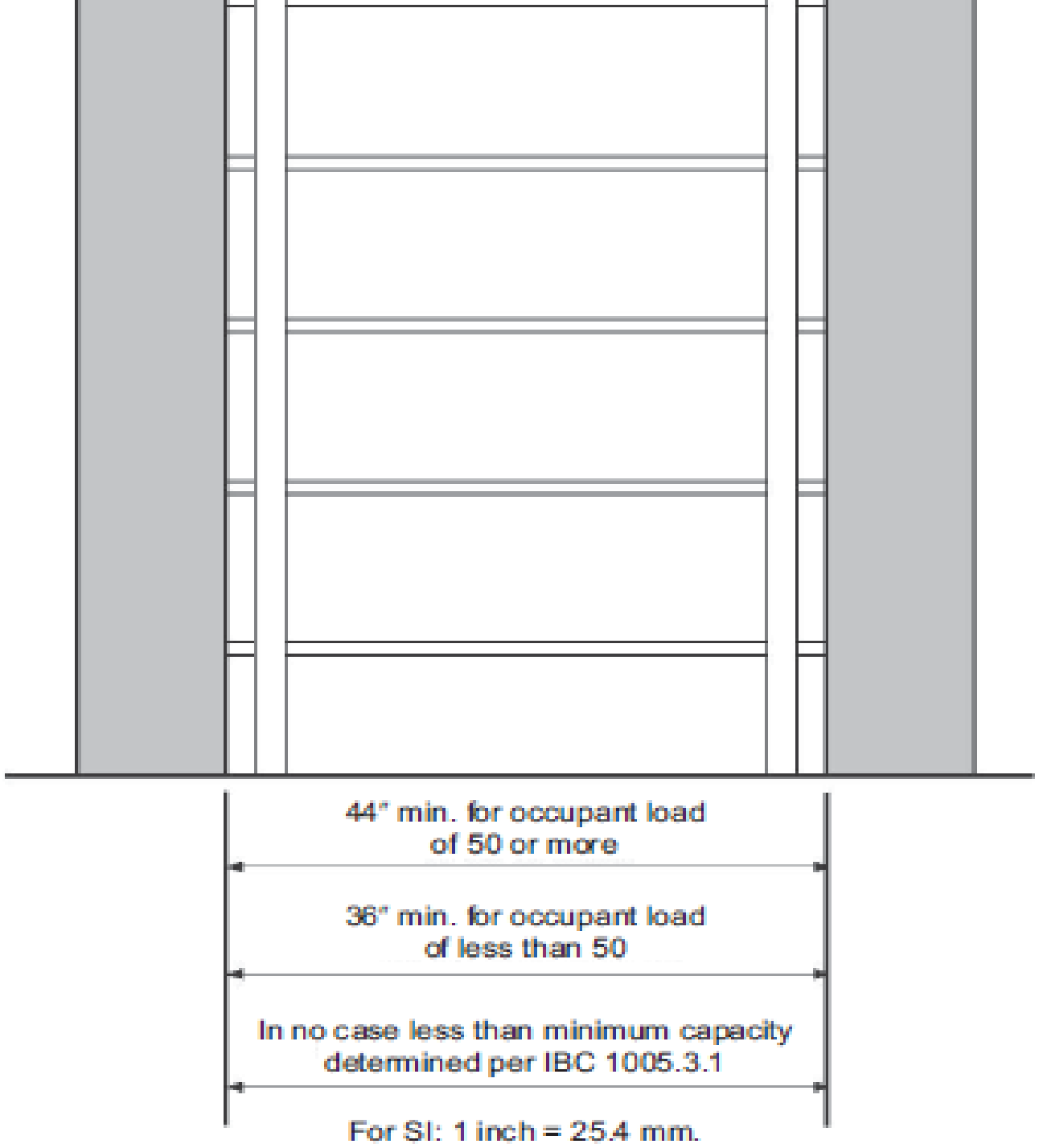


Stairways
Section 1011

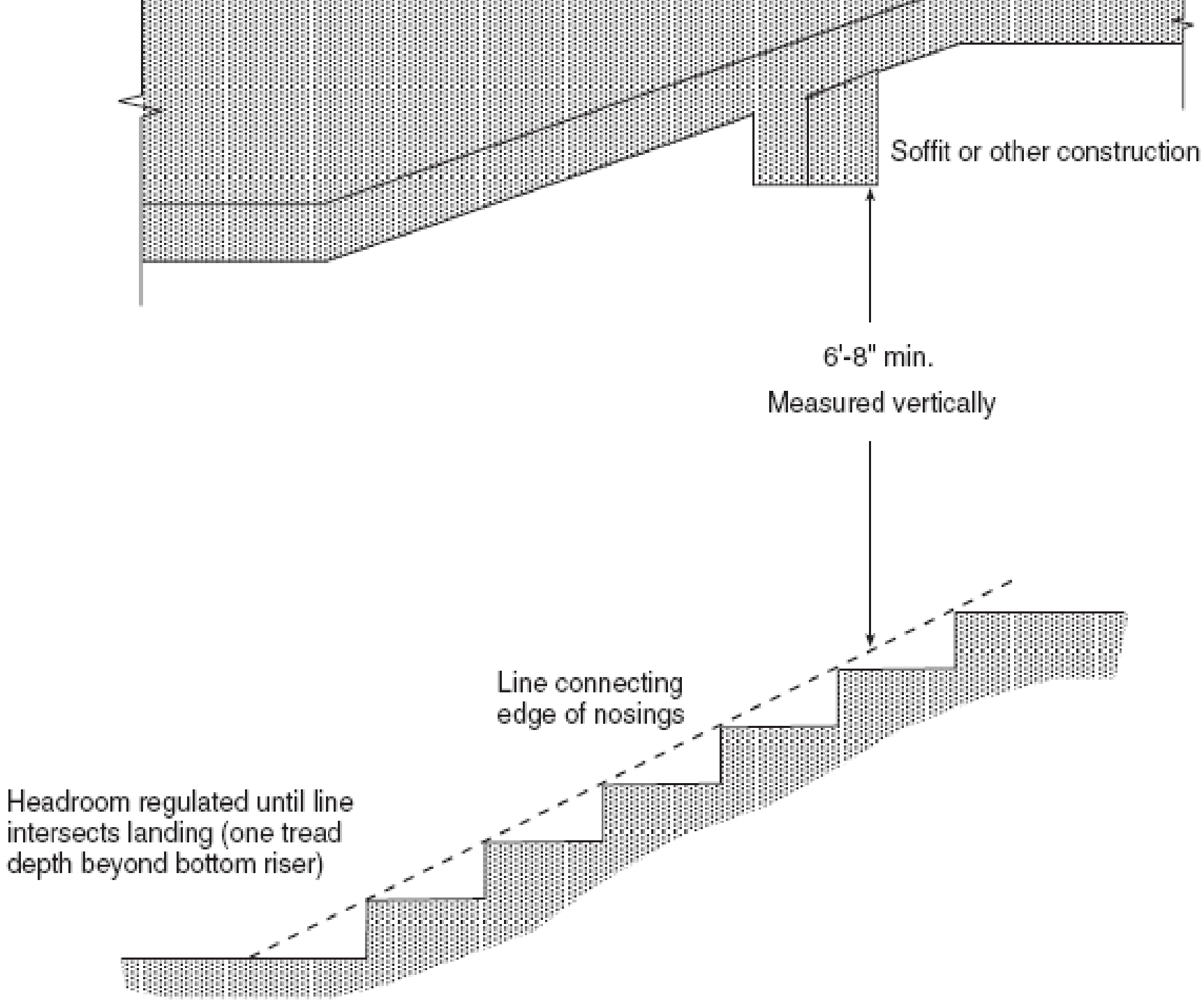
- All stairways that serve occupied portions of a building must comply with stairway provisions in Section 1011
- This applies to stairs that are required for egress and to interior exit access stairways, or “convenience” stairways

Width and Capacity
Section 1011.2

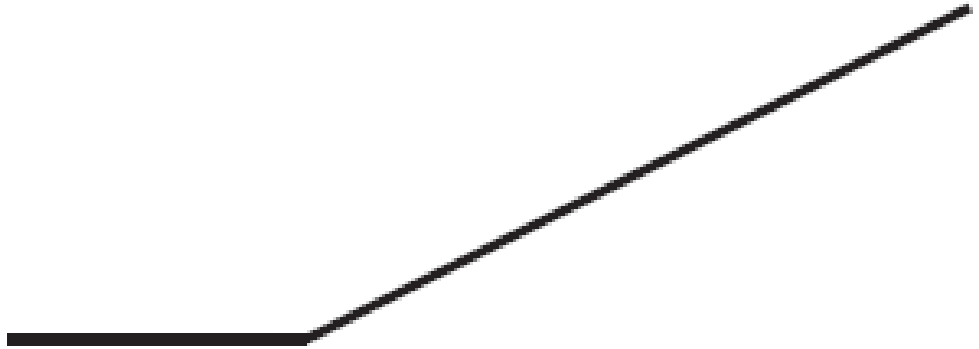
- Objects can project in stairway width
- Projections are regulated by Section 1005.3.1



Headroom
Section 1011.3



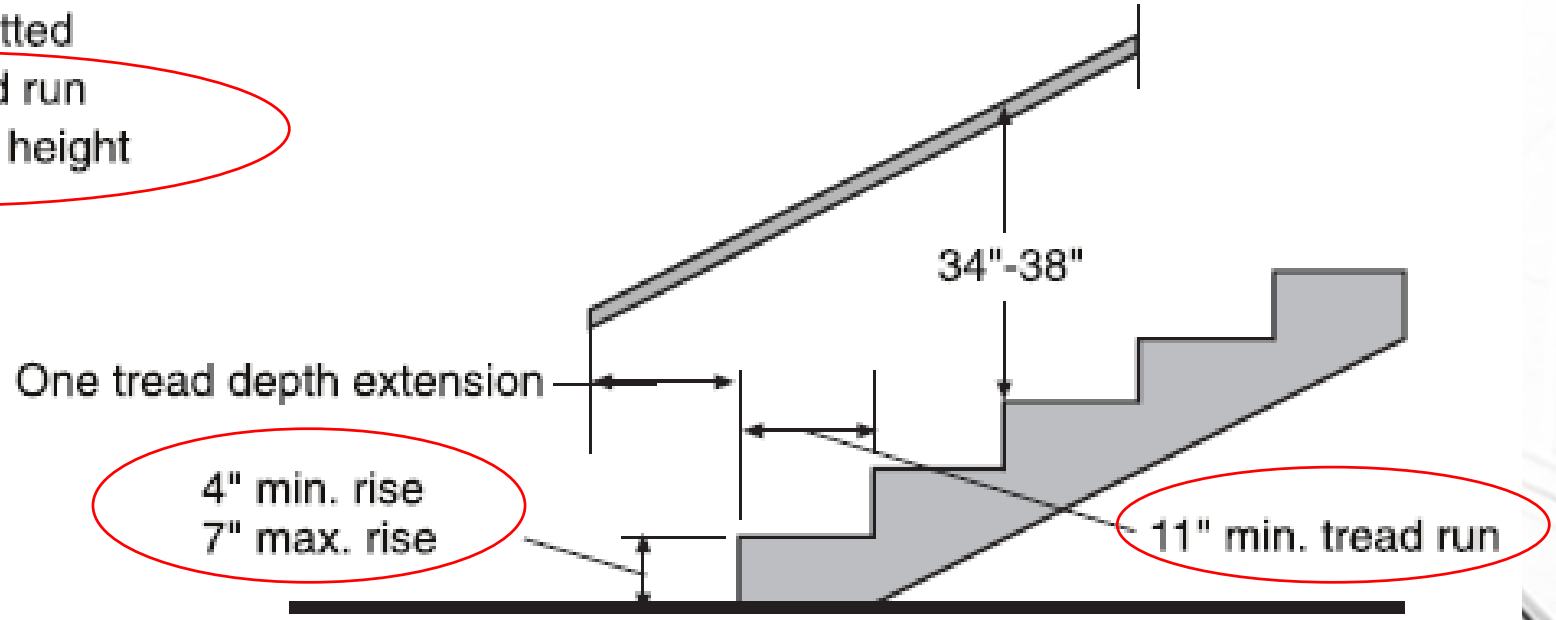
Stair Treads and Risers
Section 1011.5



Handrails –
IBC Section 1014

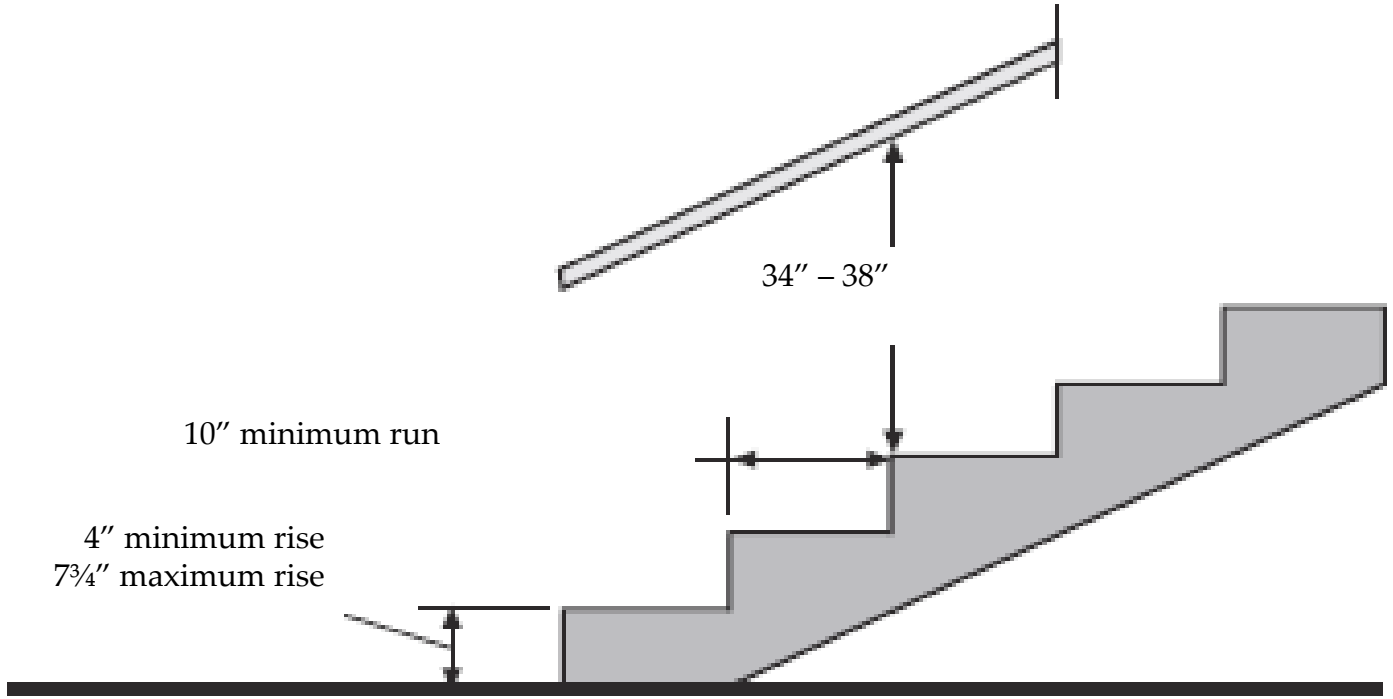
Maximum construction variation permitted

- 3/8" for tread run
- 3/8" for riser height



Stair Treads and Risers
Section 1011.5

Handrails –
IBC Section 1014

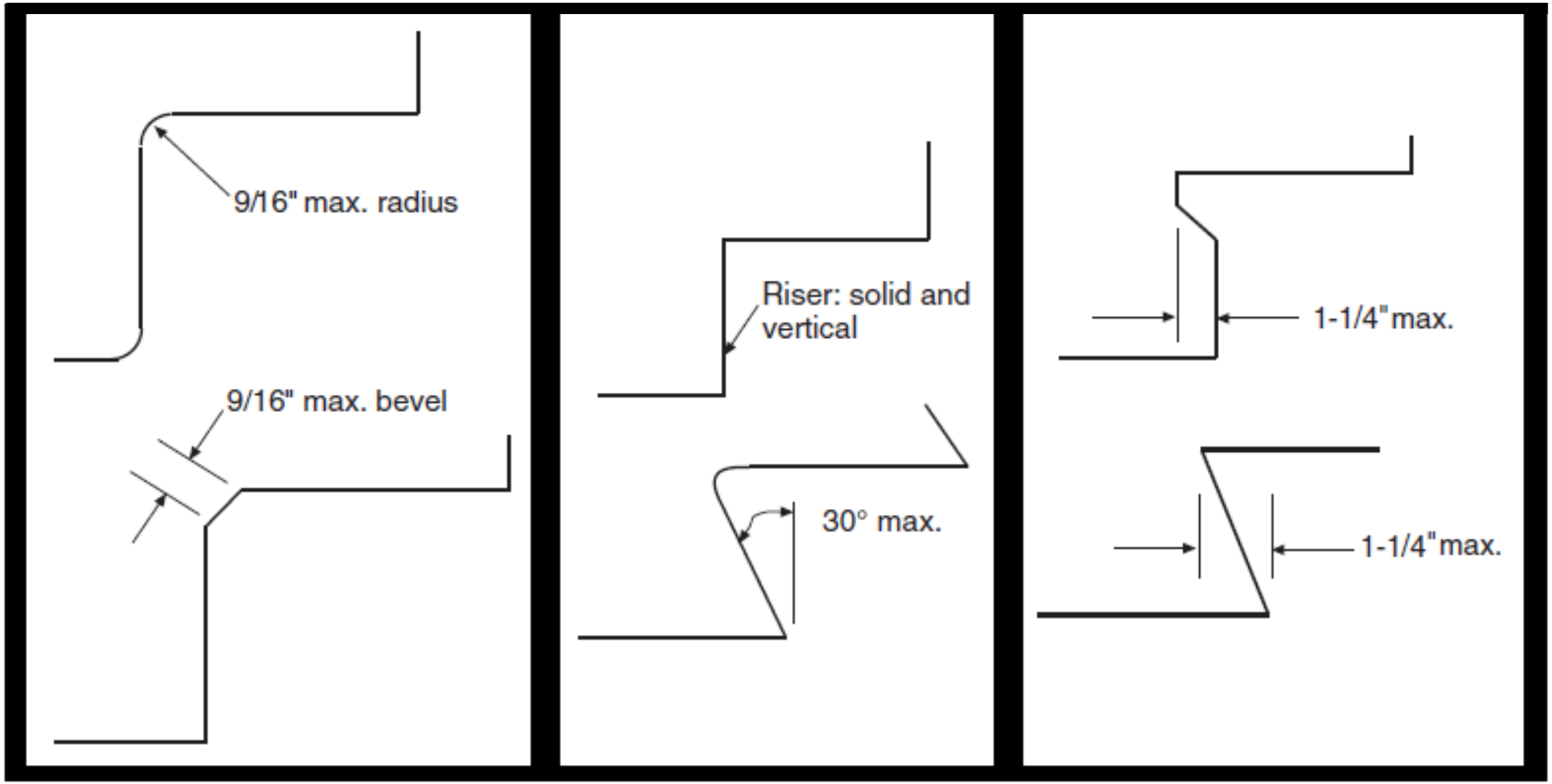


Section 1011.5.2, Exception 3
R-3; and Group U accessory to R-3;
Within dwelling units in R-2

For SI: 1 inch = 2.54 mm

I-3

Nosing and Riser Profile
Section 1011.5.5



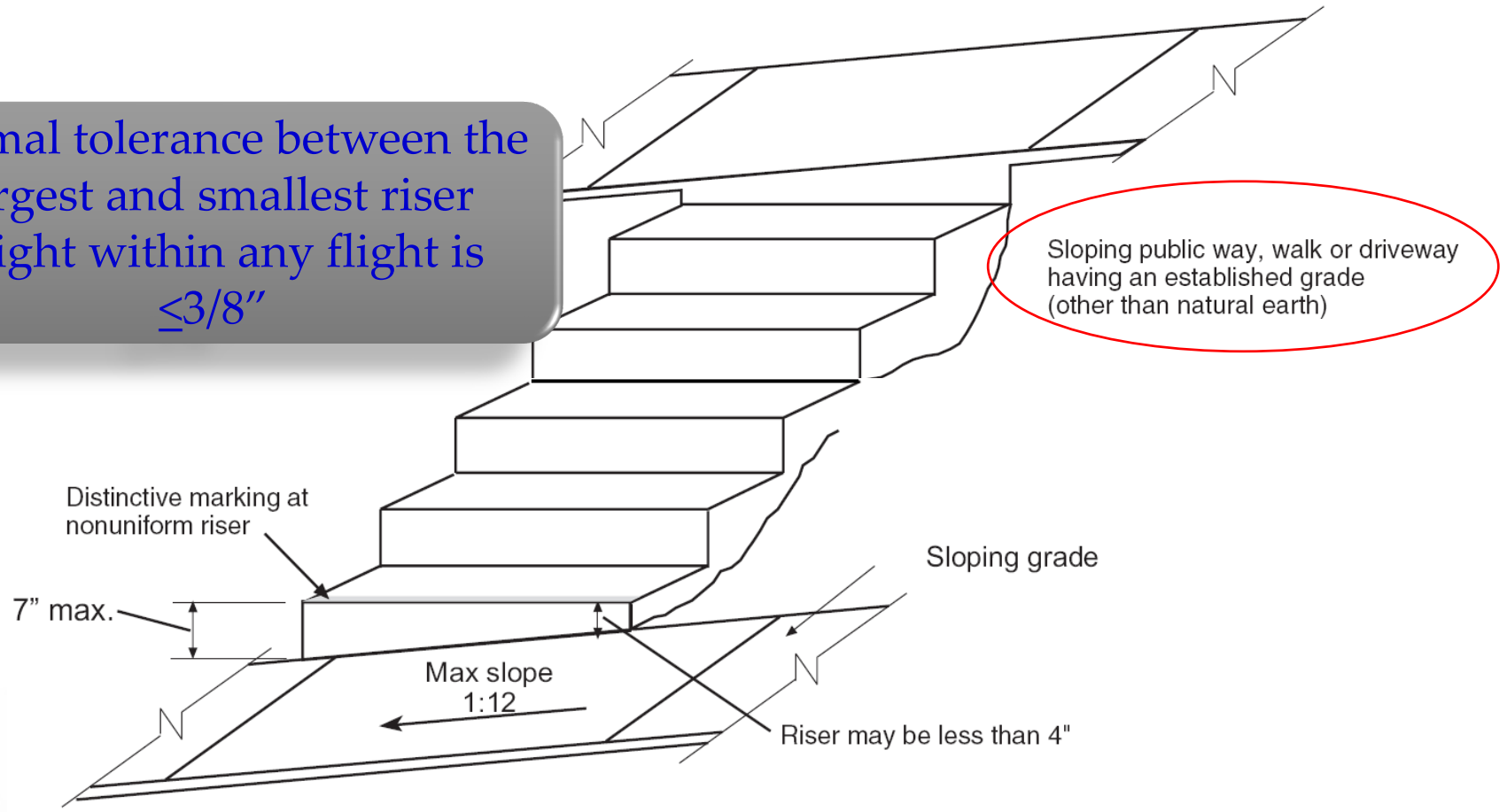
For SI: 1 inch = 25.4 mm.

For SI: 1 degree = 0.01745 rad.

For SI: 1 inch = 25.4 mm.

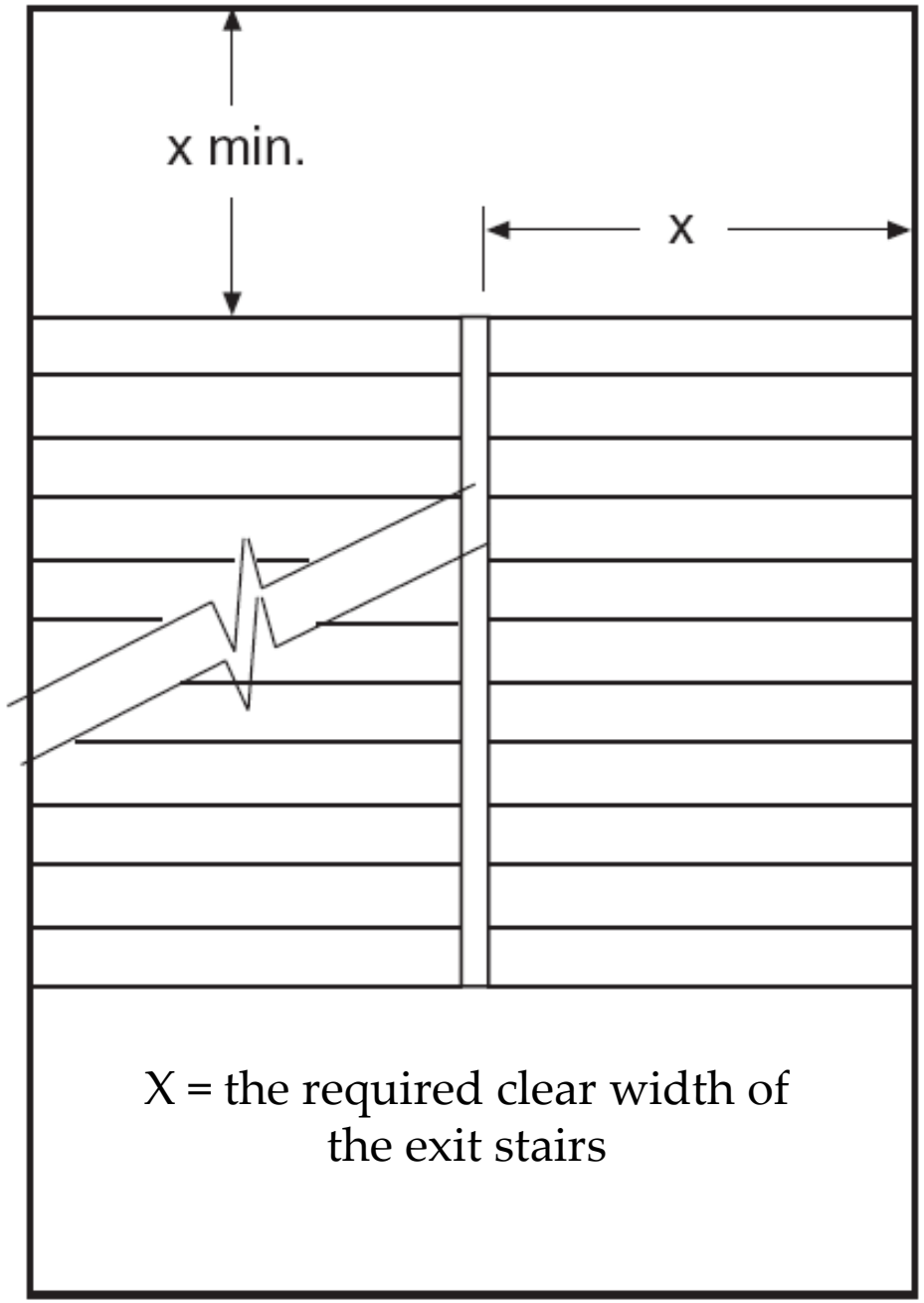
Dimensional Uniformity
Section 1011.5.4

Normal tolerance between the largest and smallest riser height within any flight is ≤3/8”

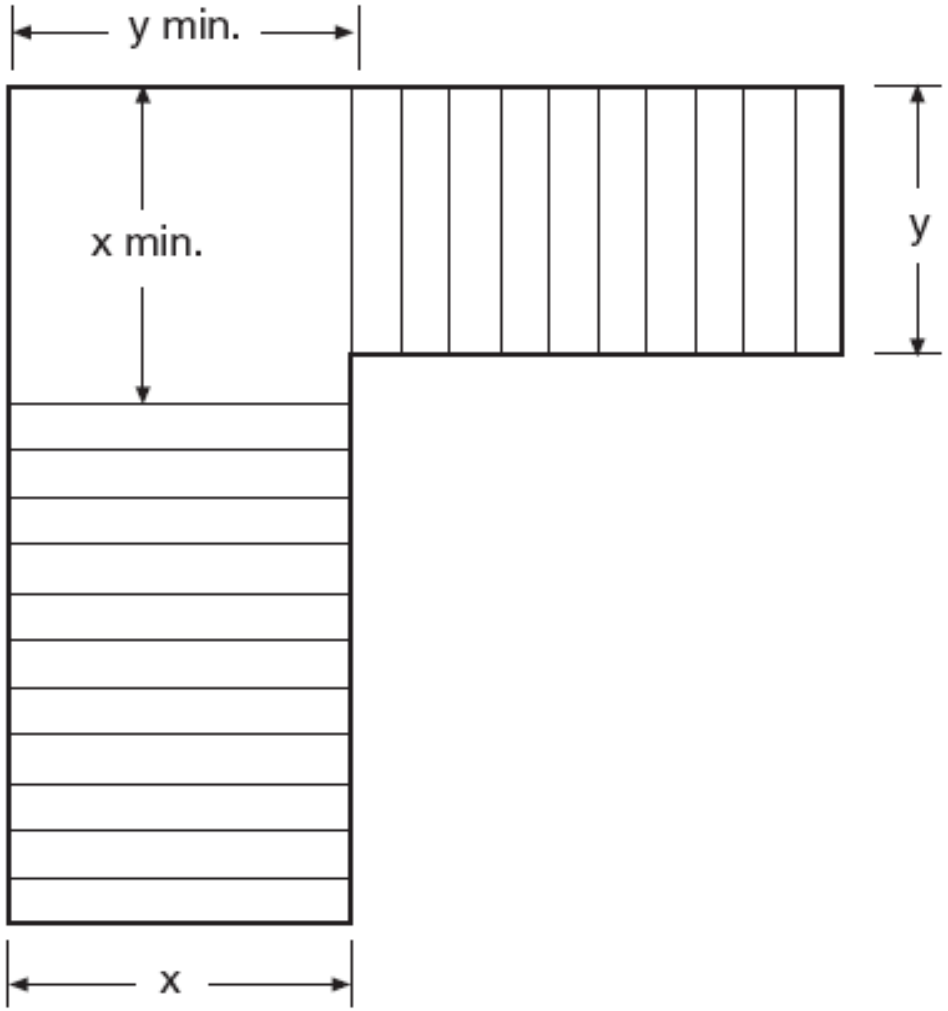


Stairway Landings
Section 1011.6

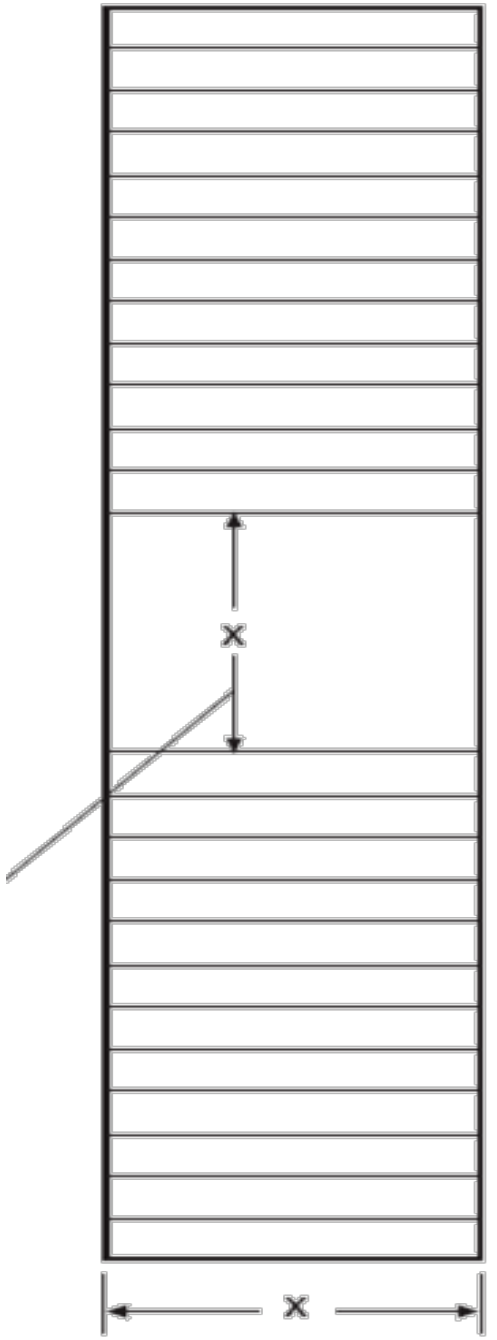
- There shall be a floor or landing at the top and bottom of each stairway



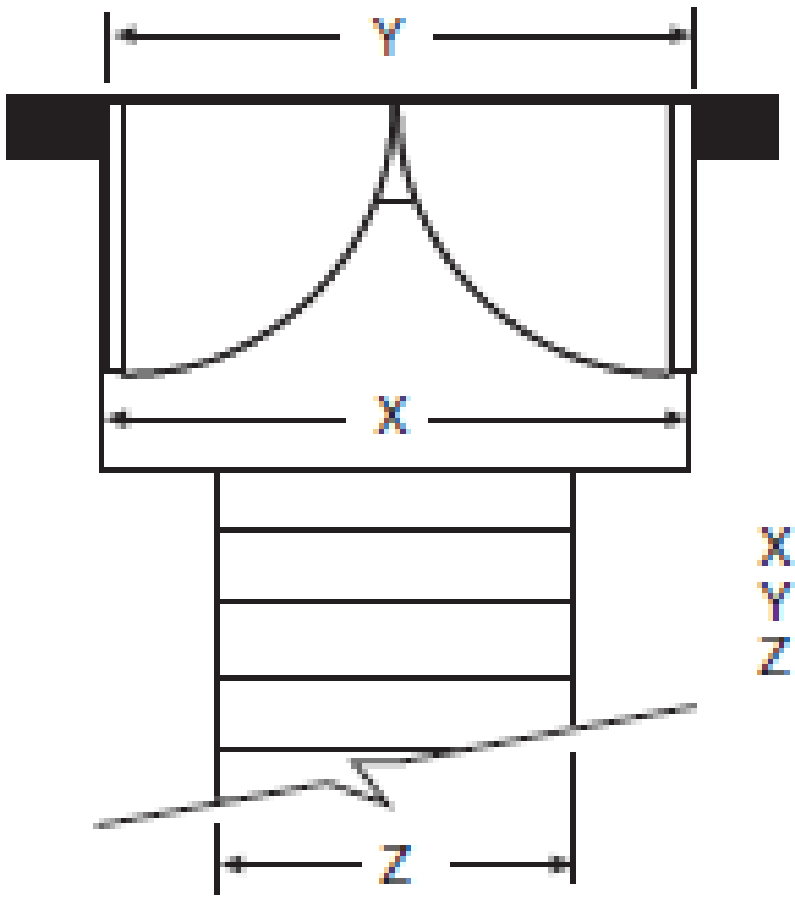
Stairway Landings
Section 1011.6



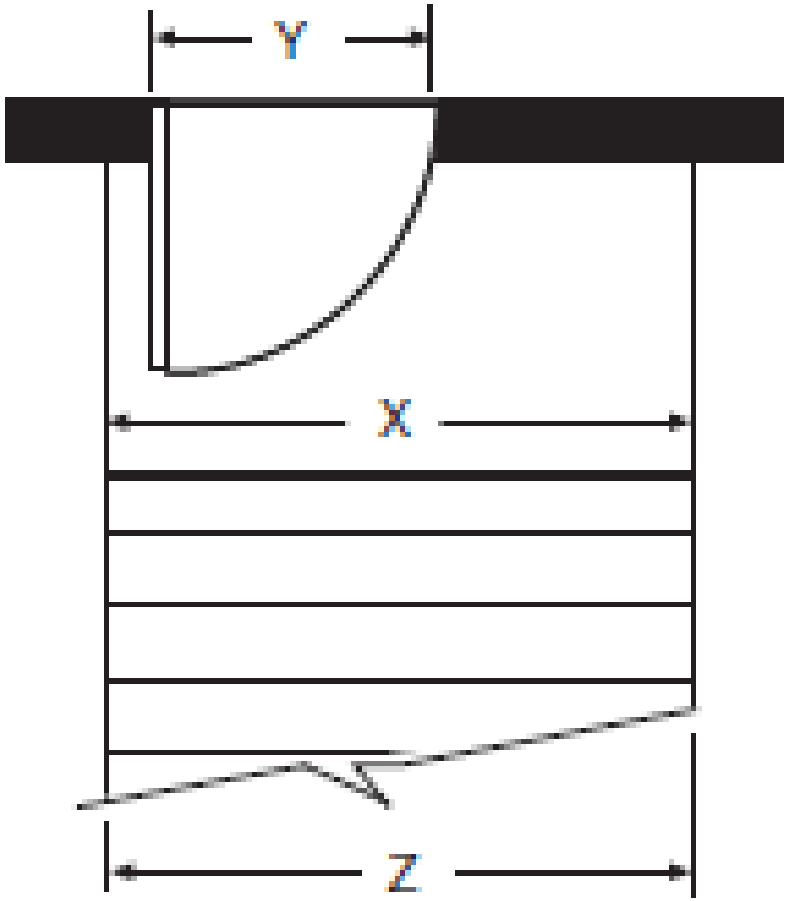
Must be at least required width of stairs, but not more than 48”



Stairway Landings
Section 1011.6



X = Landing width
Y = Doorway width
Z = Stair width

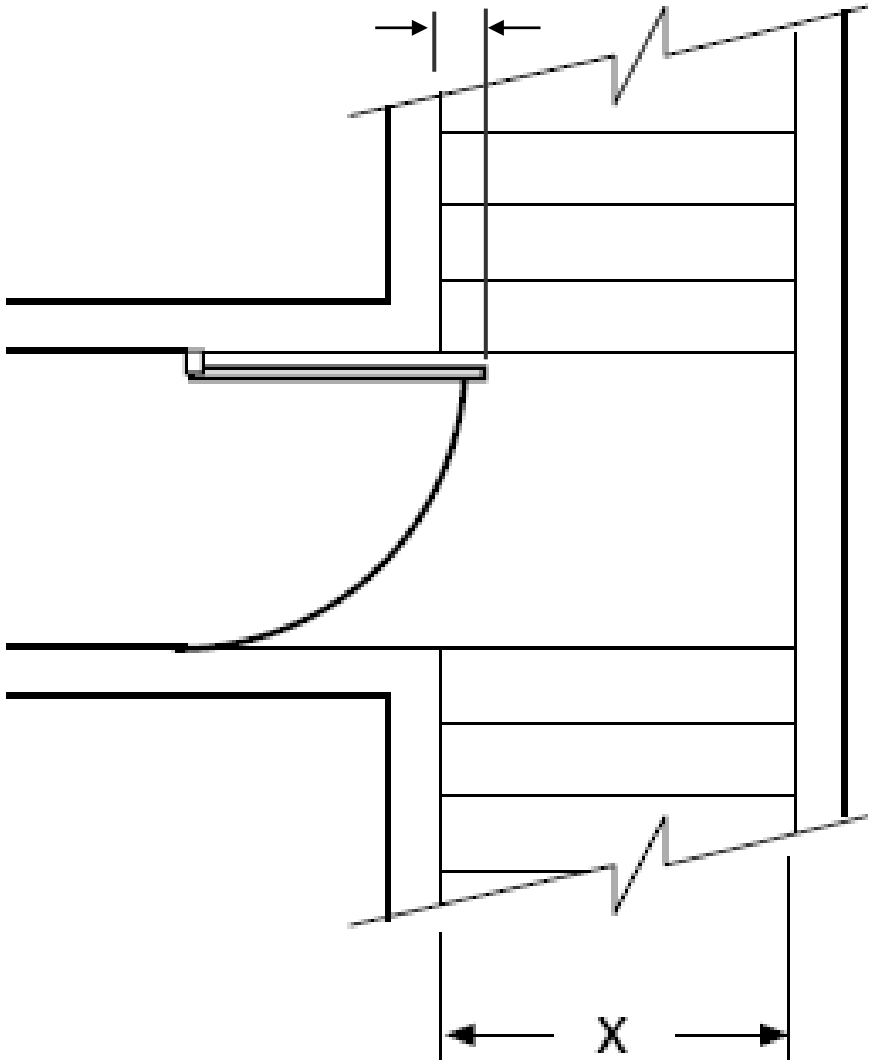


X shall be equal to or greater than
both Y and Z

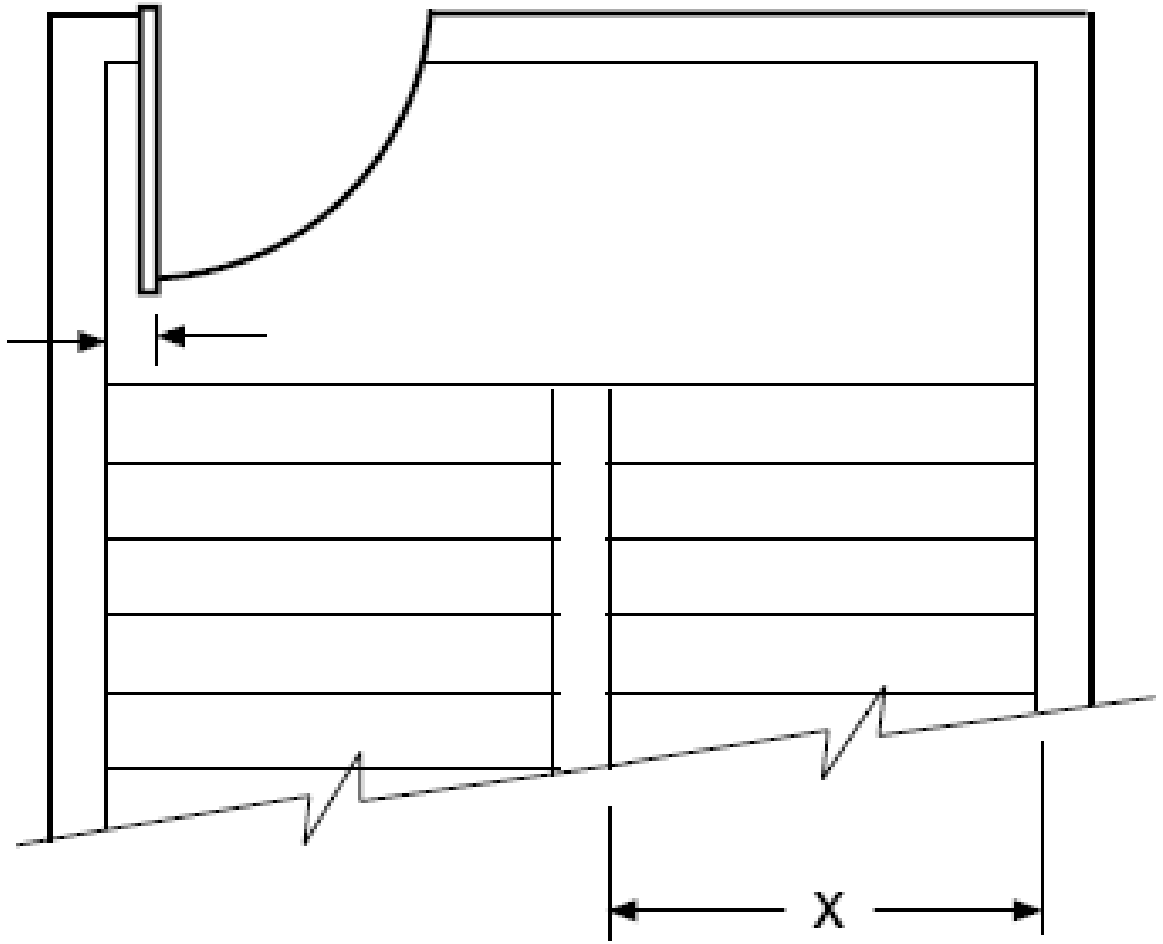
Stairway Landings Section 1011.6

X = the required width of the stairway

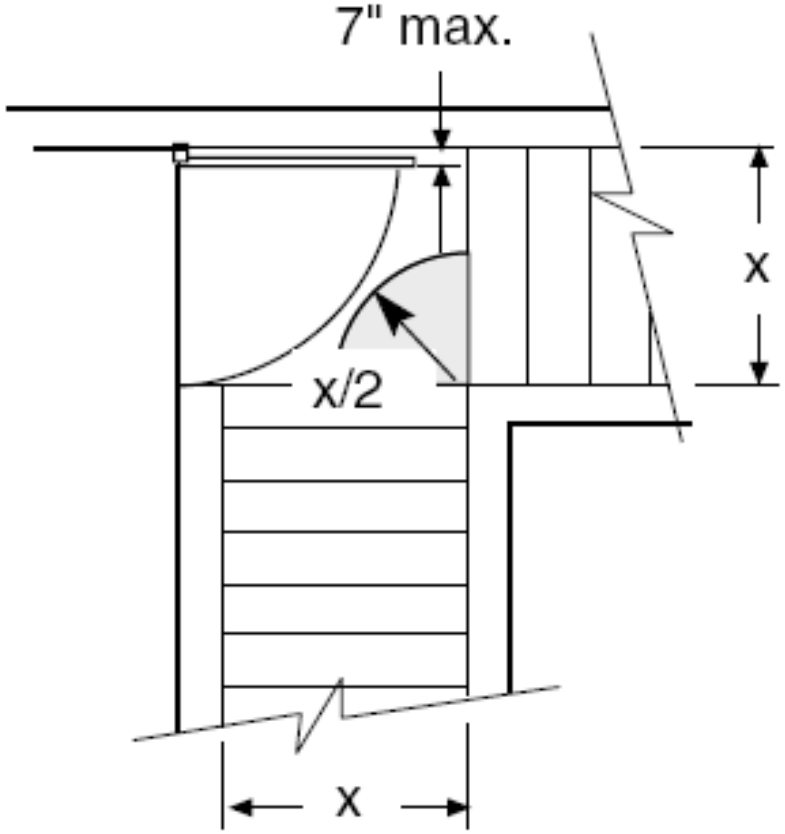
7″ max.

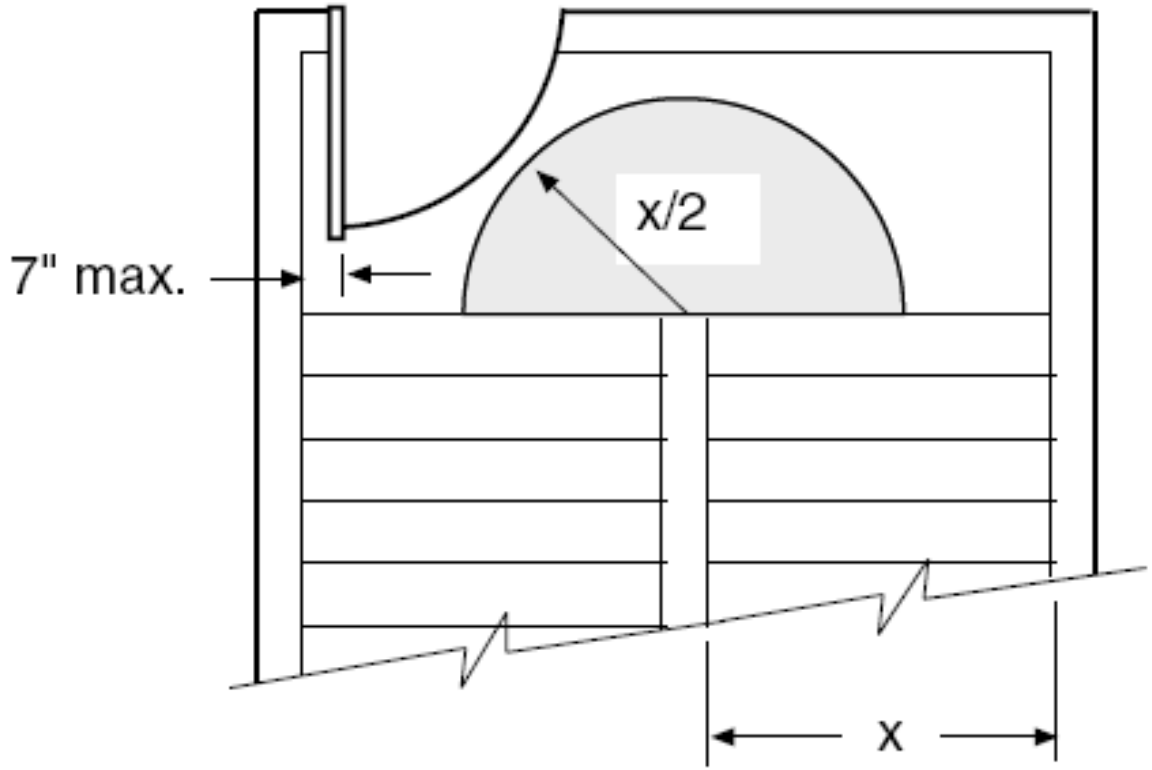


7″ max.



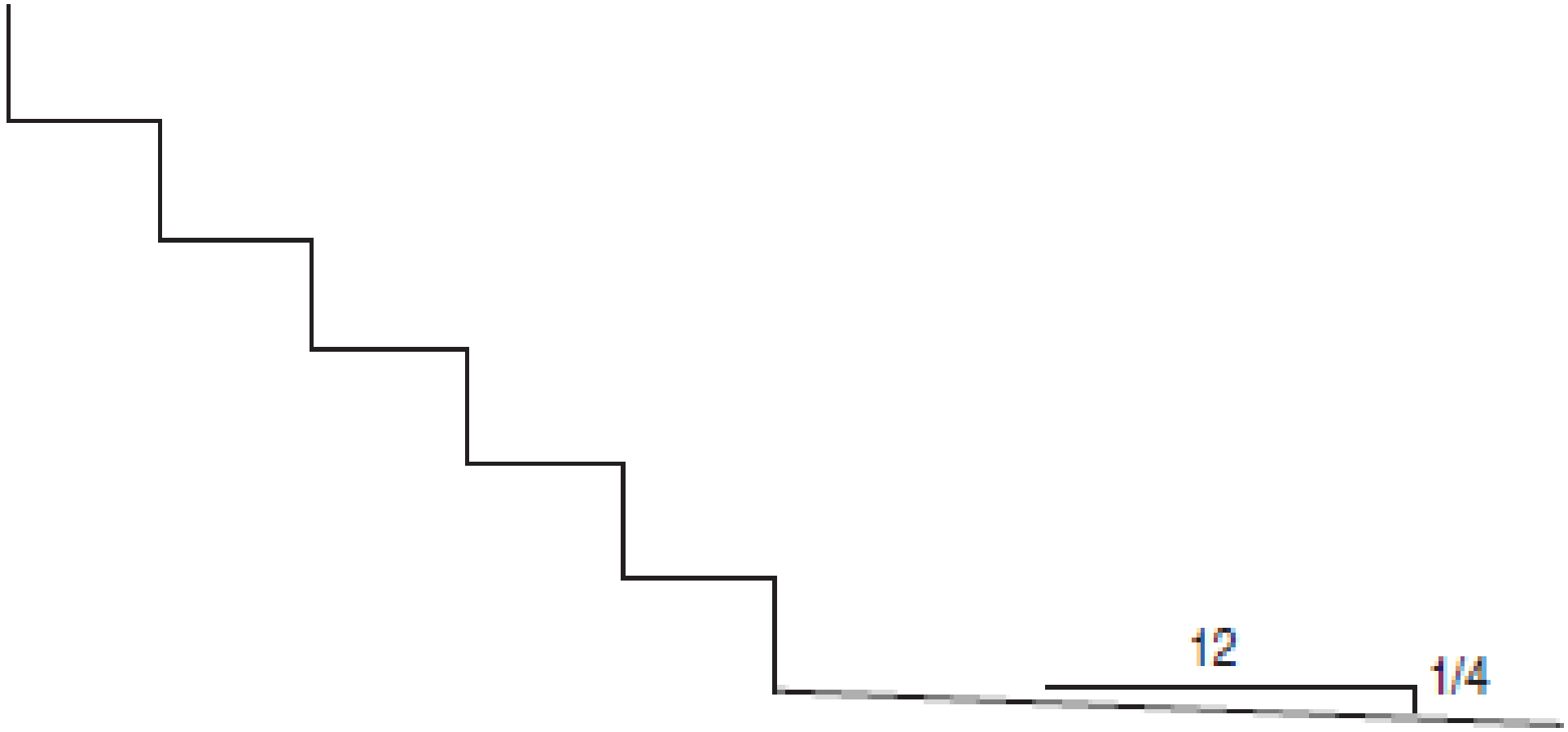
Stairway Landings Section 1011.6





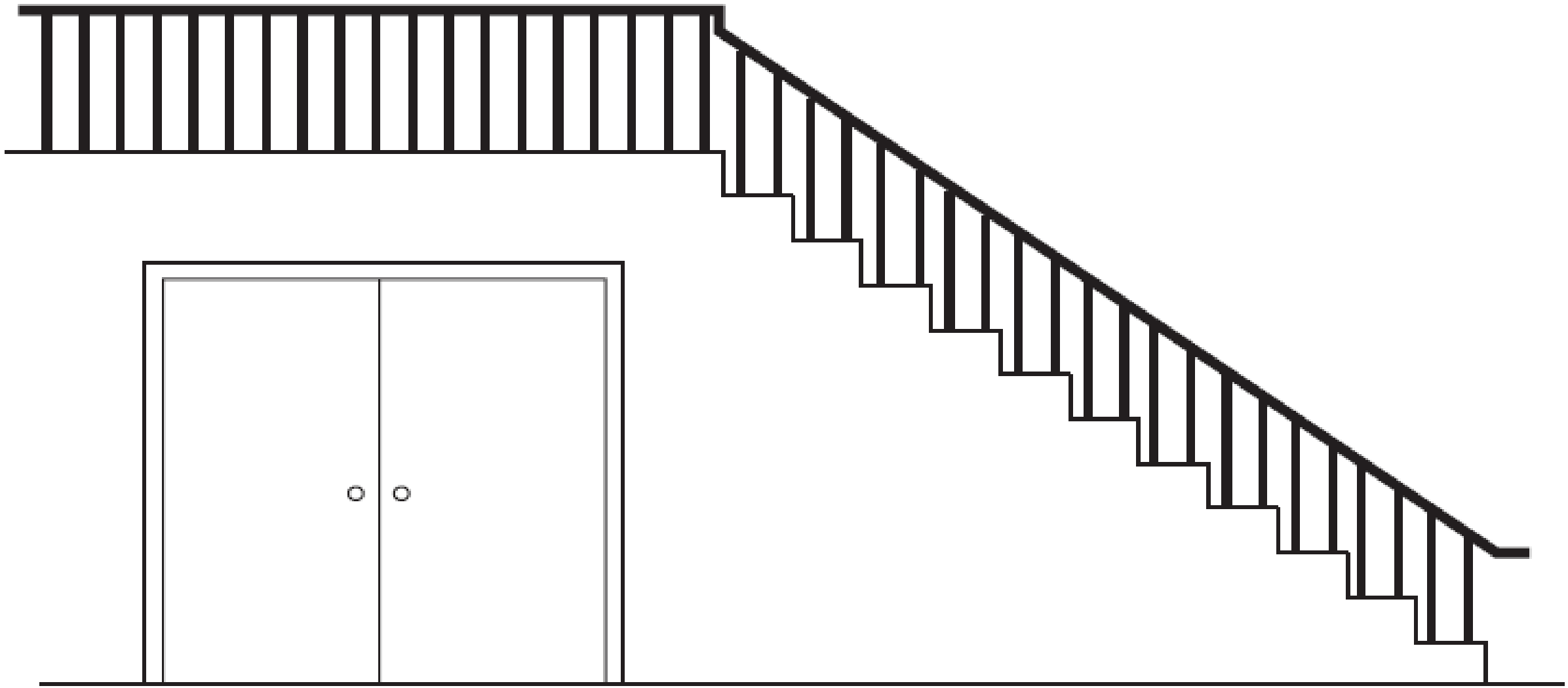
Section 1011.6 – Doors opening onto a landing shall not obstruct the landing more than ½ the required width of the landing.

Stairway Walking Surface
Section 1011.7.1



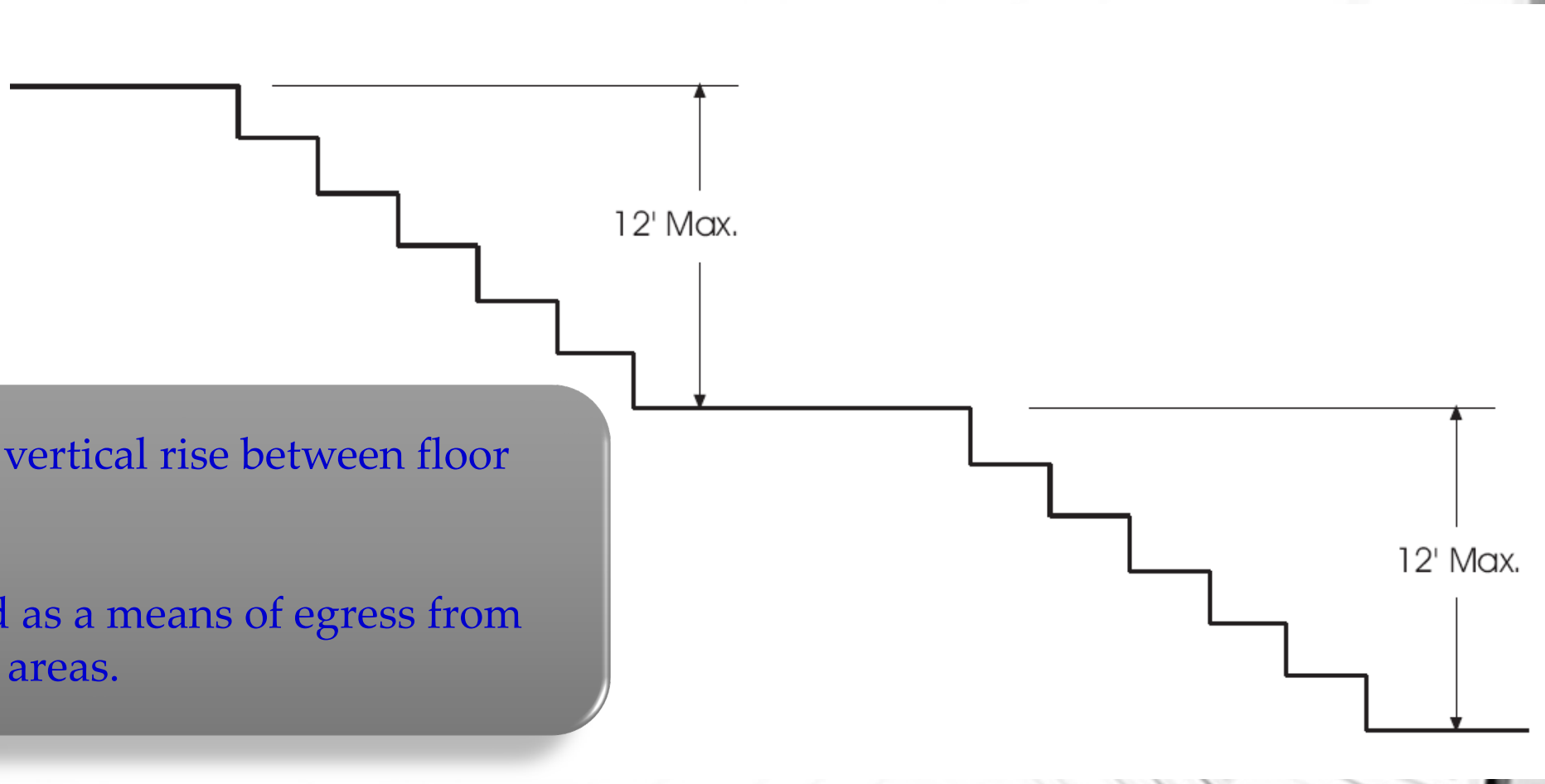
Treads and landings slope no more than 2 percent in any direction

Stairway Walking Surface Section 1011.7.1



Access to enclosed usable space shall not be from within a stair enclosure

Vertical Rise
Section 1011.8

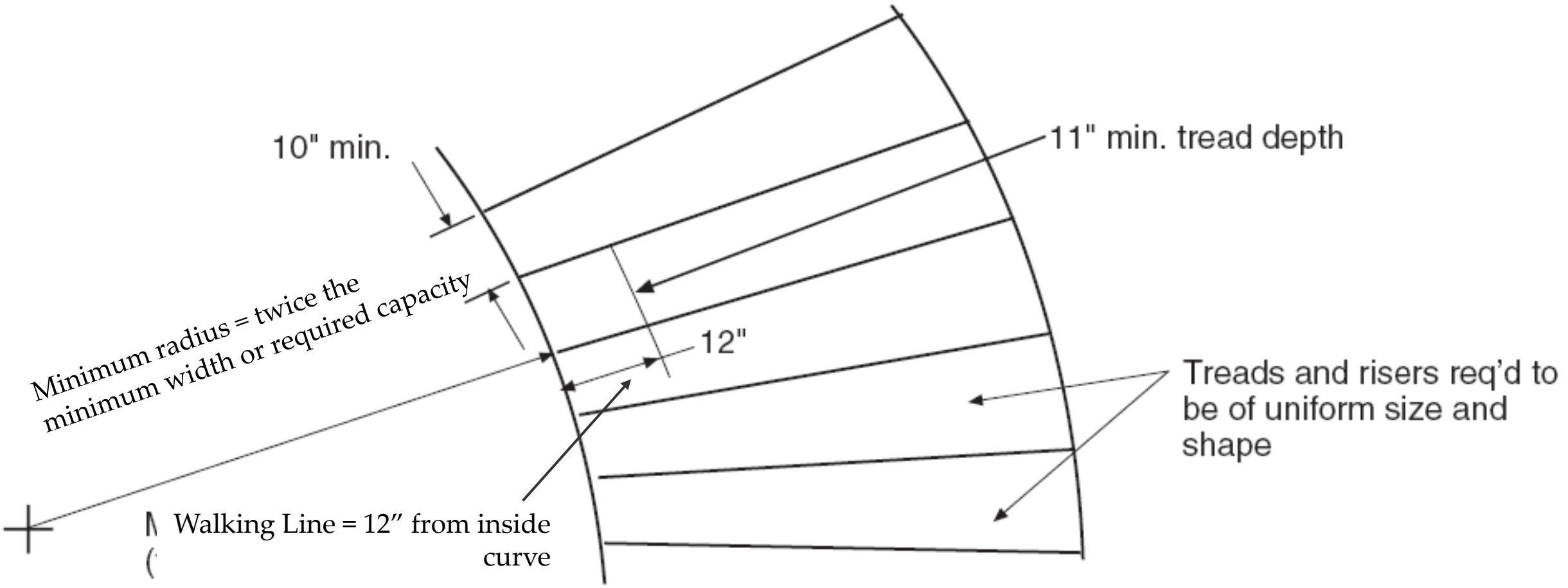


Maximum rise of 12’ vertical rise between floor levels or landings.

Exception:

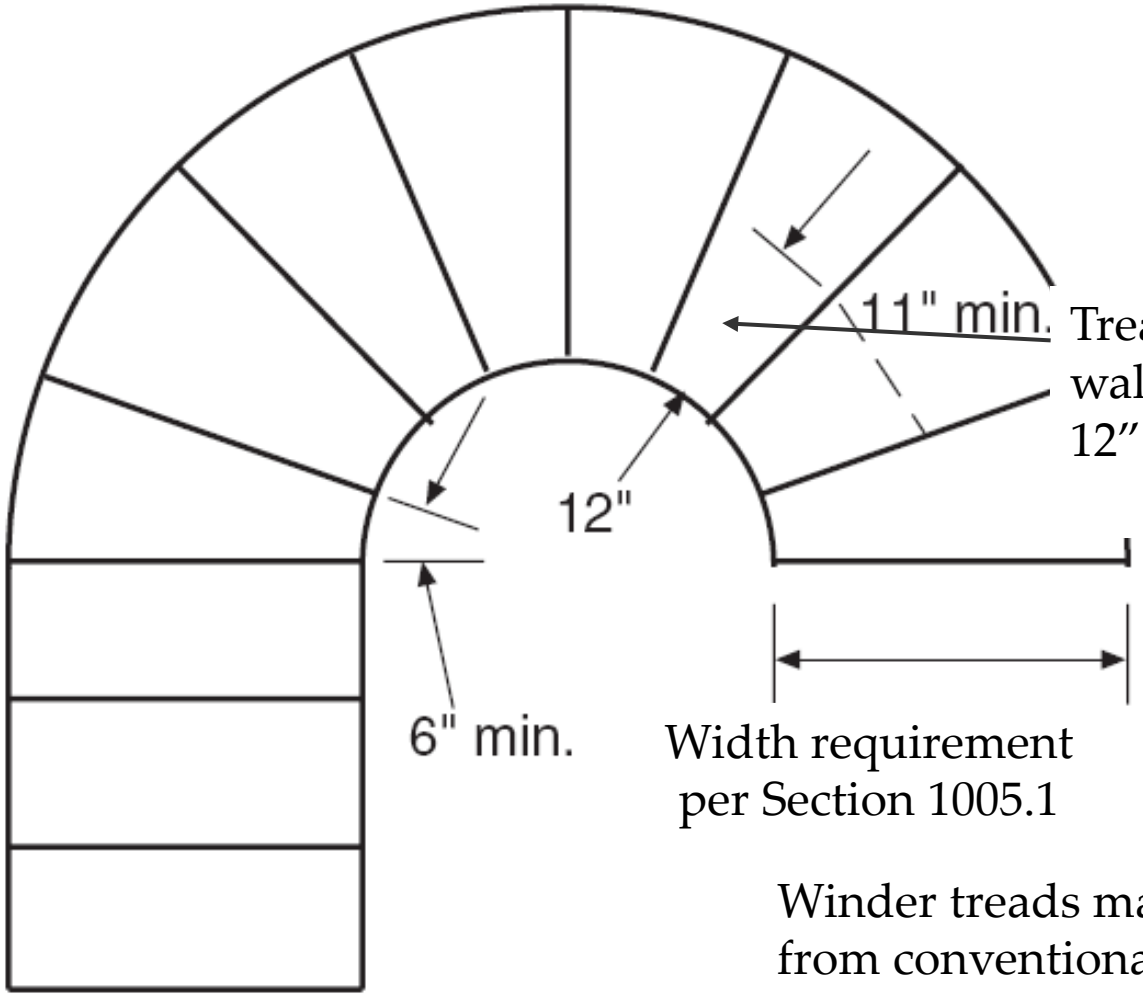
Spiral stairways used as a means of egress from technical production areas.

Curved Stairways
Section 1011.9



For SI: 1 inch = 25.4 mm.

Winder Treads
Section 1011.5.3



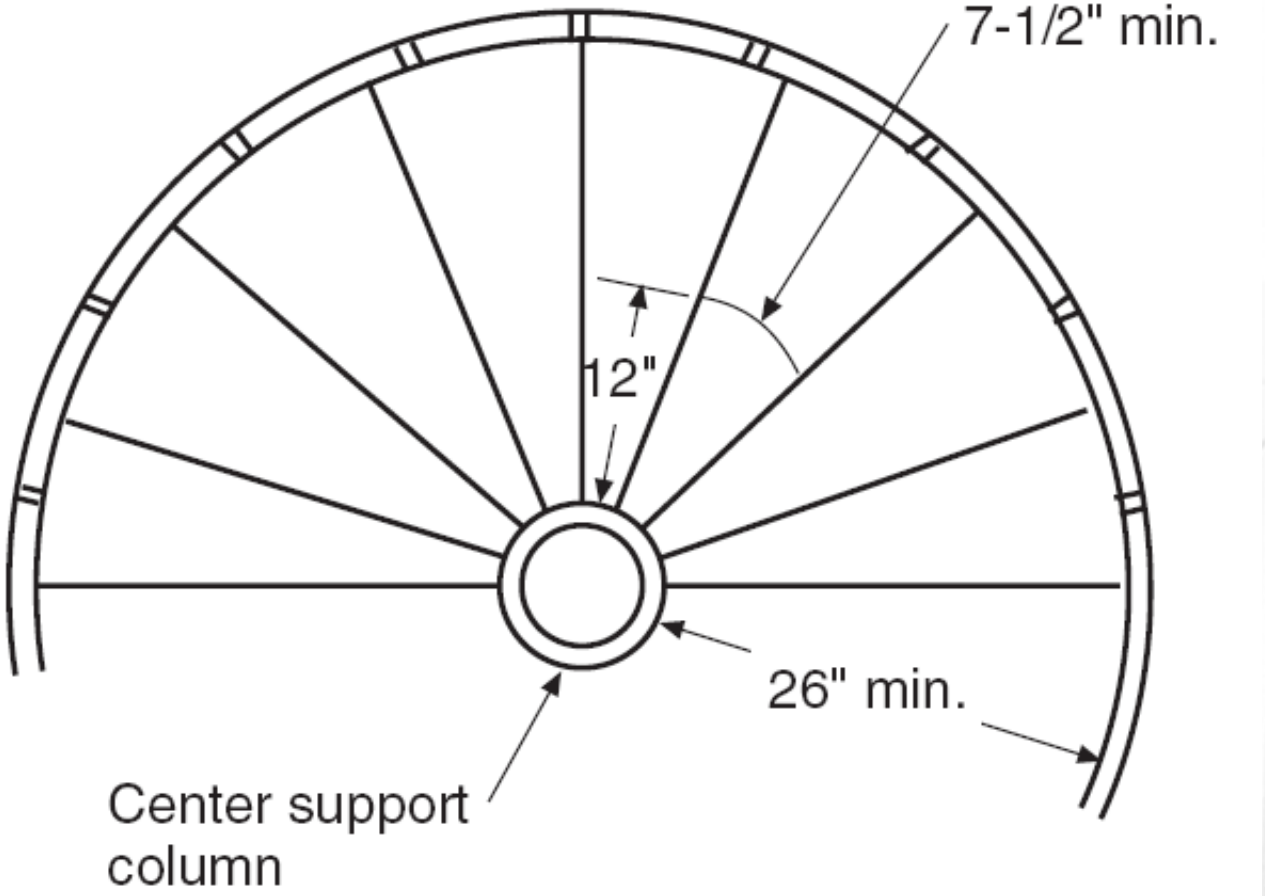
Tread depth is measured at the walkline:
12″ from the inside radius

Width requirement per Section 1005.1

Winder treads may transition from conventional rectangular treads in the same flight of stairs

Spiral Stairways
Section 1011.10

- Spiral stairways can be used as a part of the means of egress if:
  - Located within a dwelling unit
  - Used for egress from a space ≤250 square feet with ≤5 occupants
  - Used for egress from technical production areas

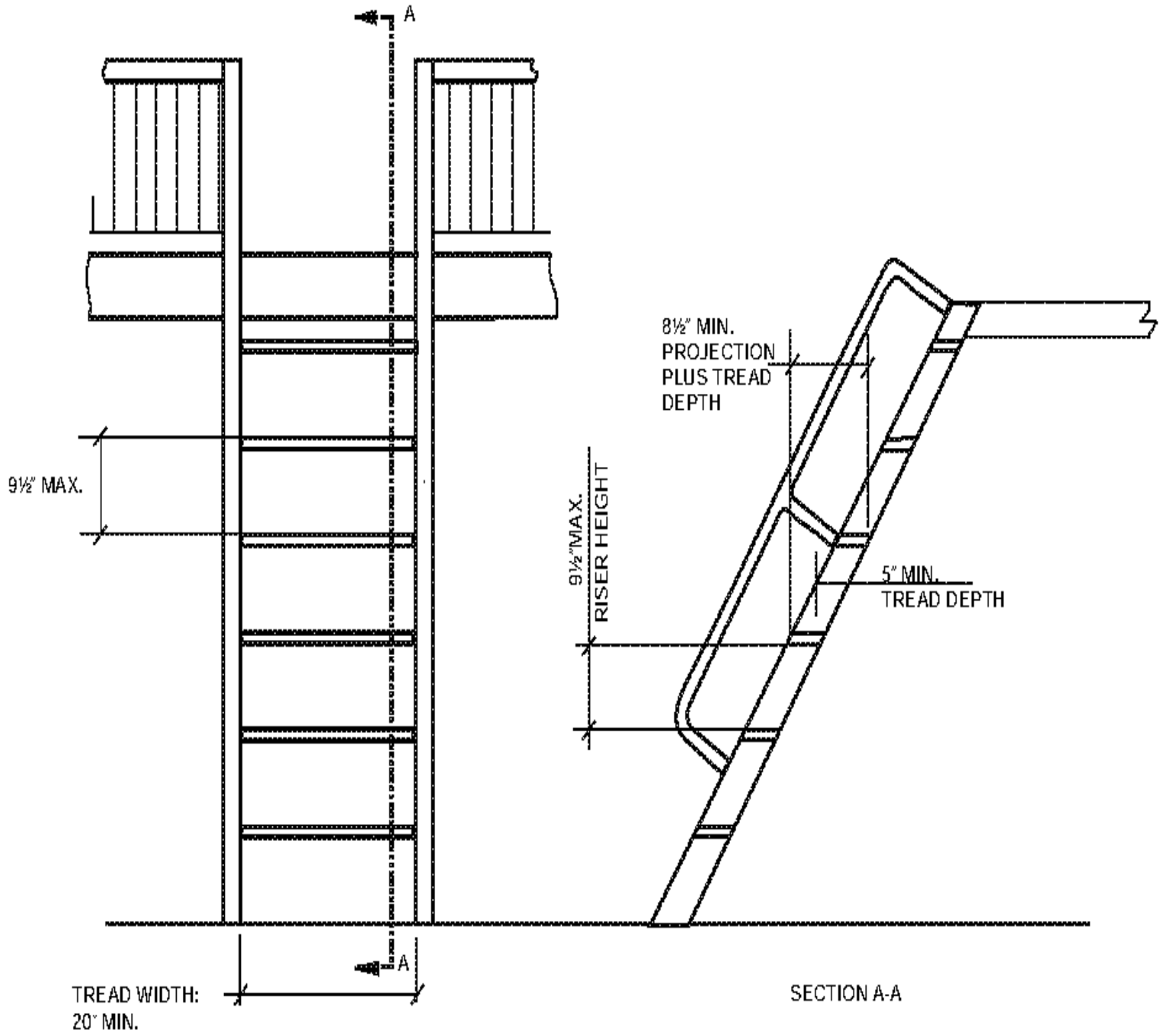


Alternating Tread Devices
Section 1011.14

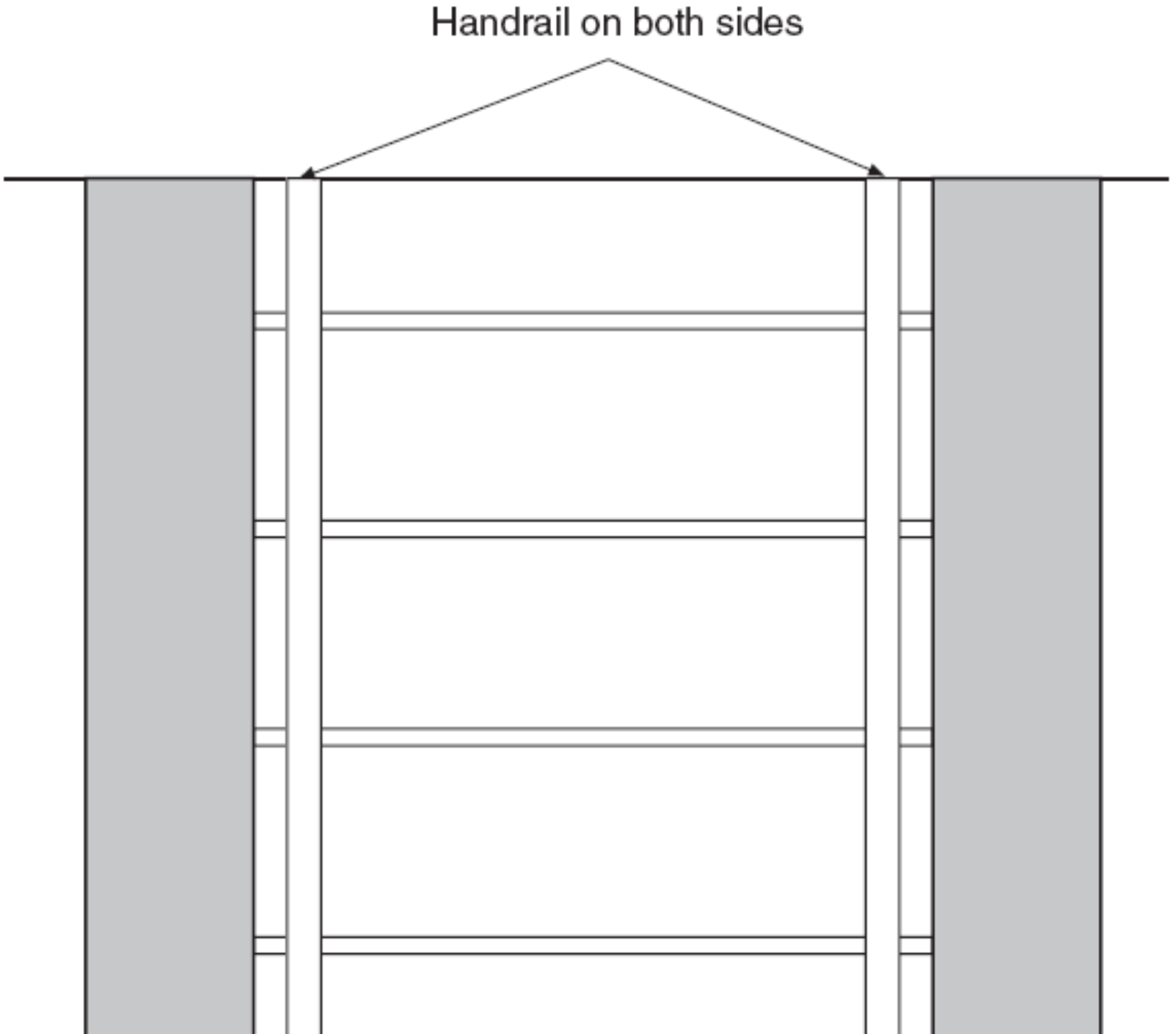
- Allowed as a component of egress in:
  - Groups F, H and S
    - Mezzanine ≤250 square feet with ≤5 occupants
  - Group I-3
    - Observation towers and control rooms in ≤ 250 square feet
  - Access to unoccupied roofs

Ships Ladders
Section 1011.15

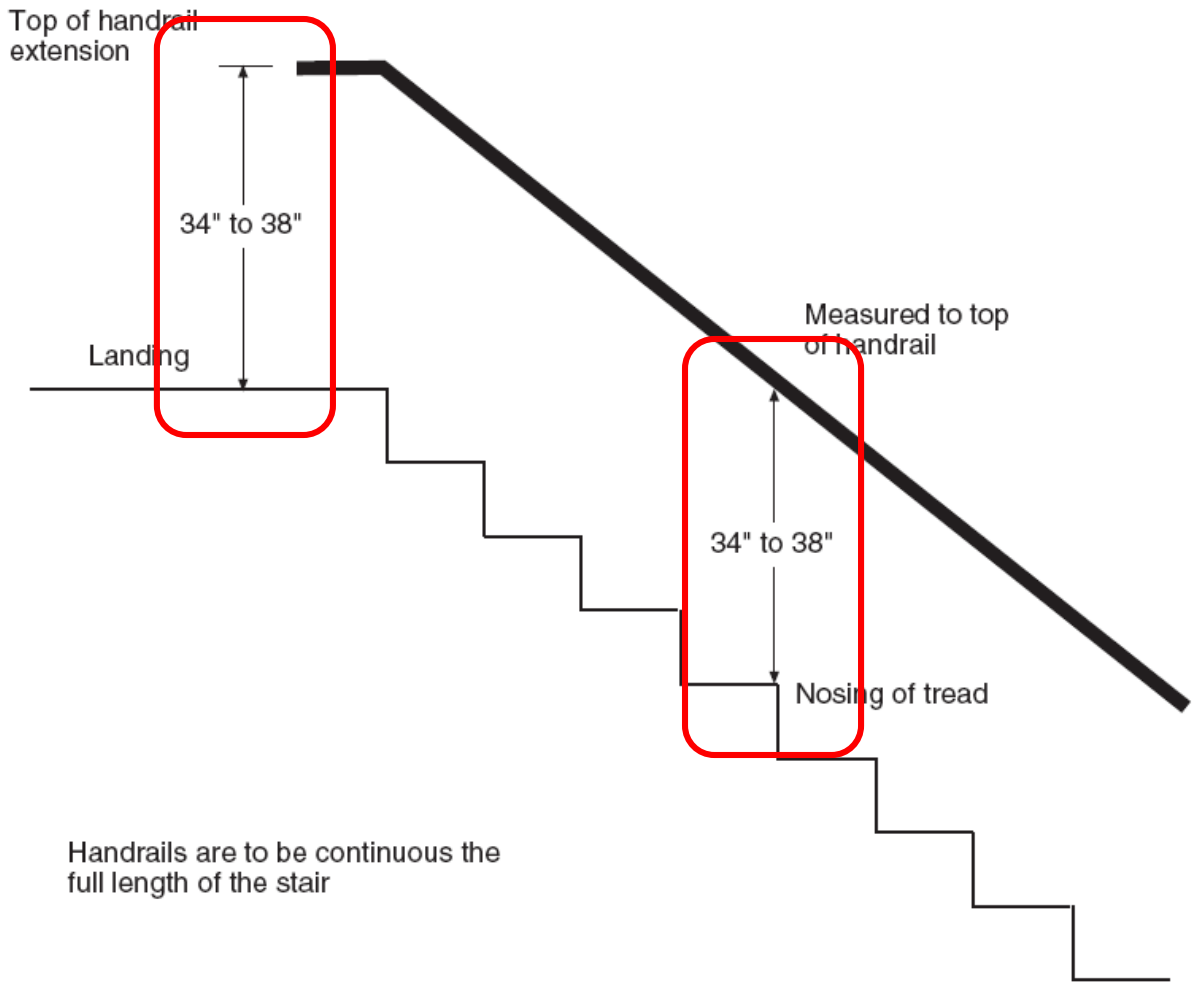
- Allowed for in egress in:
  - Group I-3
    - Observation towers and control rooms in ≤250 square feet with ≤3 occupants
  - Access to unoccupied roofs



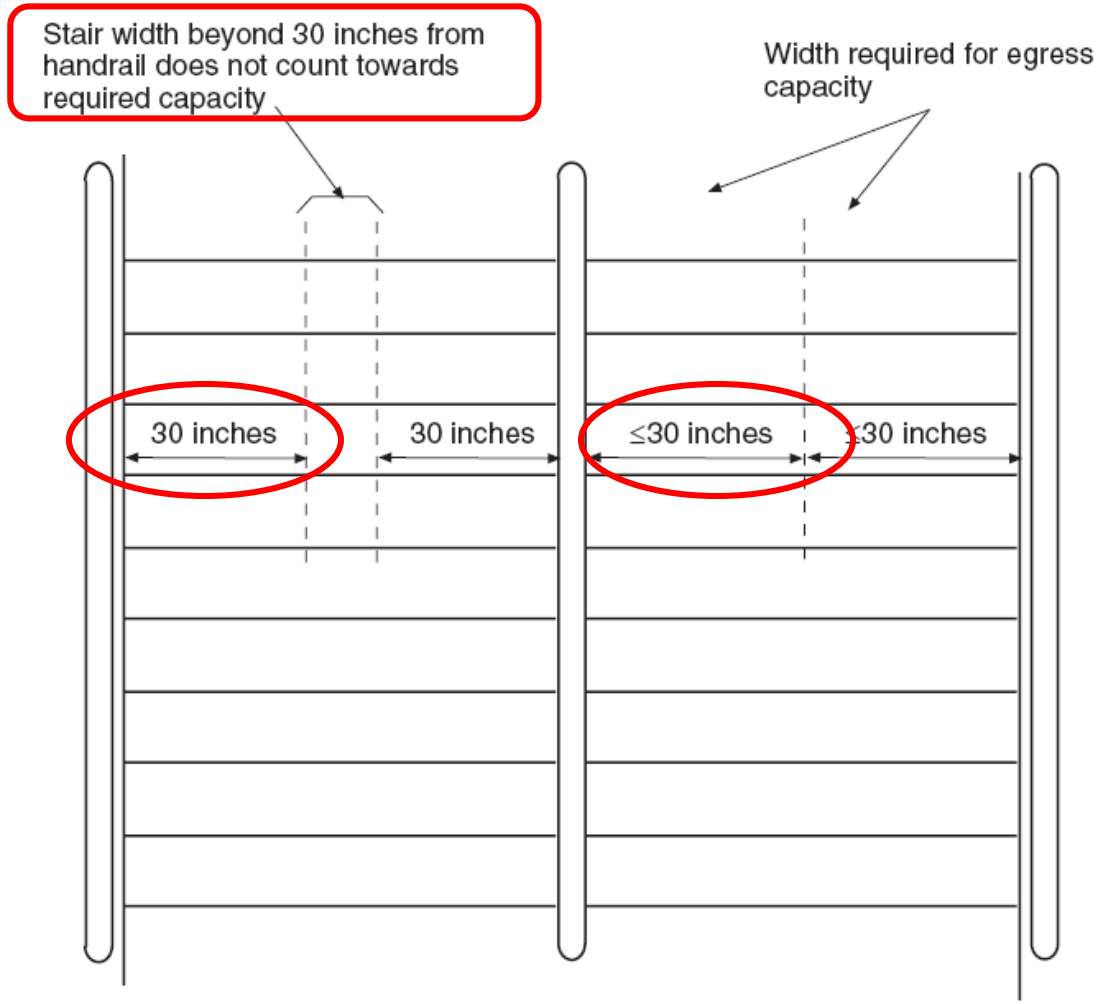
Handrails
Section 1011.11



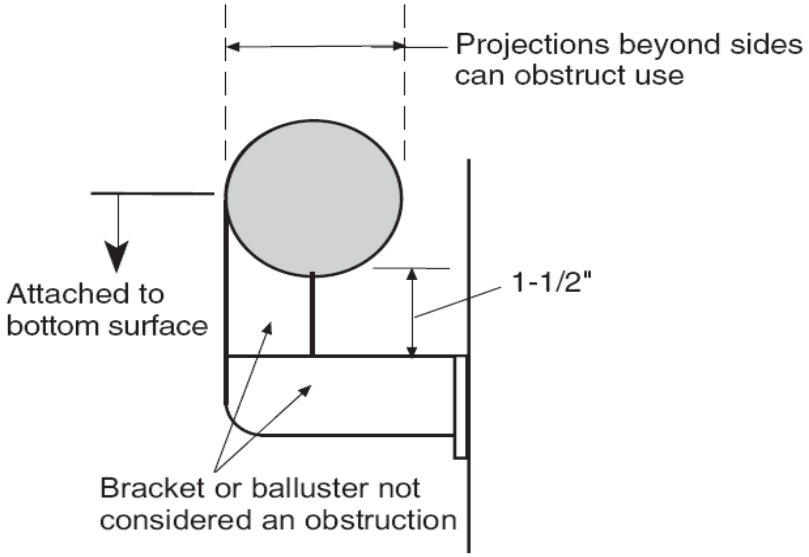
Handrail Height
Section 1014.2

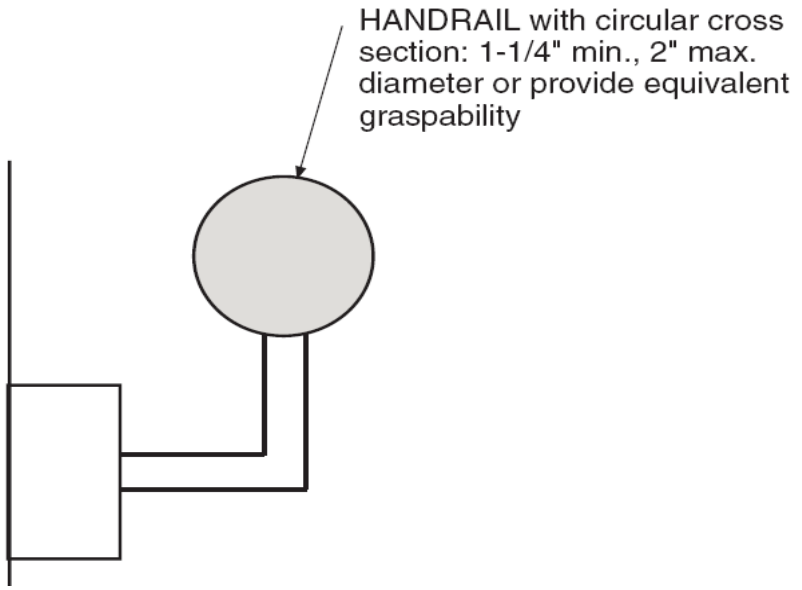


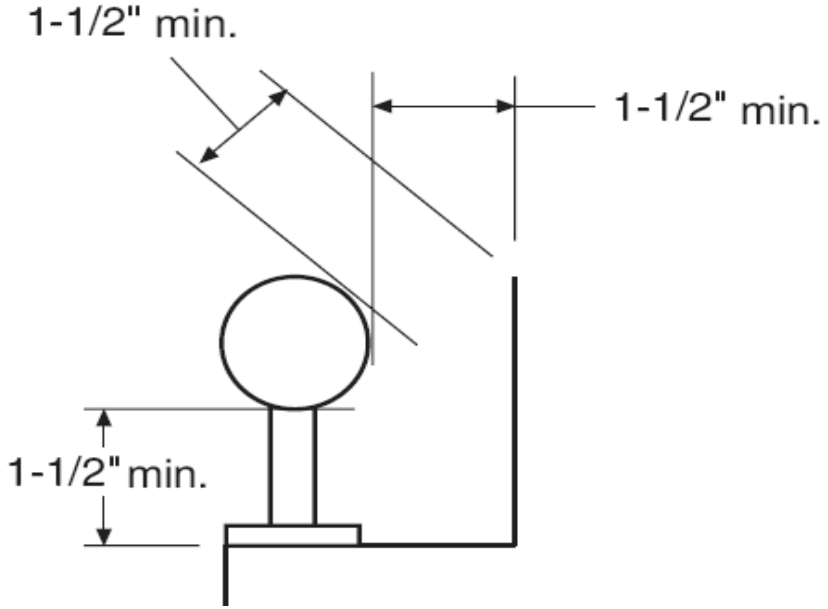
Intermediate Handrails
Section 1014.9

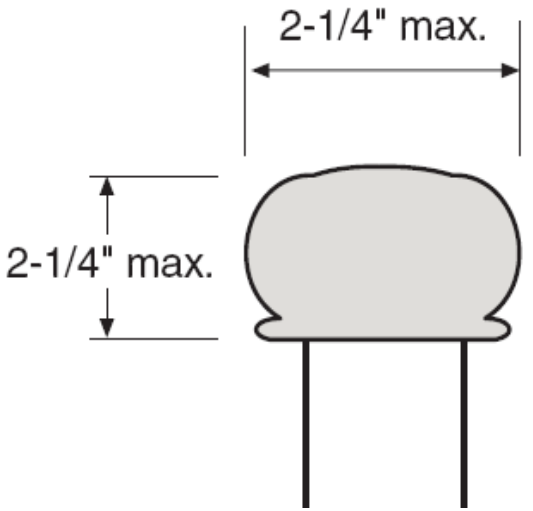


Handrail Graspability – Type I
Section 1014.3



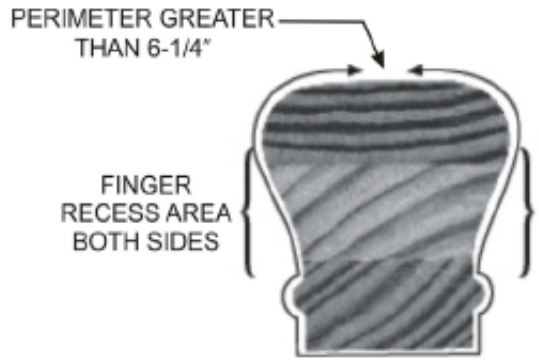




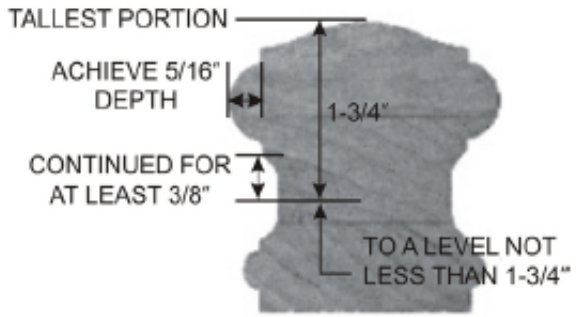


HANDRAIL that is not circular: perimeter of at least 4" but not greater than 6-1/4"

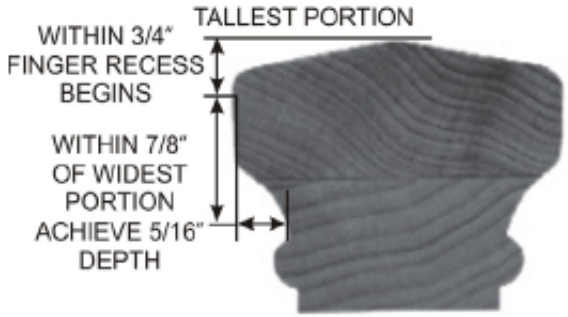
Handrail Graspability – Type II
Section 1014.3



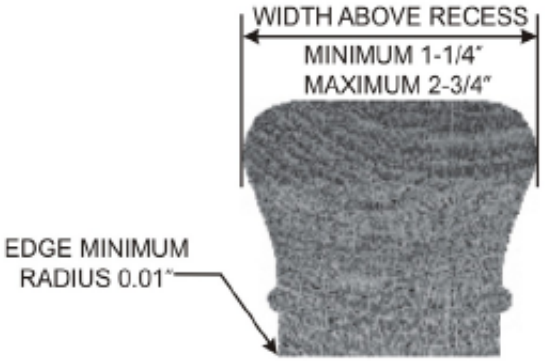
A) PERIMETER



B) FINGER RECESS

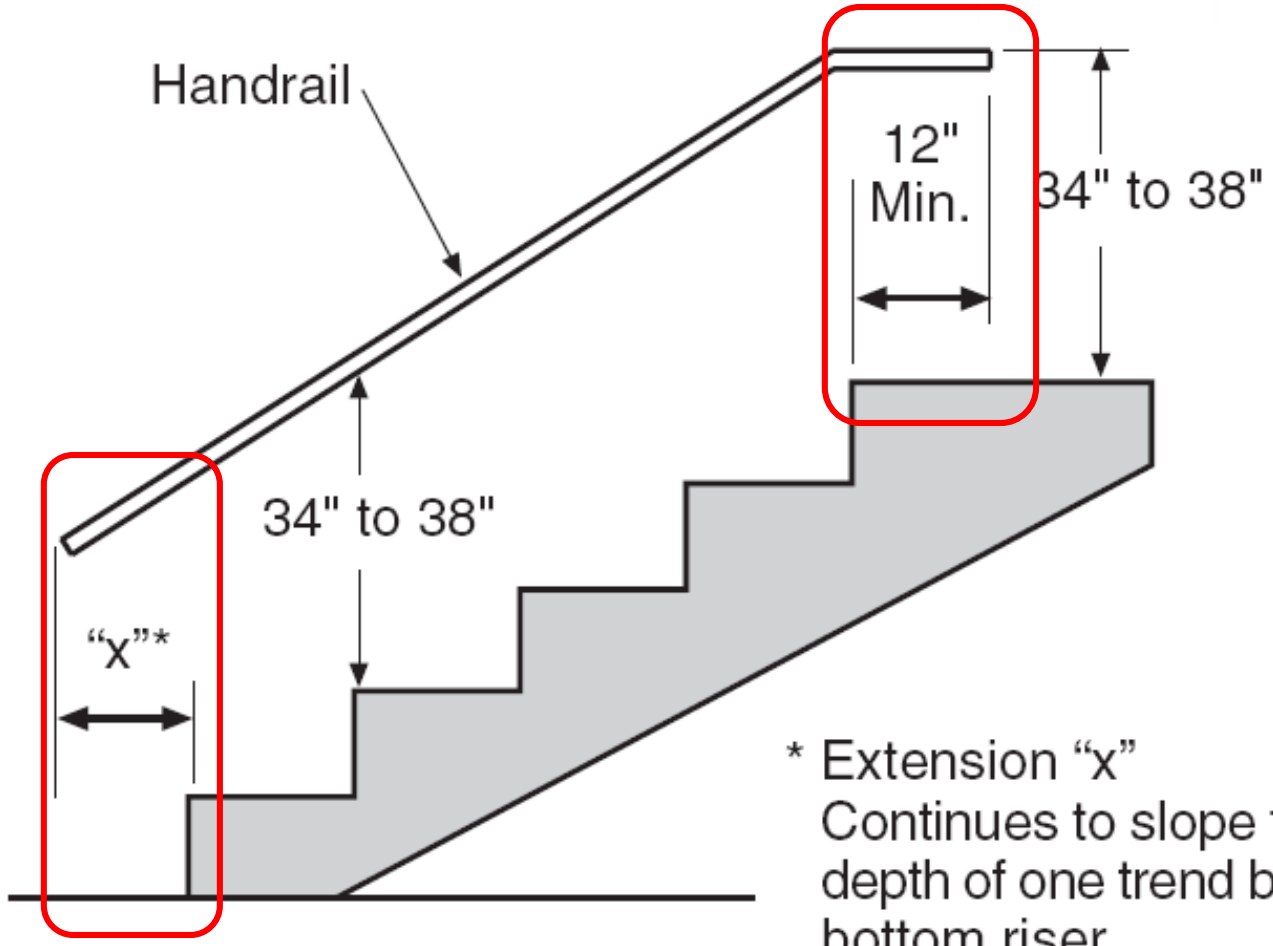


C) FINGER RECESS



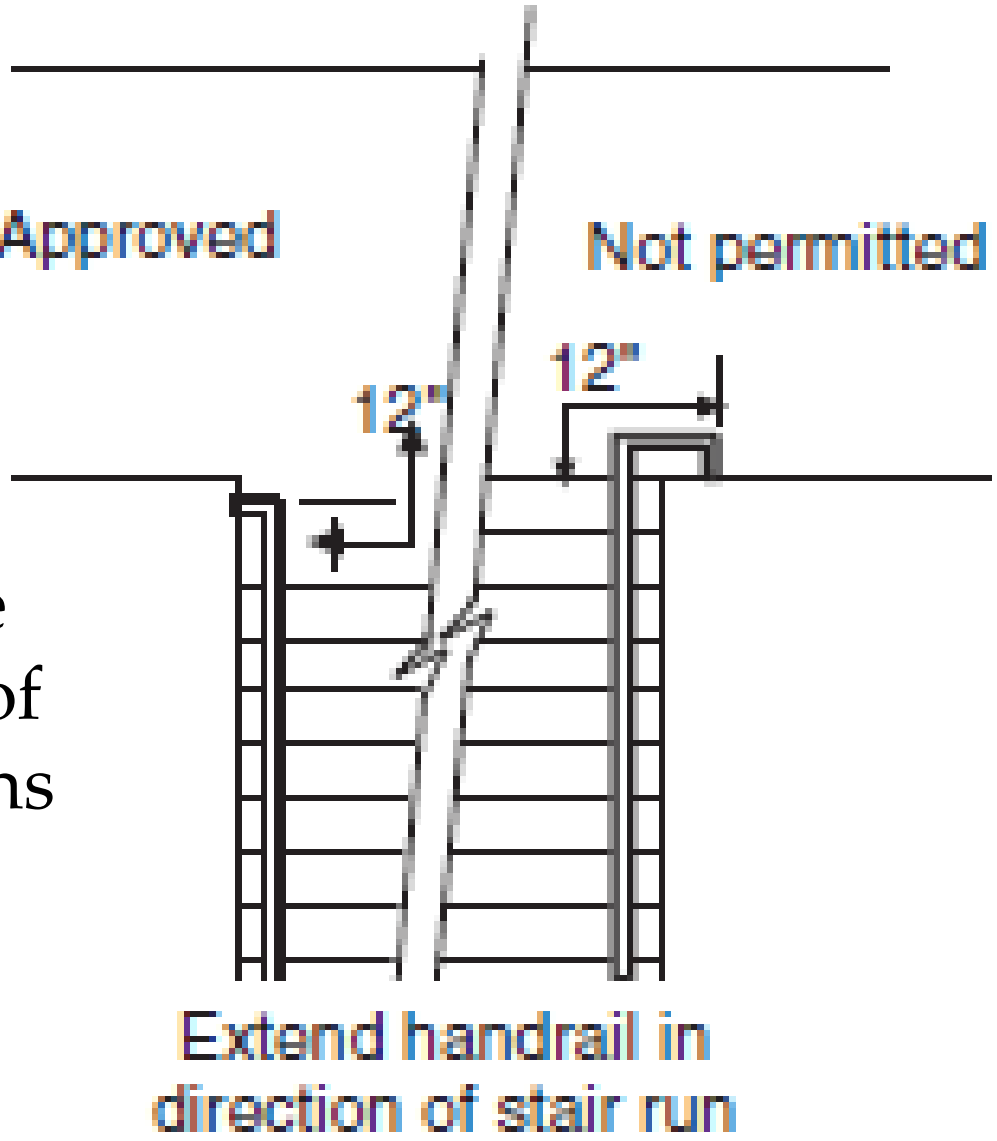
D) WIDTH

Handrail Extensions
Section 1014.6



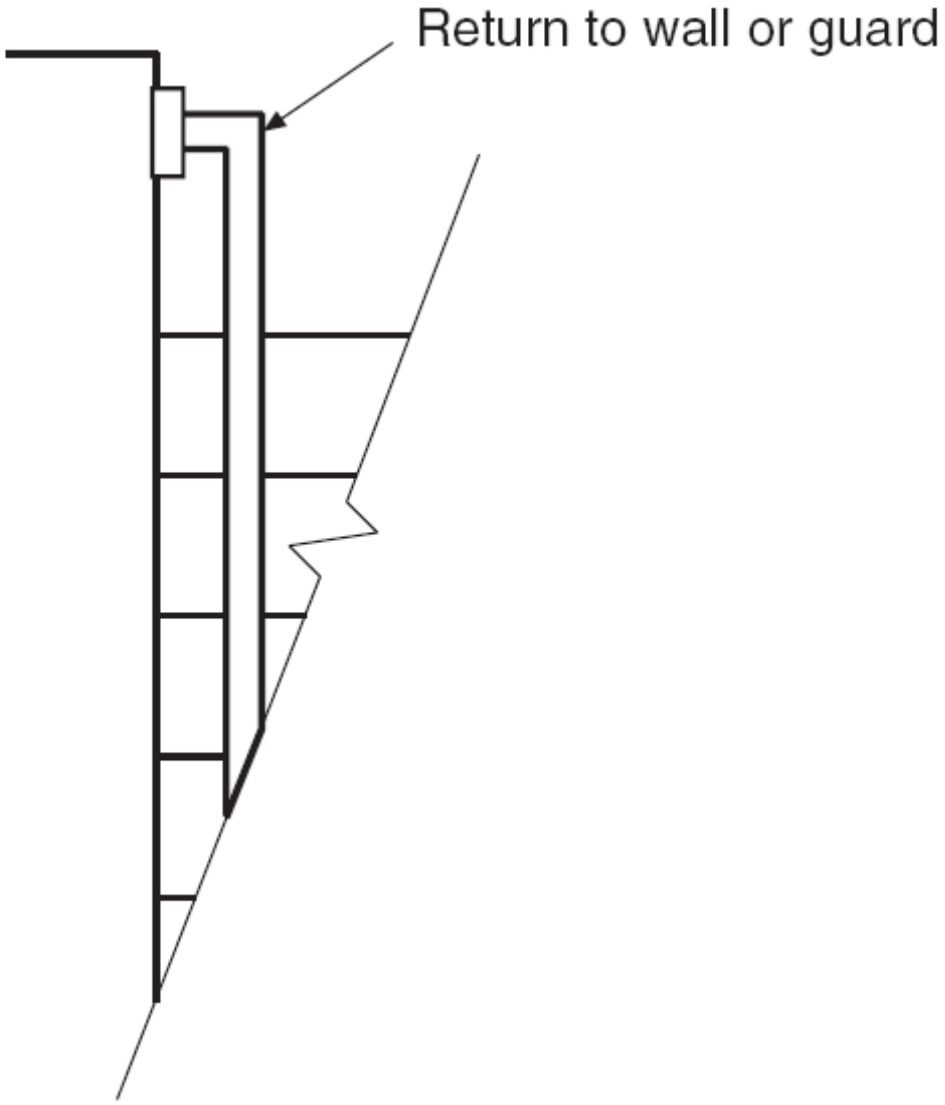
Handrail Extensions
Section 1014.6

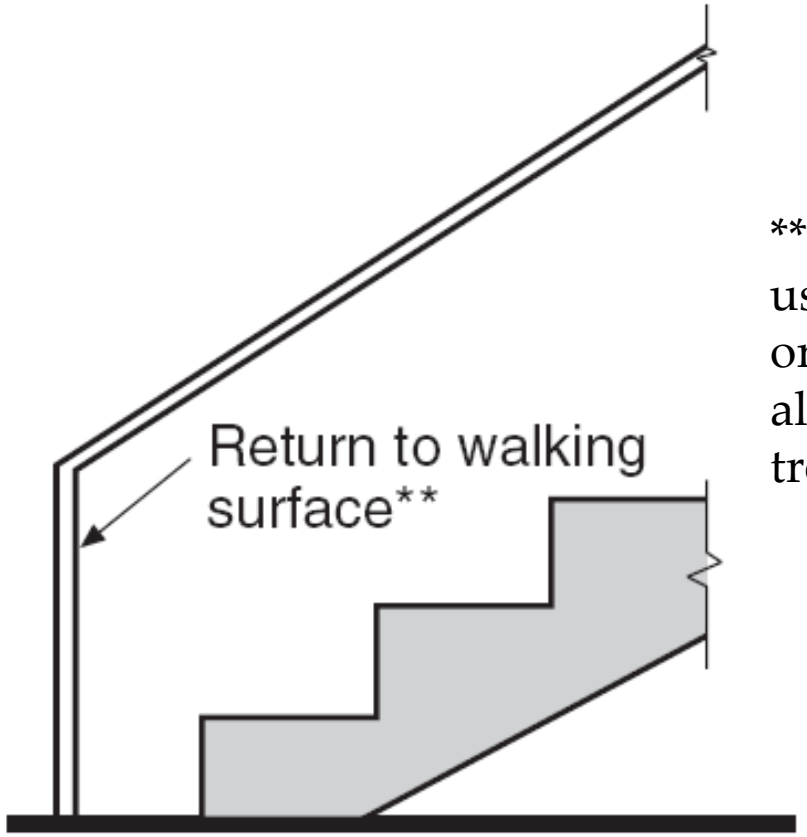
The extensions of handrails shall be in the same direction of the flights of stairs at stairways and the ramp runs at ramps.



For SI: 1 inch = 25.4 mm.

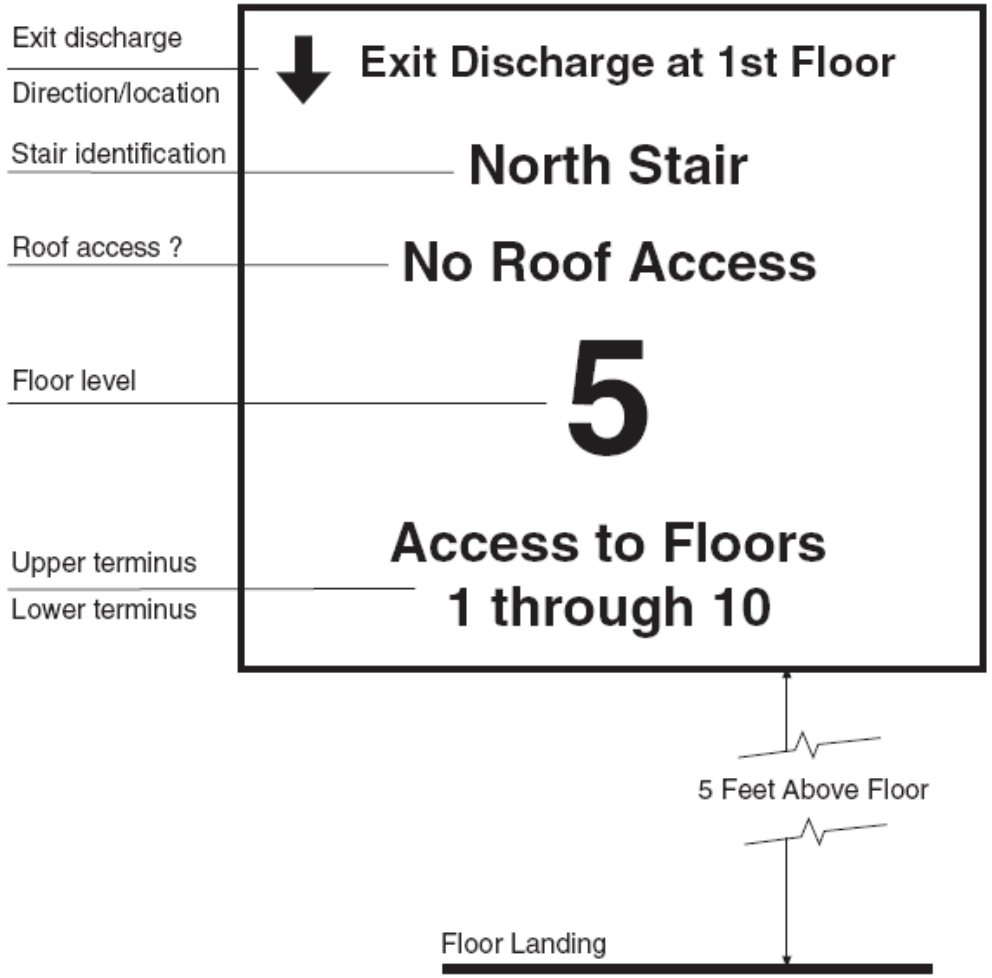
Handrail Extensions
Section 1014.6





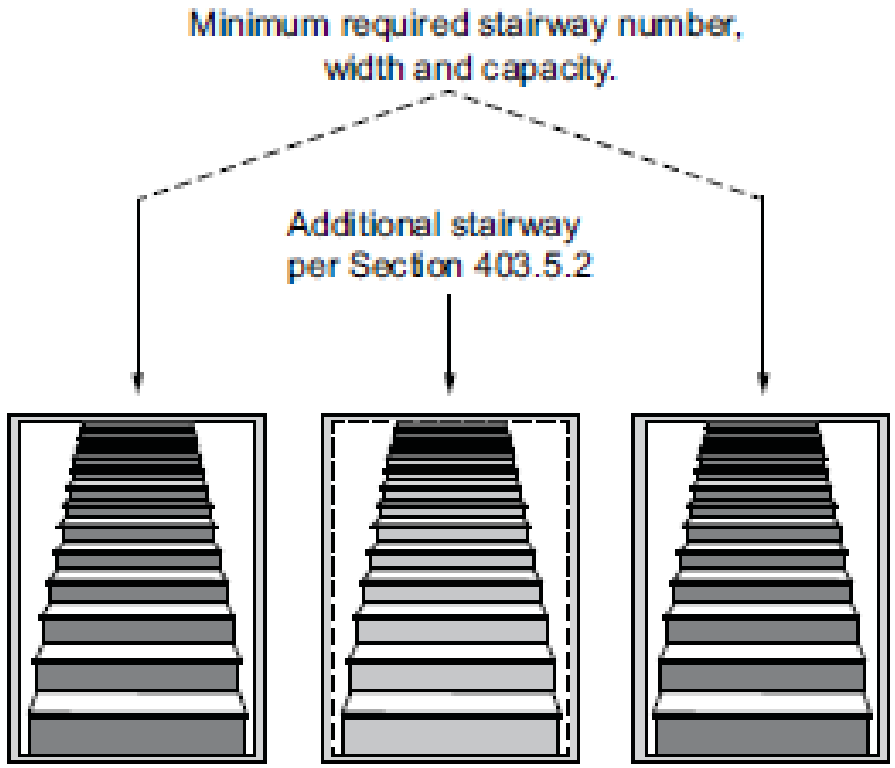
**Within a dwelling unit, use of a volute, turnout or starting easing is allowed on the lowest tread

Stairway Identification Signs
Section 1023.9



Additional Interior Exit Stairways
Section 403.5.2

- Additional exit stairway for high-rise buildings >420', other than Group R-2
- Required egress width must be provided with one stairway removed
- Not required in buildings provided with occupant evacuation elevators



Remoteness of stair enclosures to comply with Section 403.5.1
***Not required for Group R-2**

For SI: 1 inch = 25.4 mm.

Slope
Section 1012.2

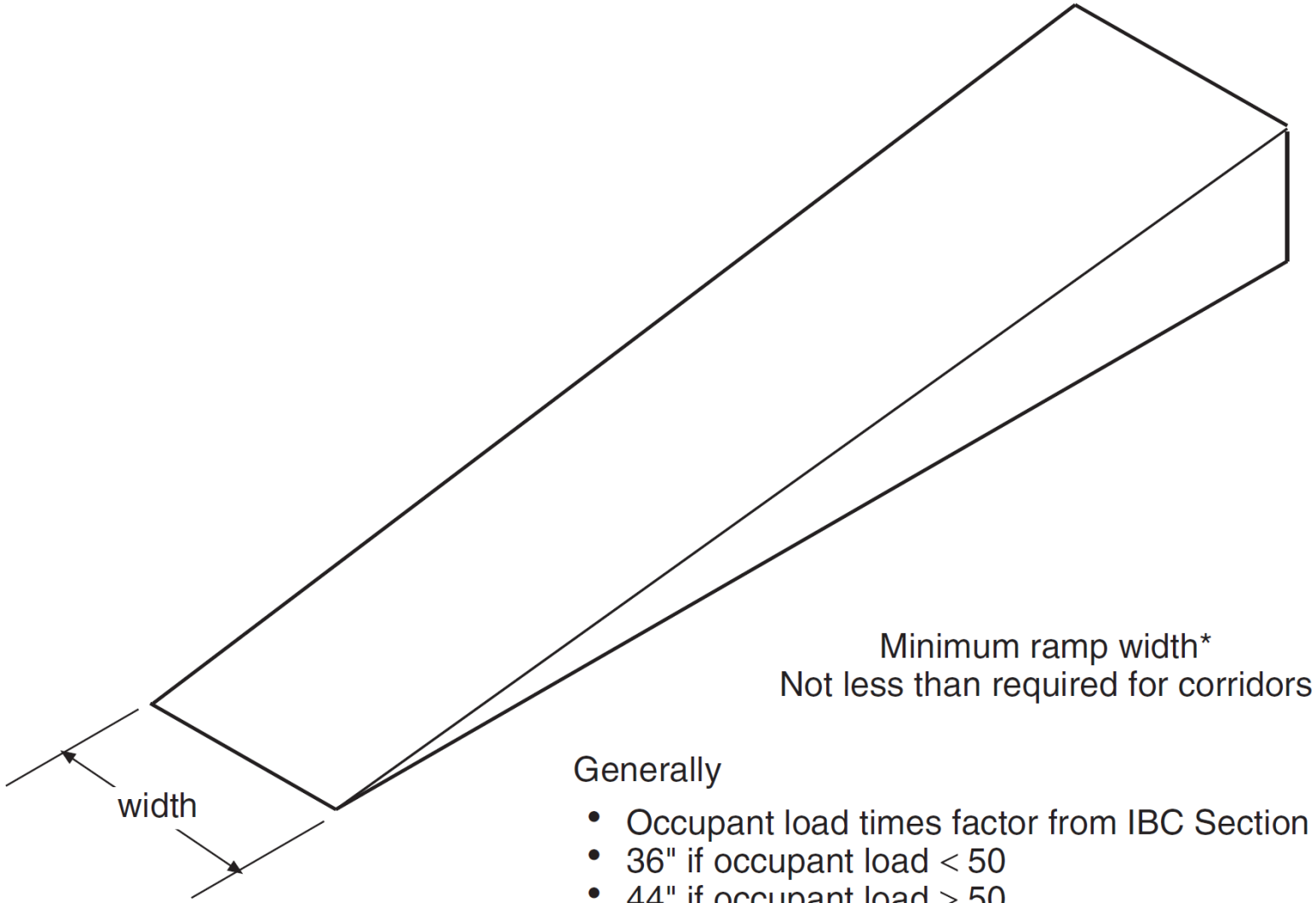
1:12 max. (8.3% Slope)

Ramp used as a part of a means of egress

1:8 max. (12.5% Slope)

For all other ramps and aisle ramps in Group A Occupancies

Width and Capacity
Section 1012.5.1



Minimum ramp width*
Not less than required for corridors

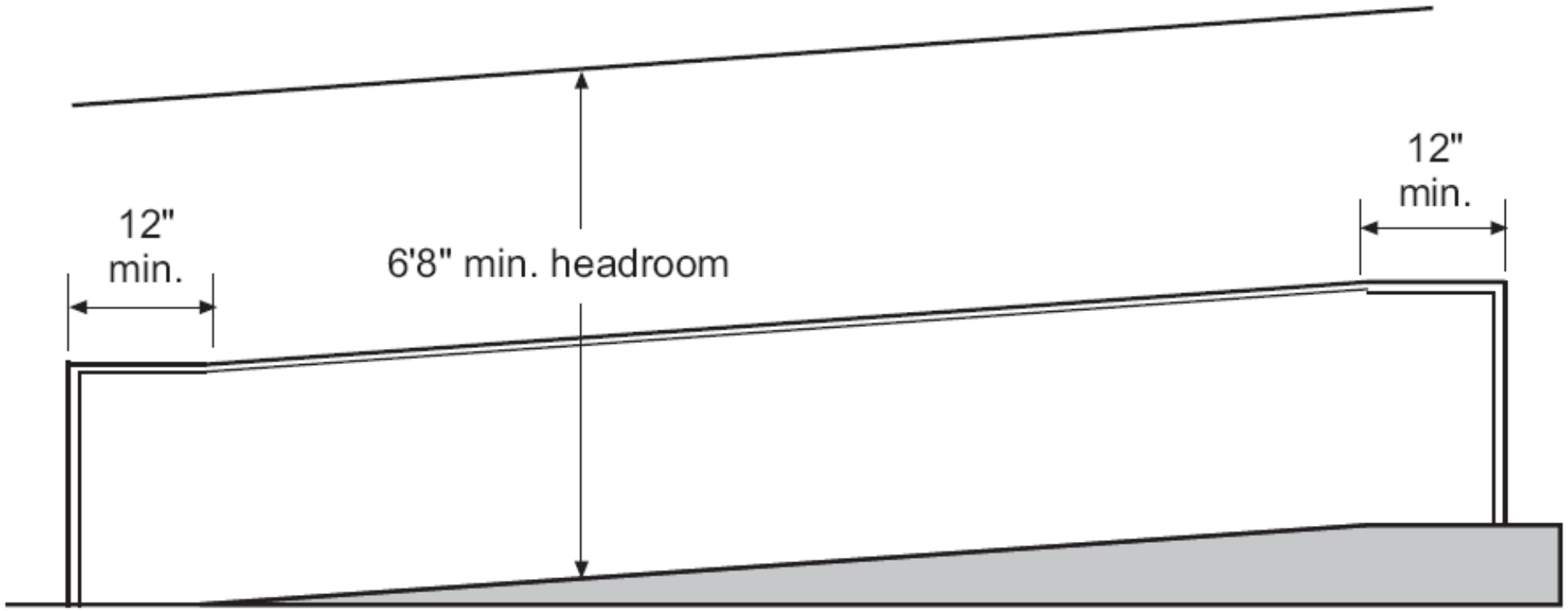
Generally

- Occupant load times factor from IBC Section 1005
- 36" if occupant load < 50
- 44" if occupant load ≥ 50

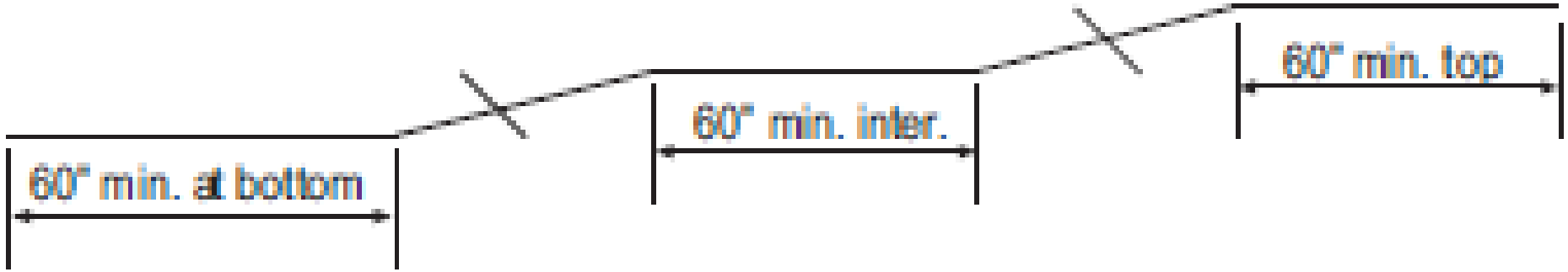
* permitted projections may reduce clear width. Handrails may project 4-1/2" per side; a minimum clear width of 36" is required between handrails.

For SI: 1 inch = 25.4 mm.

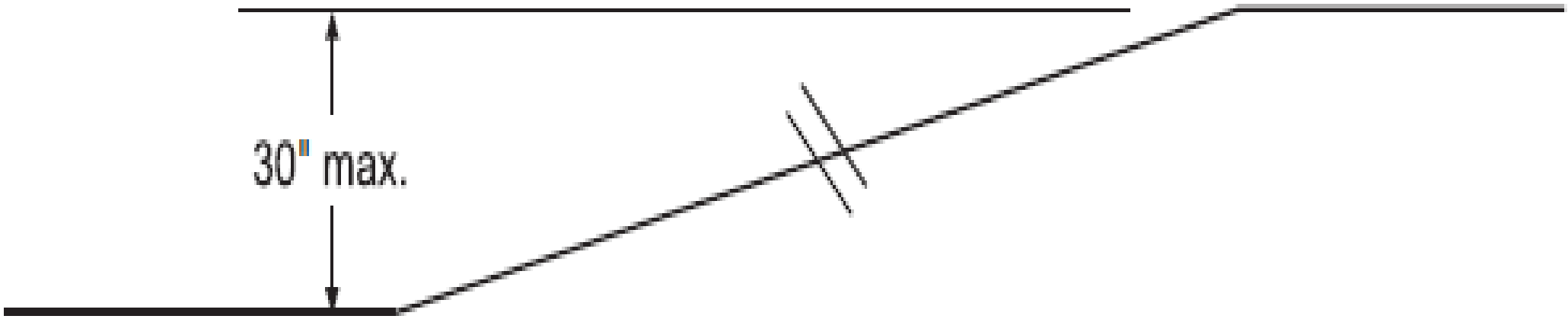
Headroom
Section 1012.5.2



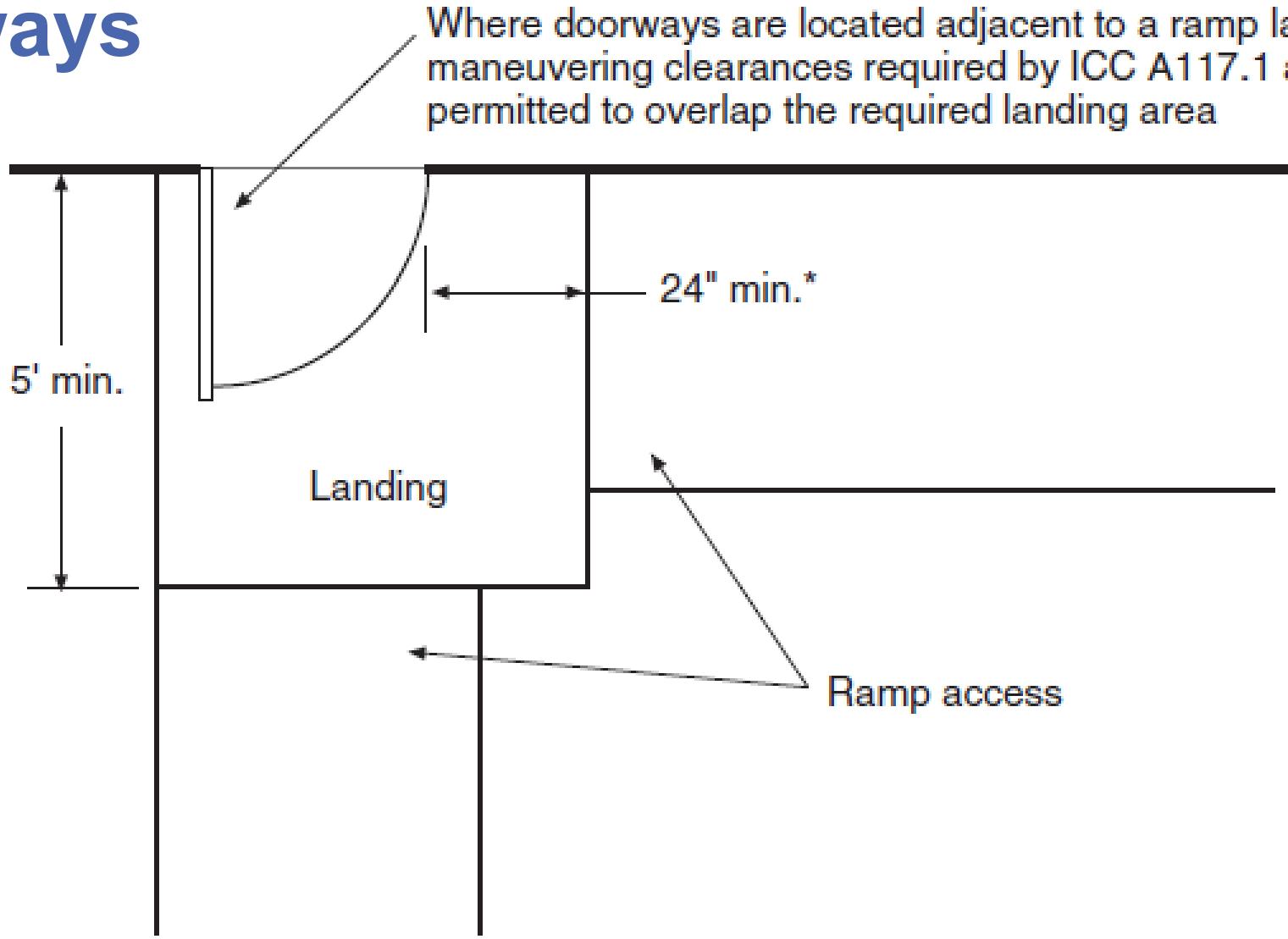
Landings
Section 1012.6



For SI: 1 inch = 25.4 mm.



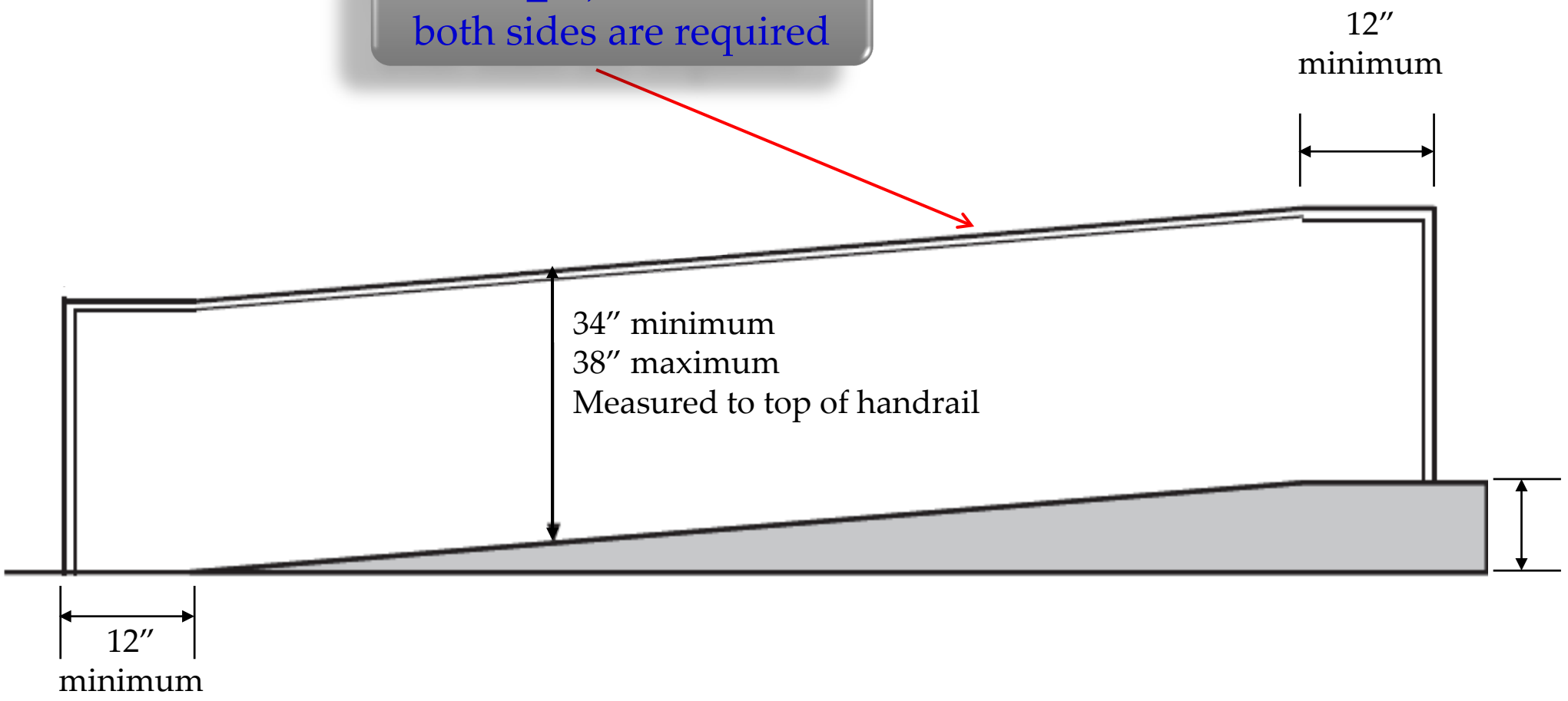
Landings at Doorways
Section 1012.6.5



* **Note:** There are multiple possibilities of required space on either side of doors related to accessibility (see ICC A117.1, Section 404.2.4) and direction of approach

Handrails
Section 1012.8

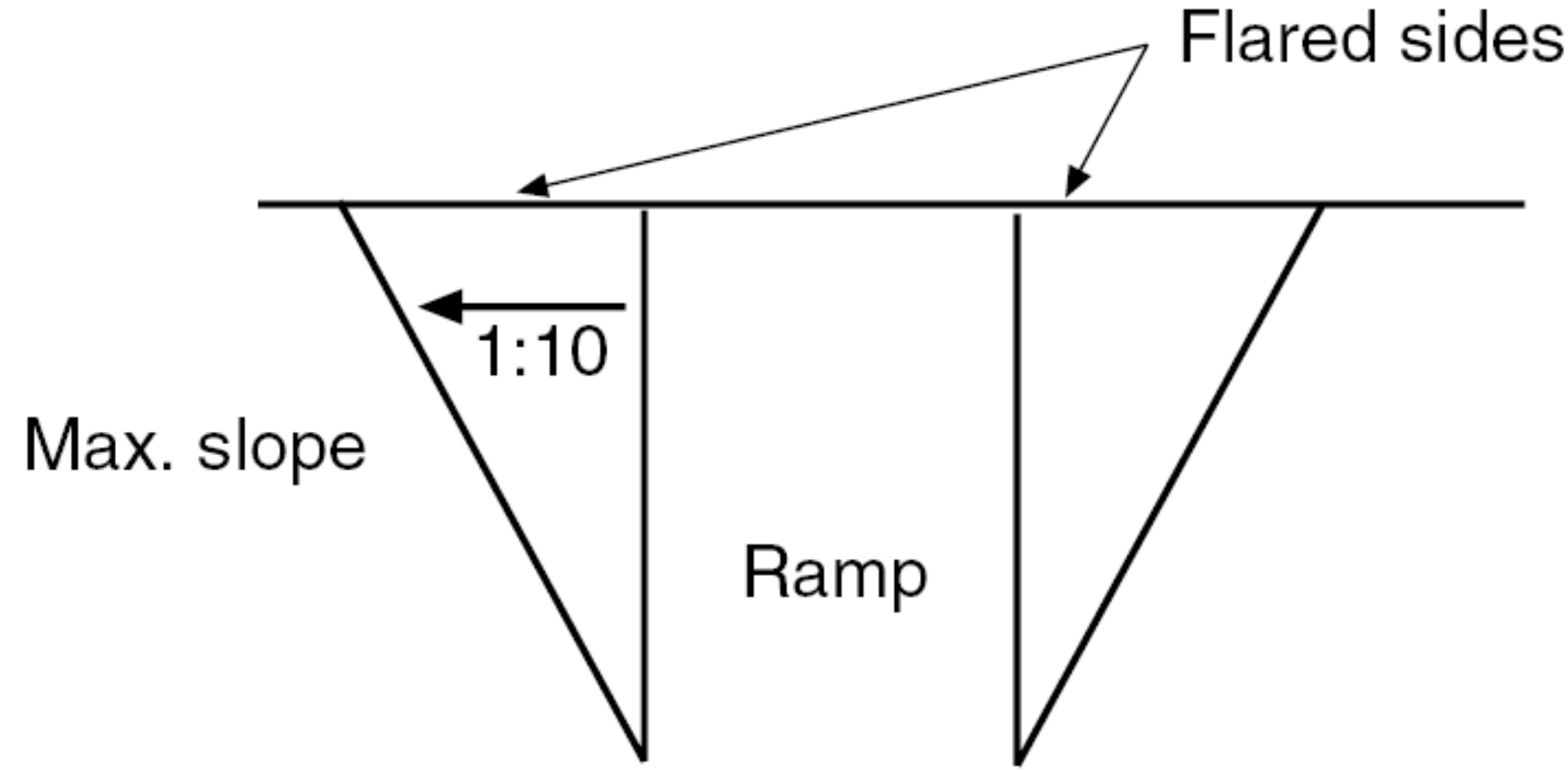
When ≥6″, handrails on both sides are required



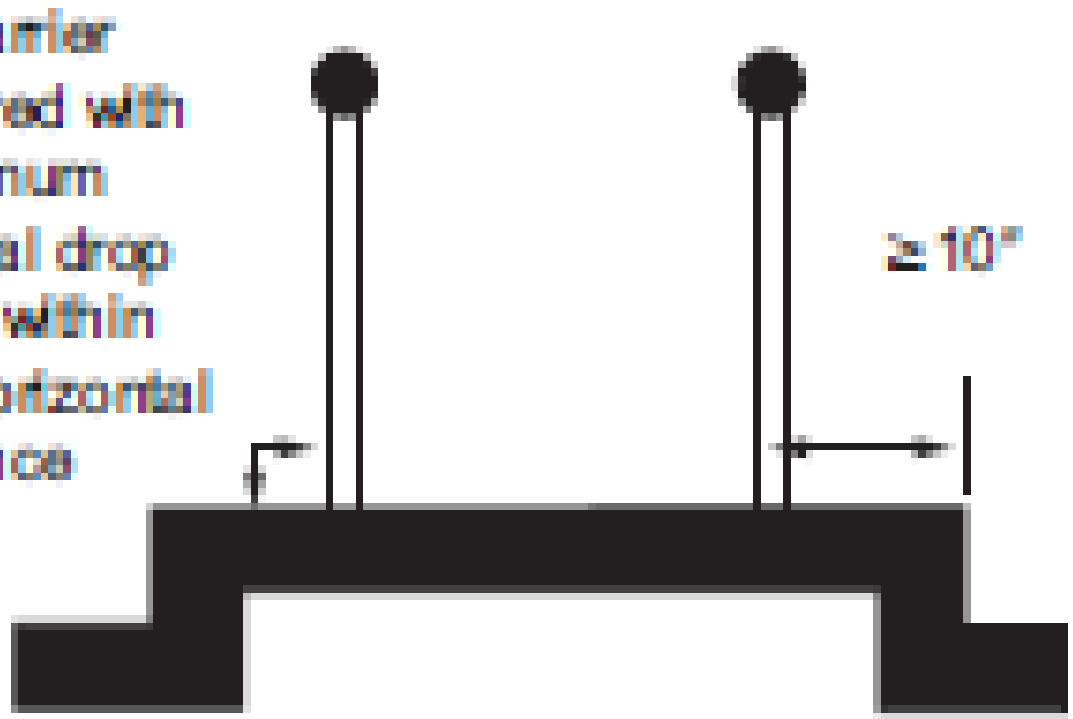
Edge Protection
Section 1012.10, Exceptions

- Edge protection is required along ramps and ramp landings except:
  - Ramps not required to have handrails, provided they have flared sides that comply with the ICC A117.1 curb ramp provisions.
  - On the sides of ramp landings serving an adjoining ramp run or stairway.
  - On the sides of ramp landings having a vertical drop off of not more than ½” within 10” horizontally of the required landing area.

Edge Protection Not Required
Section 1012.10, Exception 1

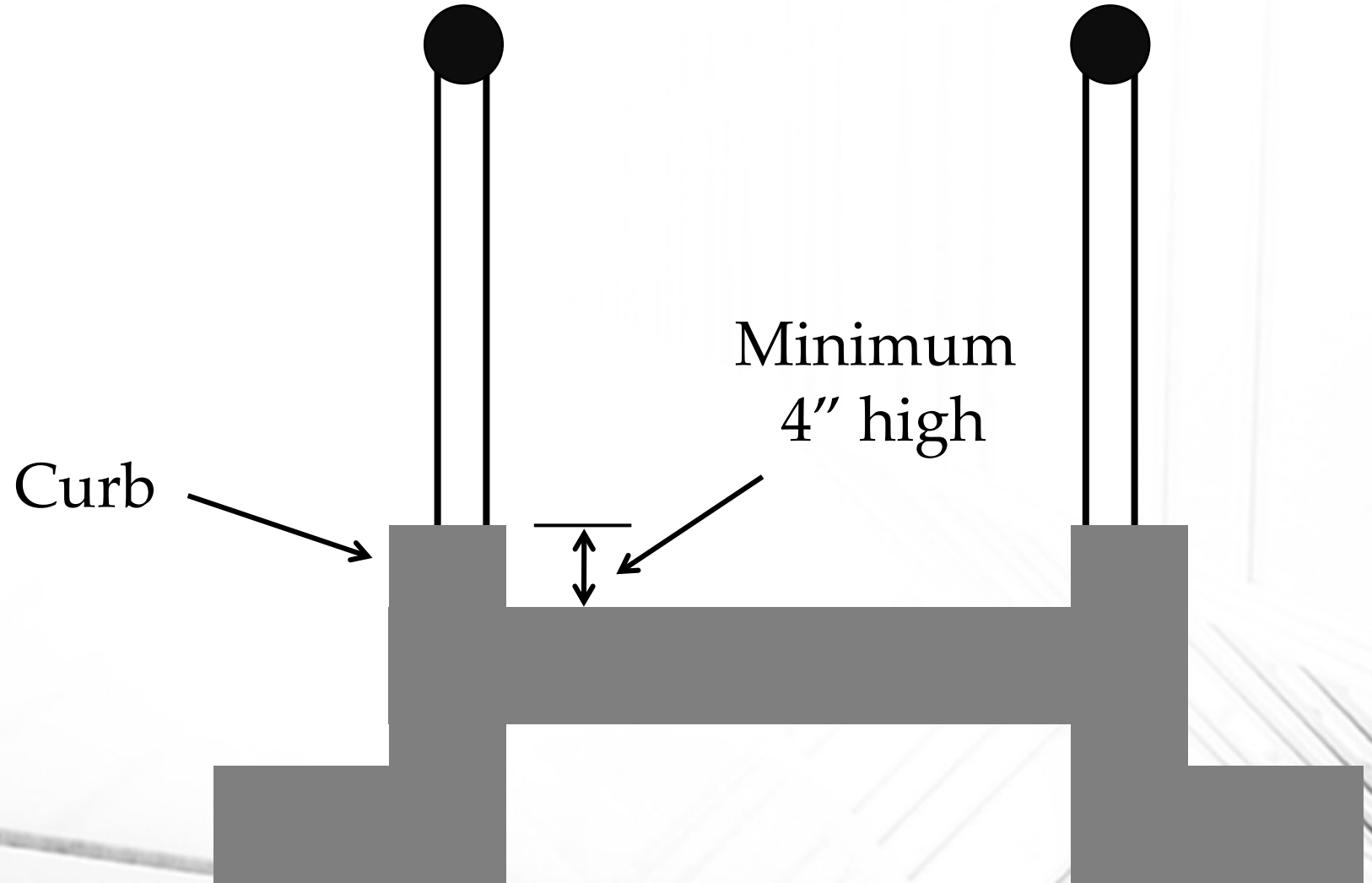


Edge Protection Not Required
Section 1012.10, Exception 3

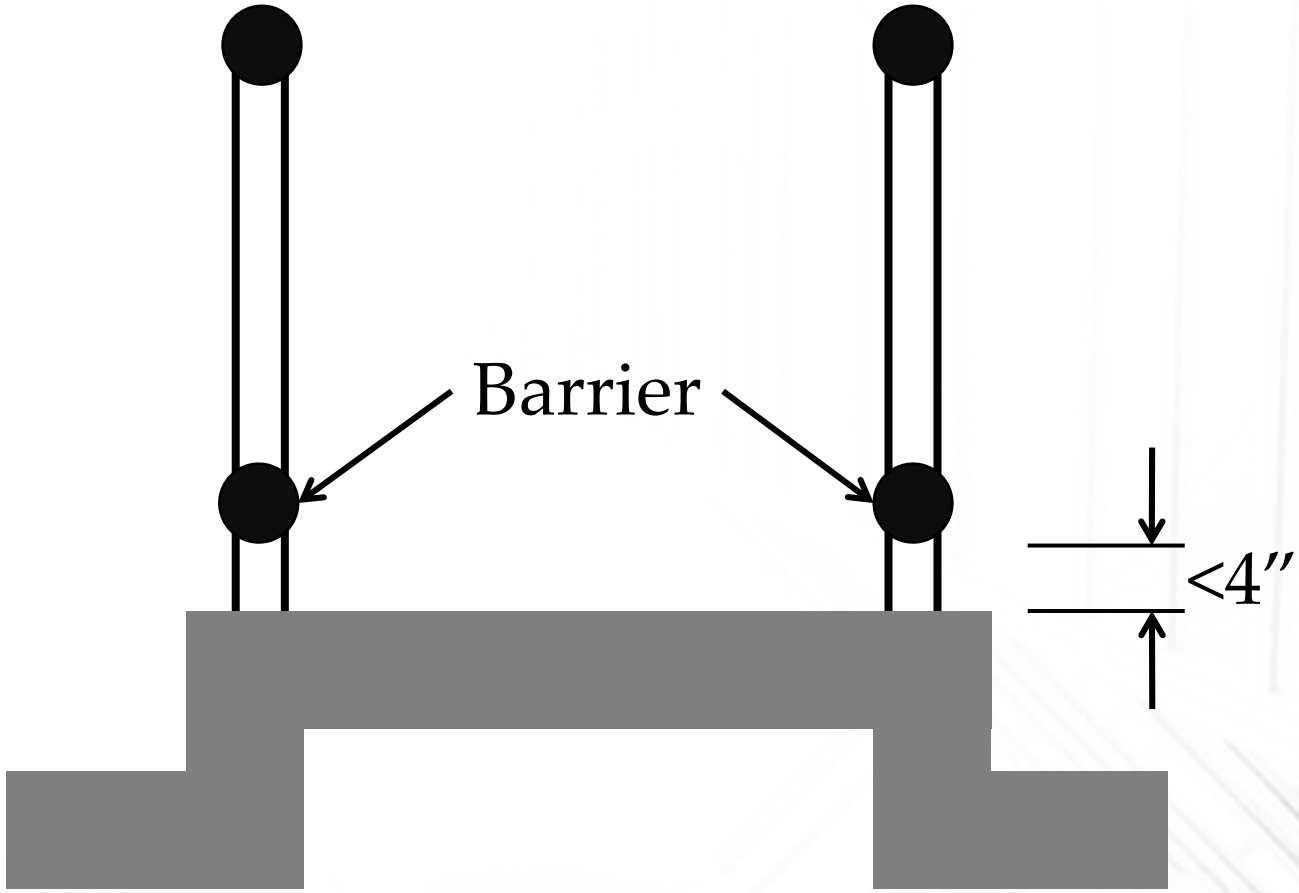


For SI: 1 inch = 25.4 mm.

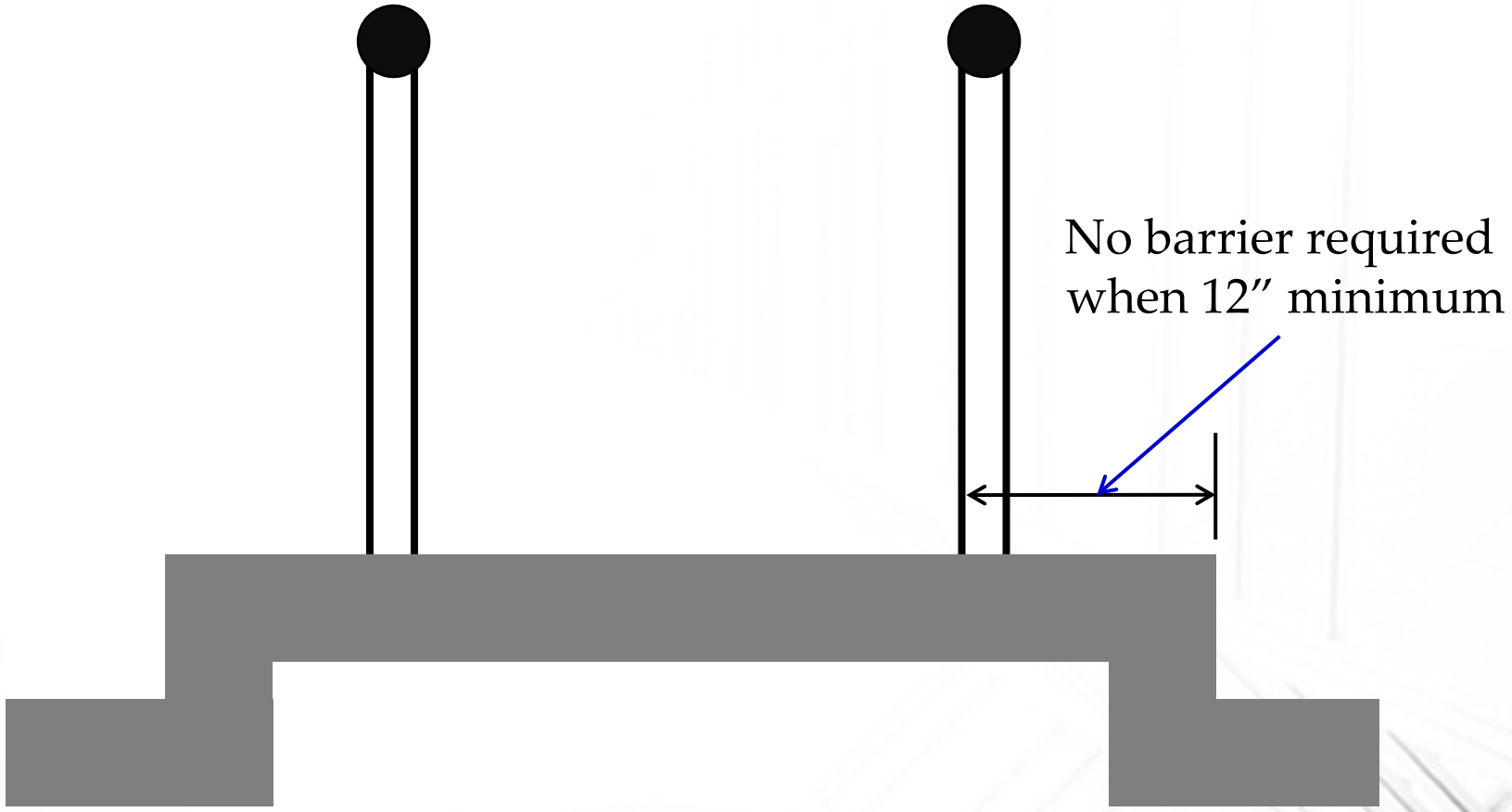
Curb, Rail, Wall or Barrier
Section 1012.10.1



Curb, Rail, Wall or Barrier
Section 1012.10.1

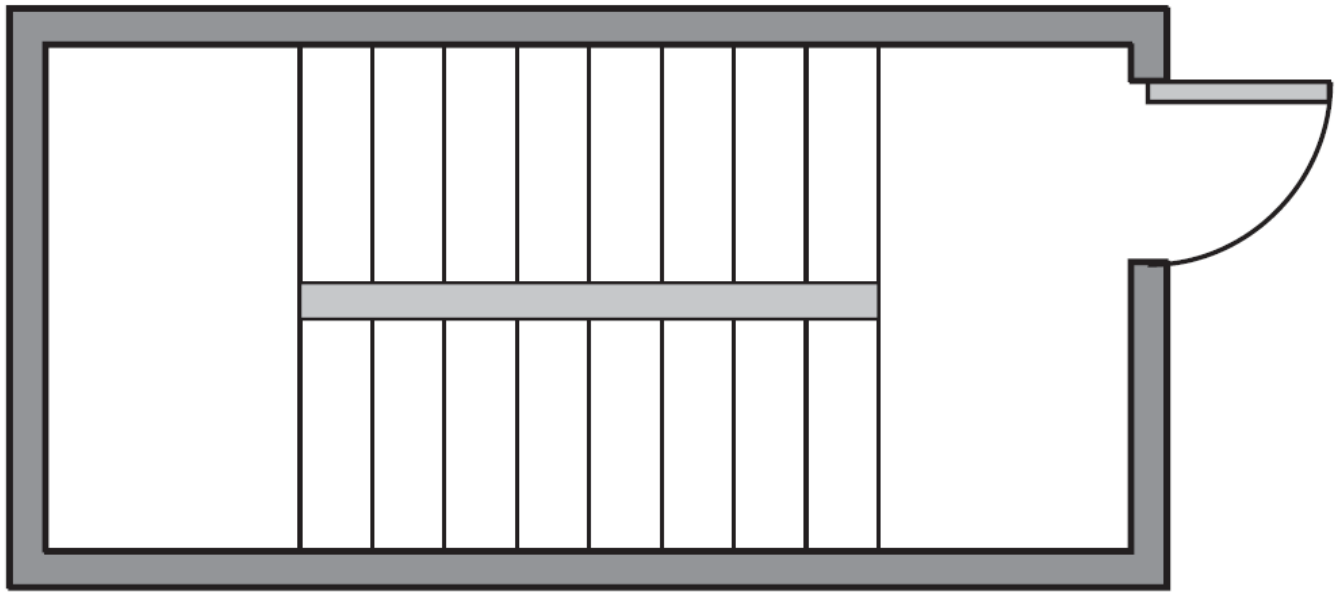


Extended Floor or Ground Surface
Section 1012.10.2



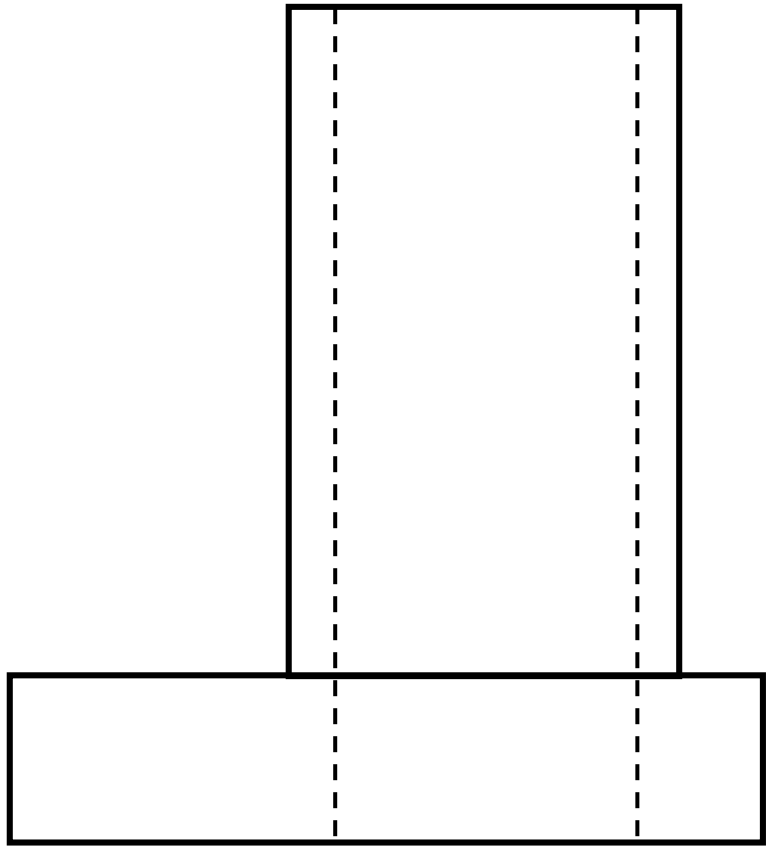
Enclosure (required for Interior Exit Stairways) Section 1023.2

- All interior exit stairways shall be enclosed



NOTE: this applies to “interior exit stairways”, not “interior exit access stairways”

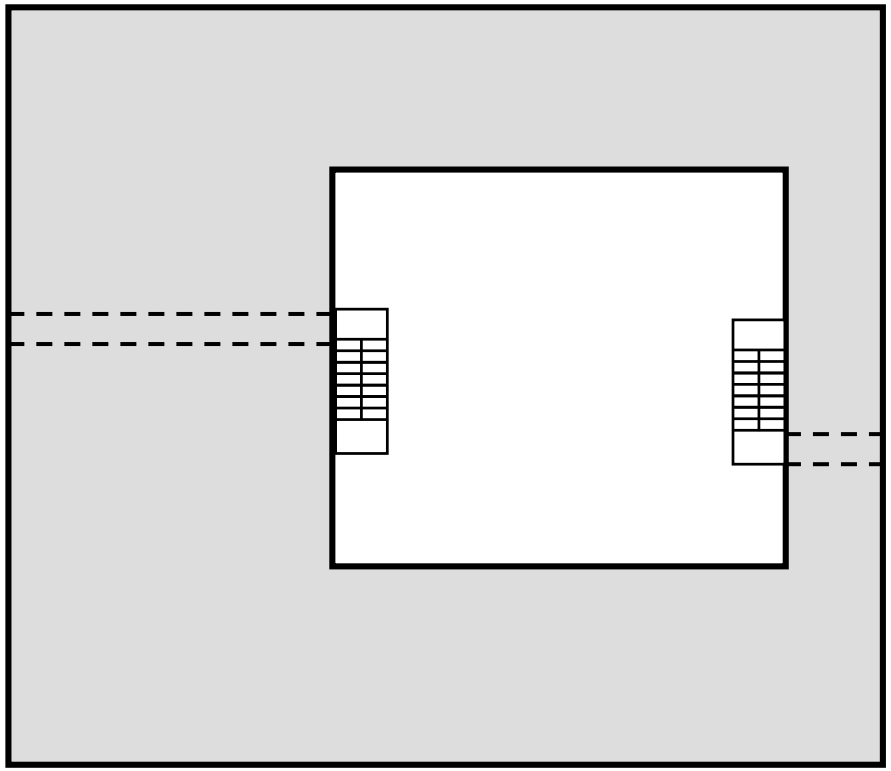
Enclosure (required for Interior Exit Stairways) Section 1023.2



Enclosure construction:
- ≥4 stories = 2-HR fire-resistance
- <4 stories = 1-HR fire-resistance

Openings and penetrations:
- Exit doors
- Equipment and ductwork necessary for ventilation
- Sprinkler and standpipe piping
- Electrical raceway for FD communication
- Electrical raceway serving the stairway or ramp

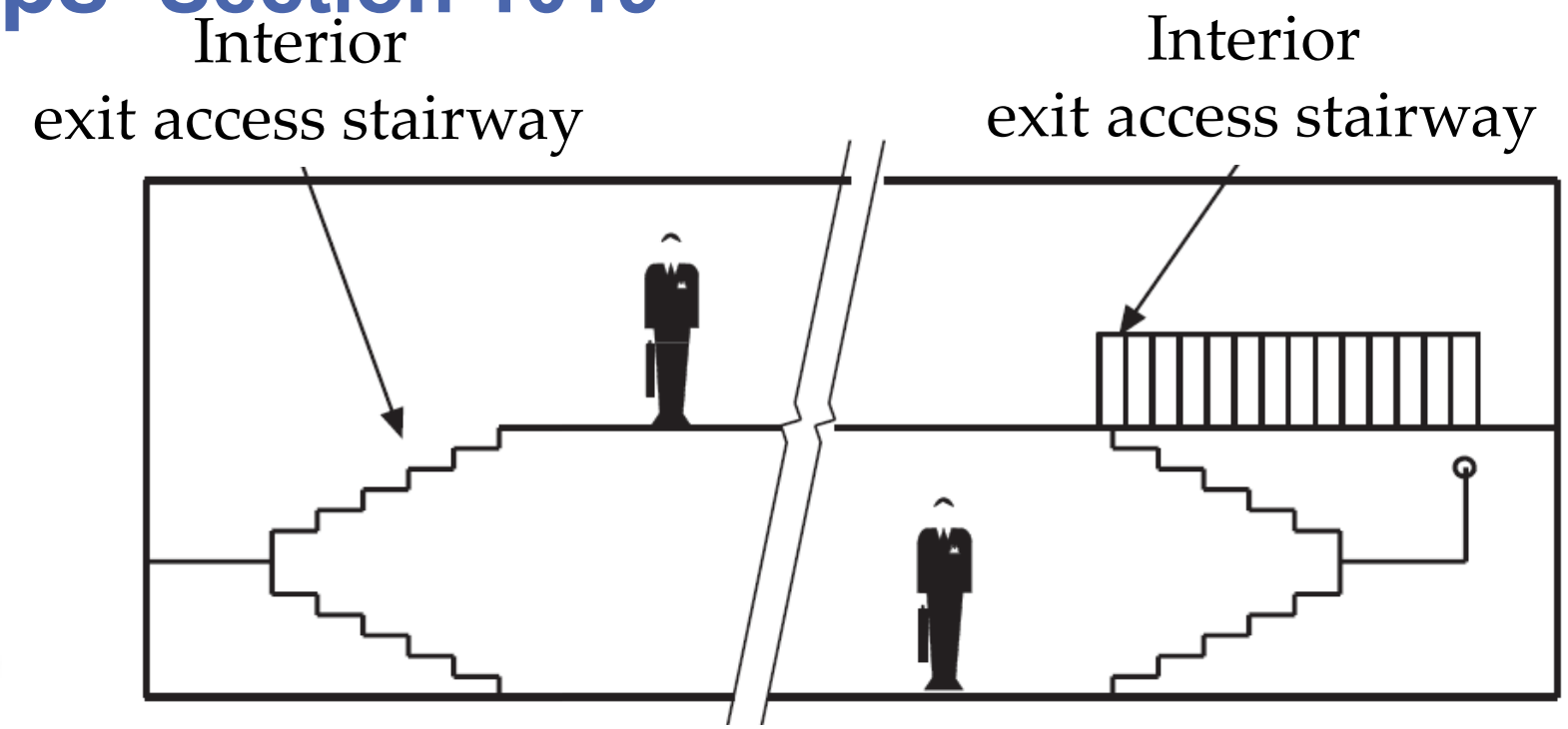
Enclosure (required for Interior Exit Stairways) Section 1023.2



Door assemblies:

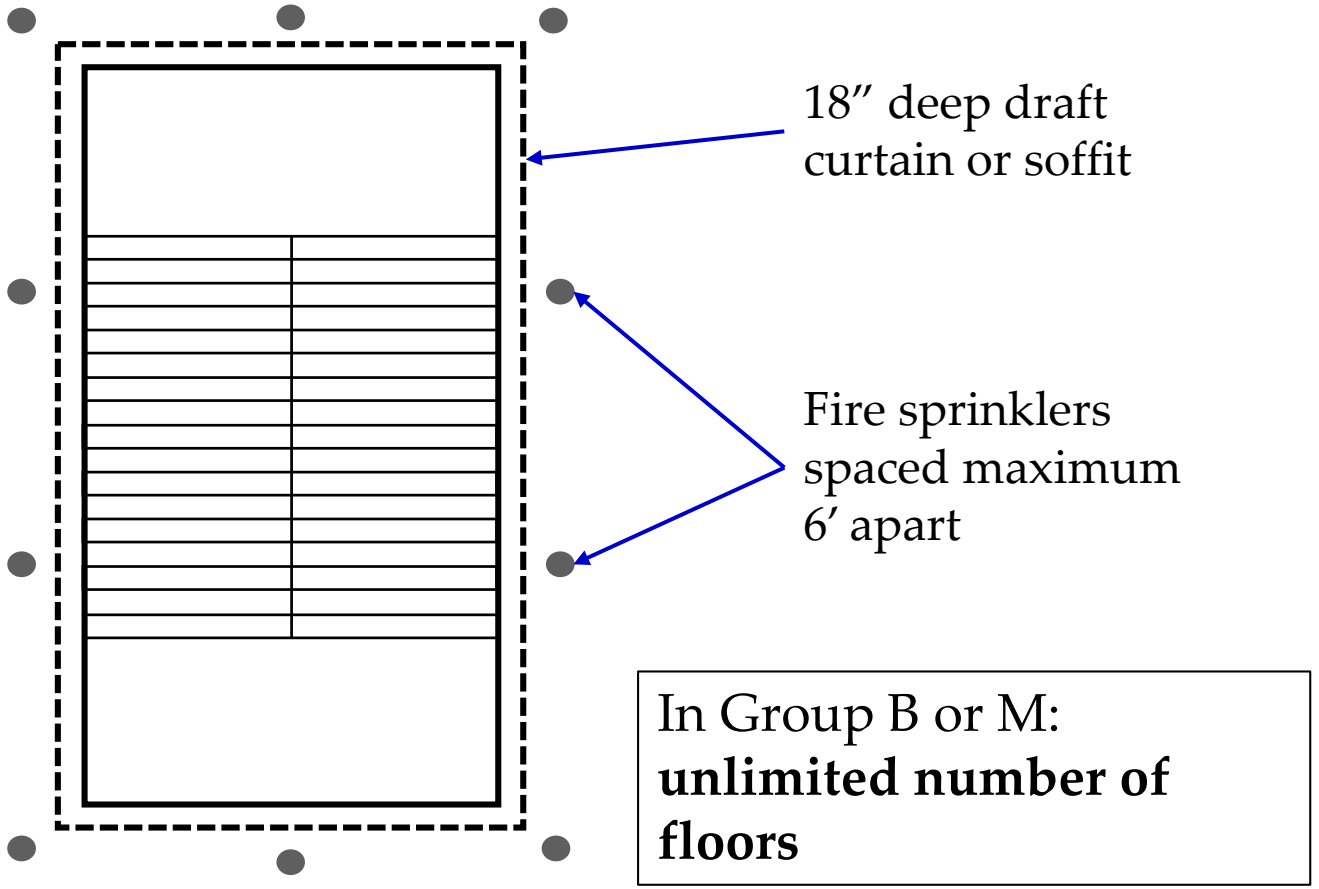
- Self-closing or automatic closing
- 1-HR rating in 1-HR construction
- 1½-HR rating in 2-HR construction

Interior Exit Access Stairways and Ramps Section 1019



- Not allowed in Groups I-2 and I-3
- Connecting two floors maximum

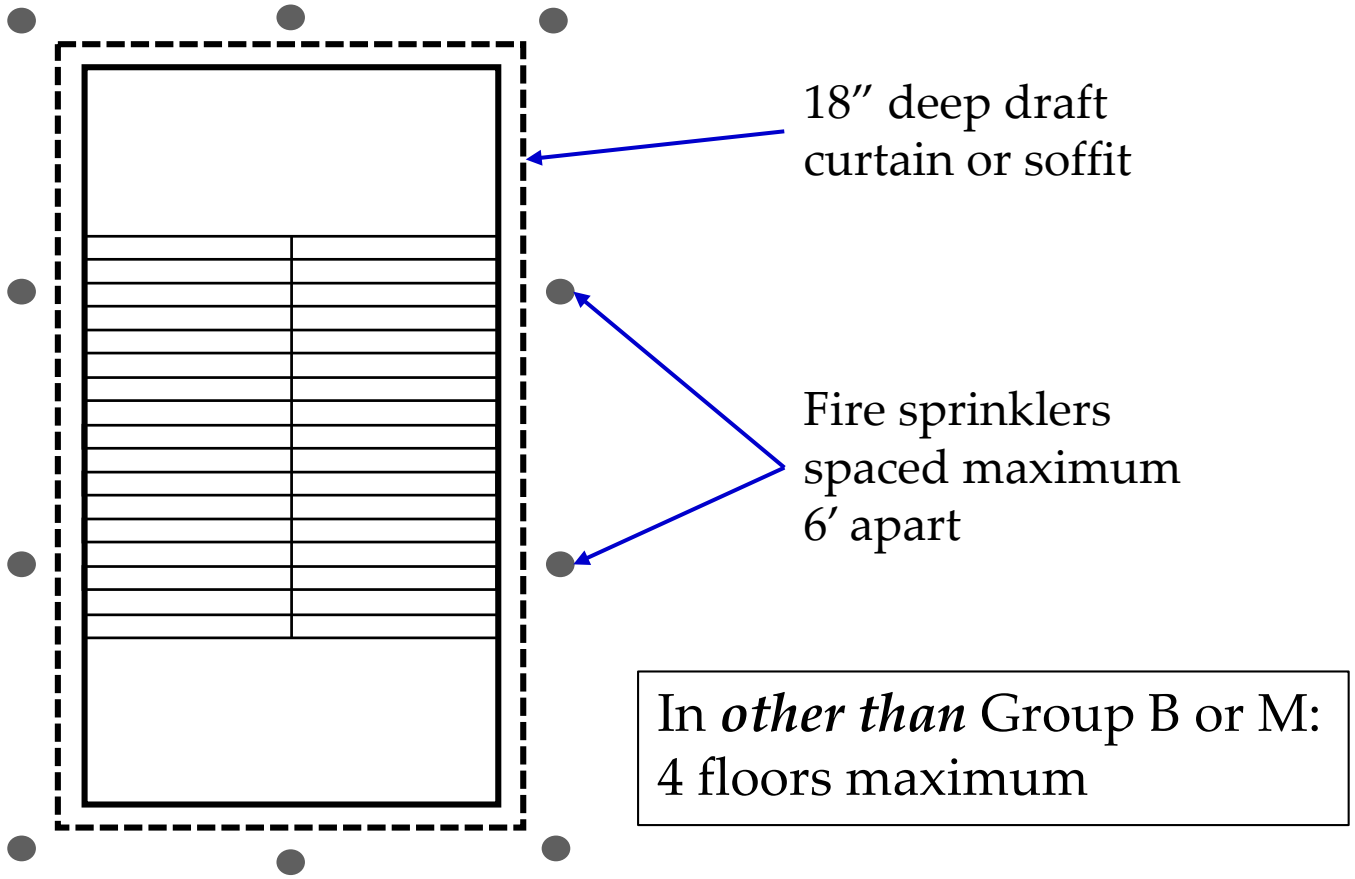
Exceptions to Interior Exit Access Stairways and Ramps
Section 1019, Condition 4, Group B and M



In Group B or M:
unlimited number of floors

Exceptions to Interior Exit Access Stairways and Ramps

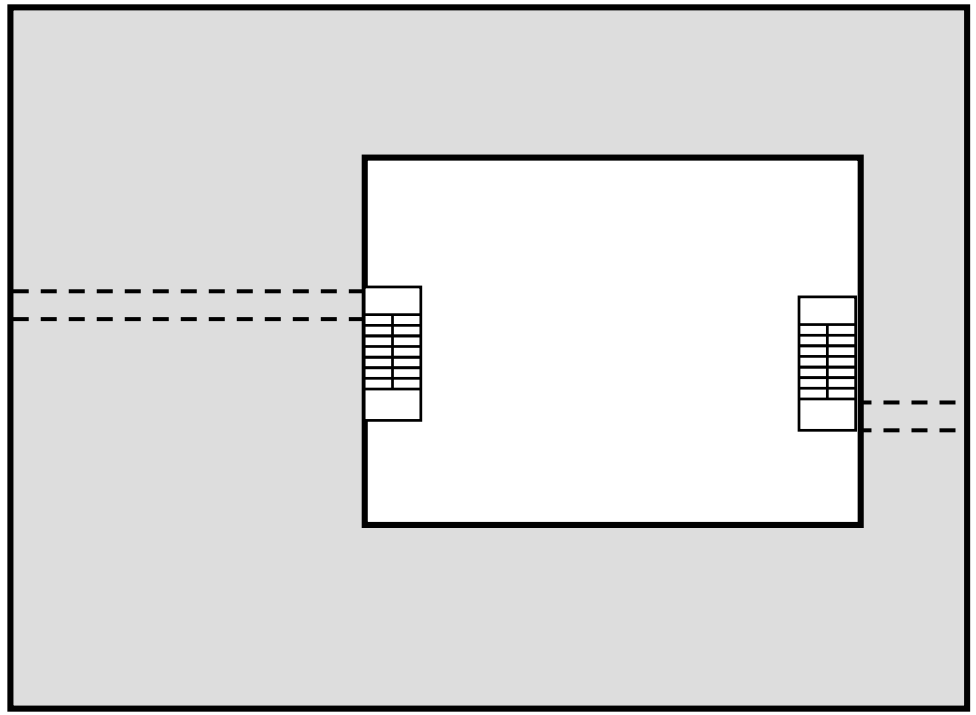
Section 1019, Condition 4, Other Than Groups B and M



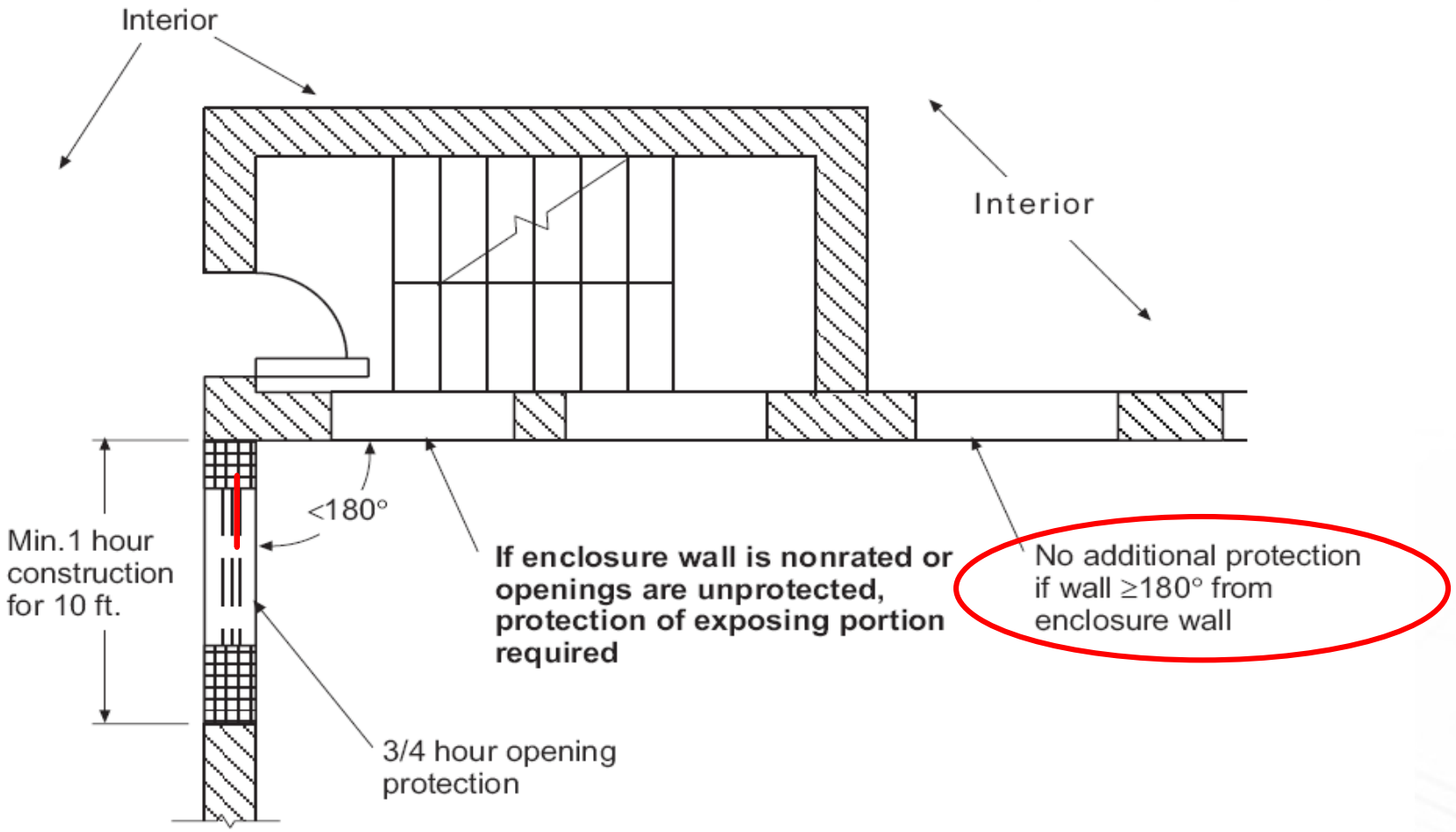
In ***other than*** Group B or M:
4 floors maximum

Interior Exit Stairway and Ramp Exterior Walls Section 1023.7

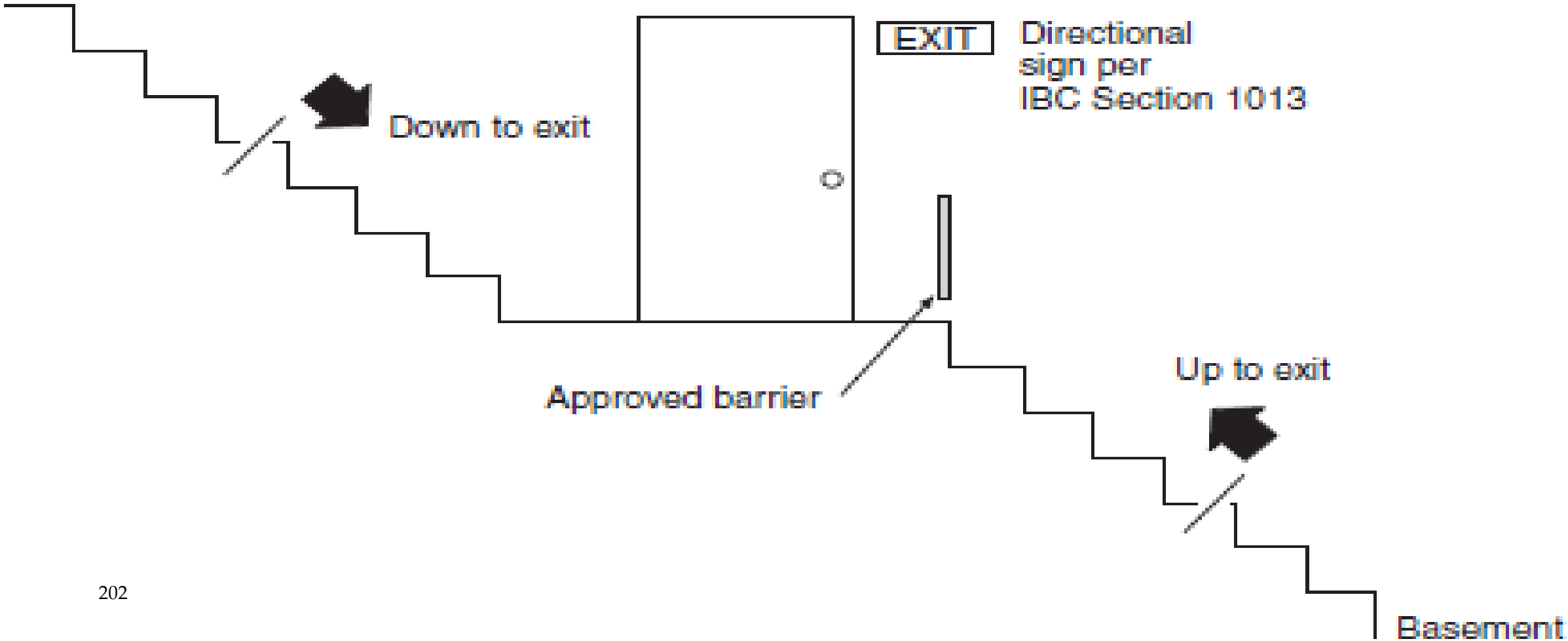
- Interior exit stairways shall lead directly to the exterior or shall be extended to the exterior of the building with an exit passageway



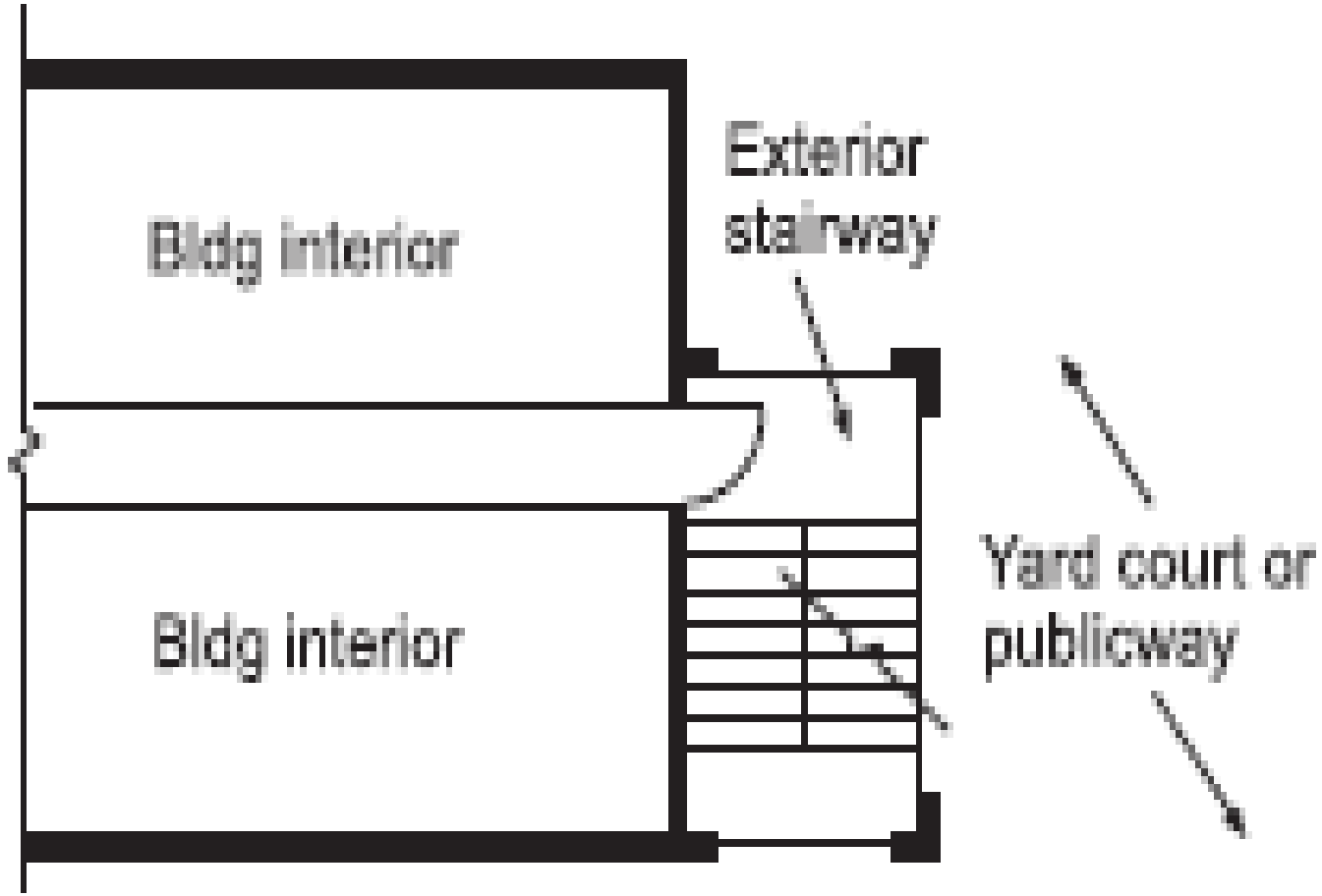
Interior Exit Stairway and Ramp Exterior Walls Section 1023.7



Discharge Identification
Section 1023.8

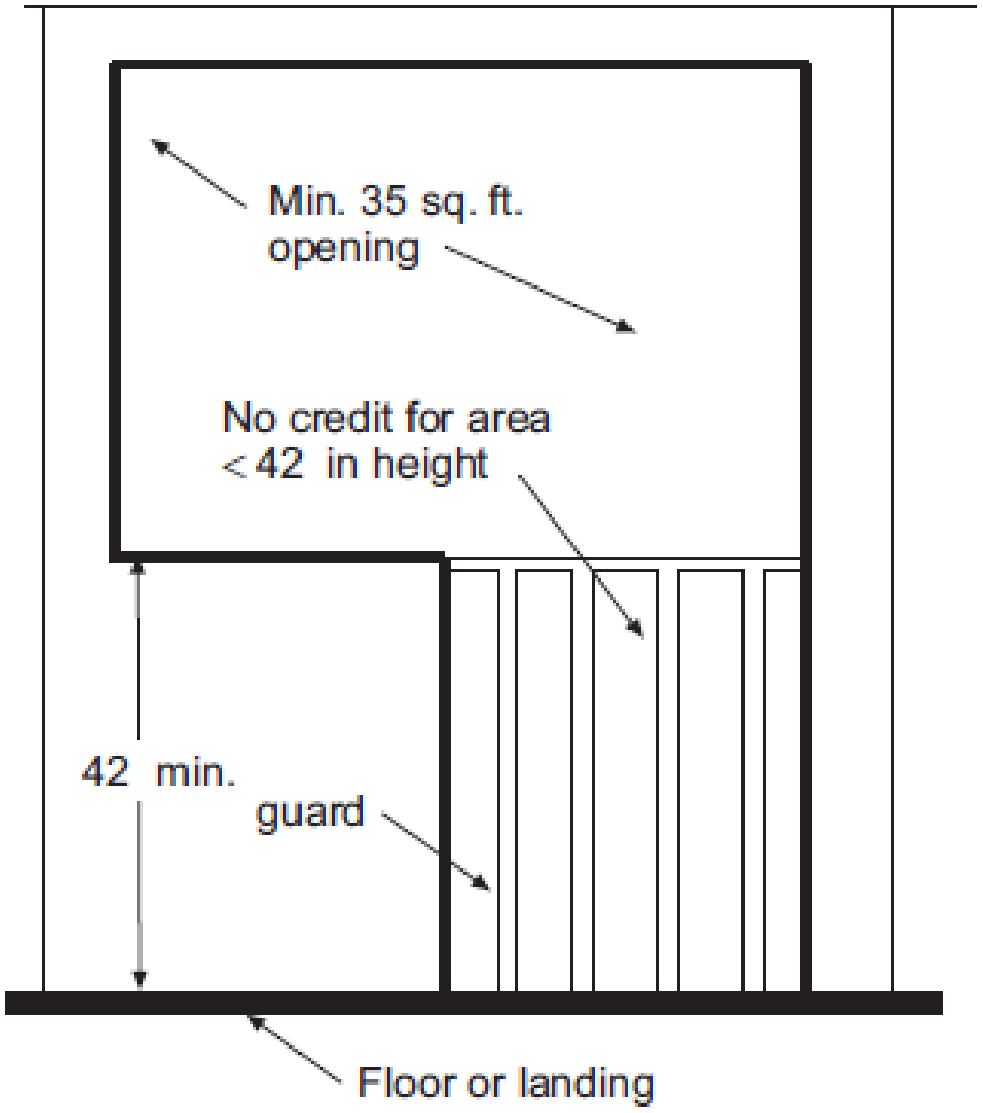


Exterior Exit Stairways and Ramps
Section 1027



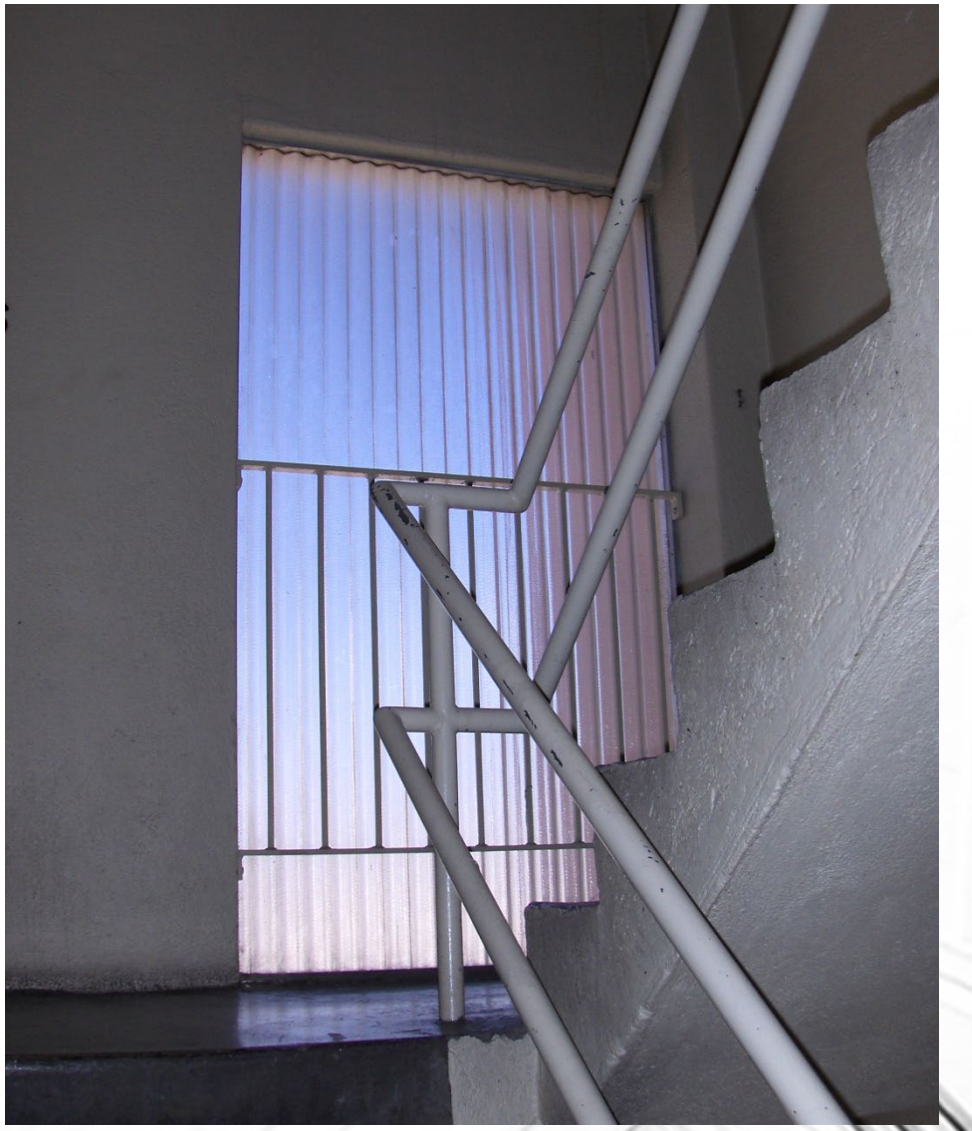
Maximum 6 stories in height
Not allowed in high-rise
Not allowed in Group I-2

Exterior Exit Stairways and Ramps
Section 1027

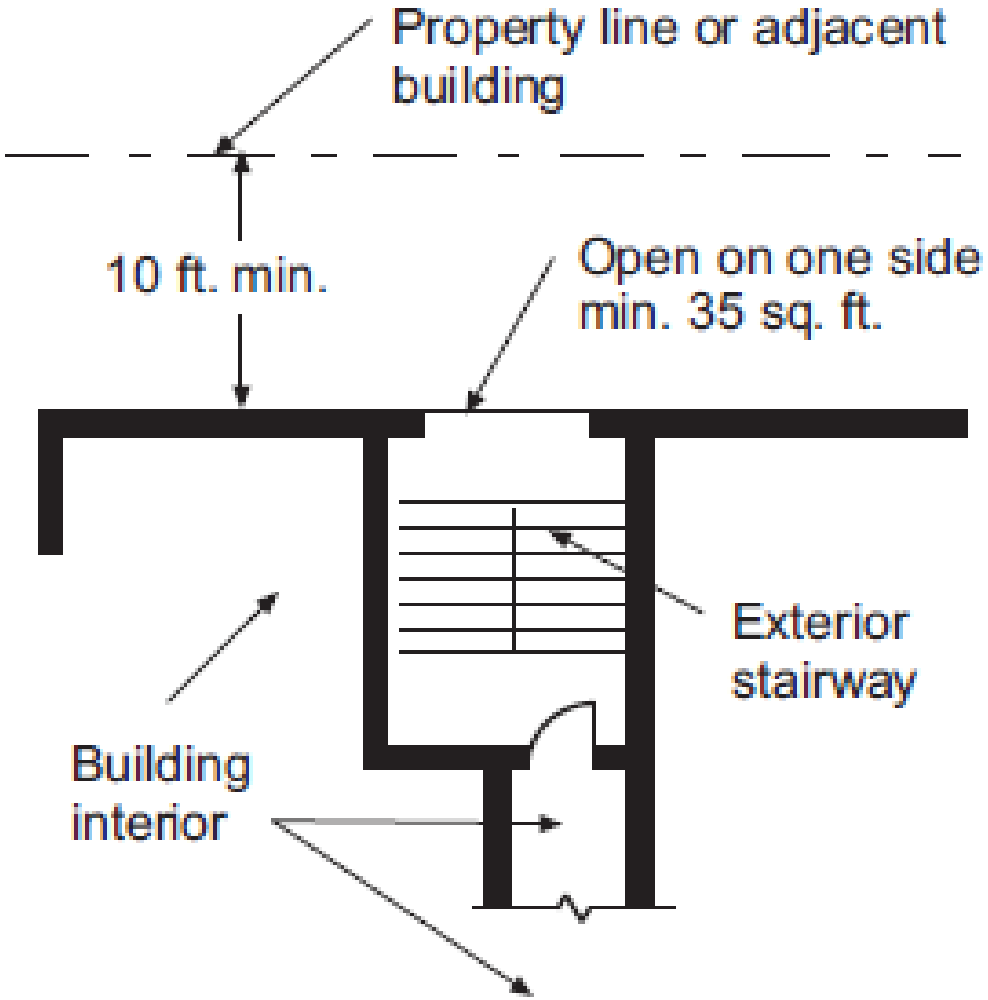


Exterior Stairway Opening
Section 1027

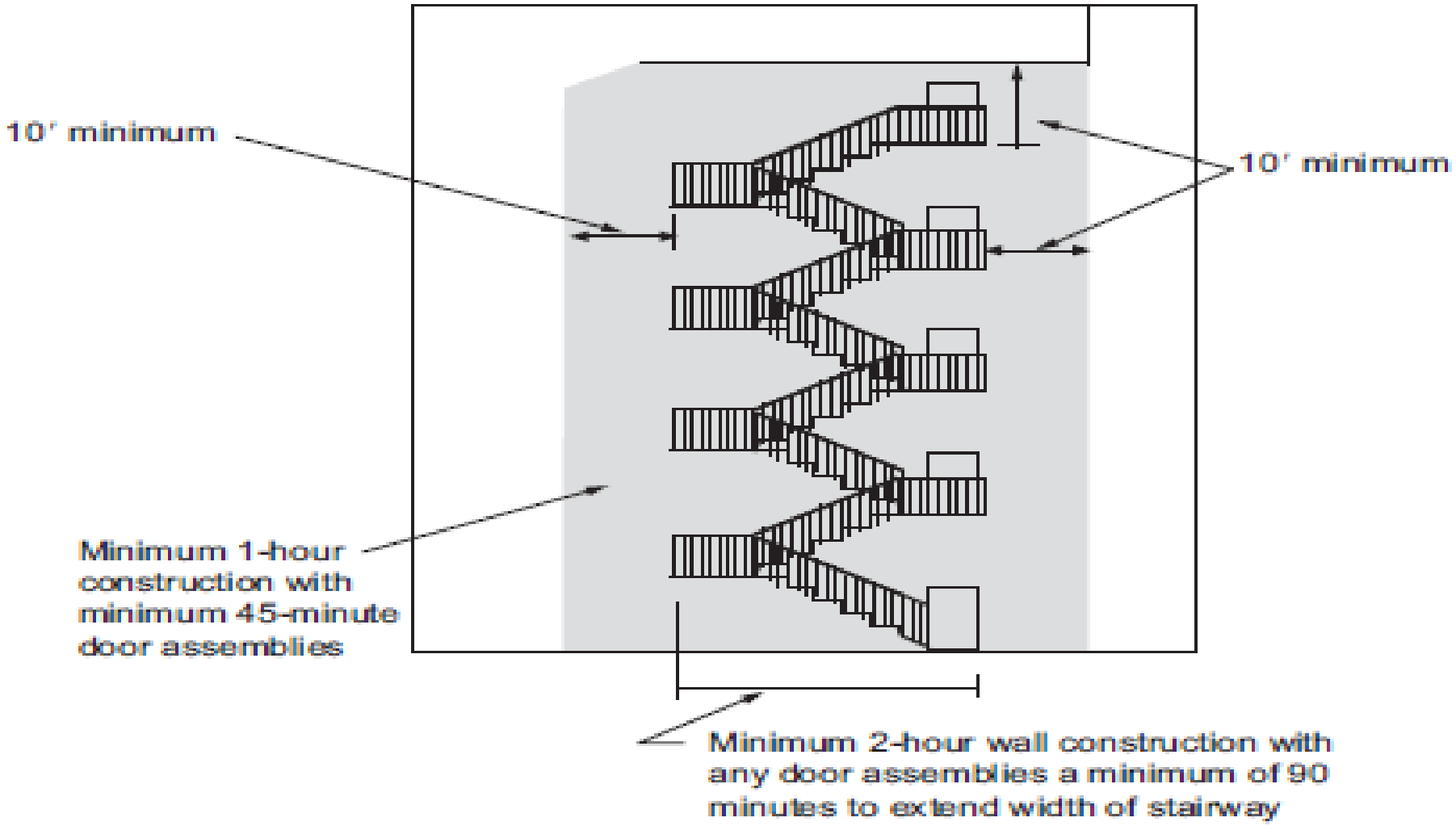
- ≥35 square feet open to exterior
- At each floor level and each landing
- Can be blocked by guards, handrails



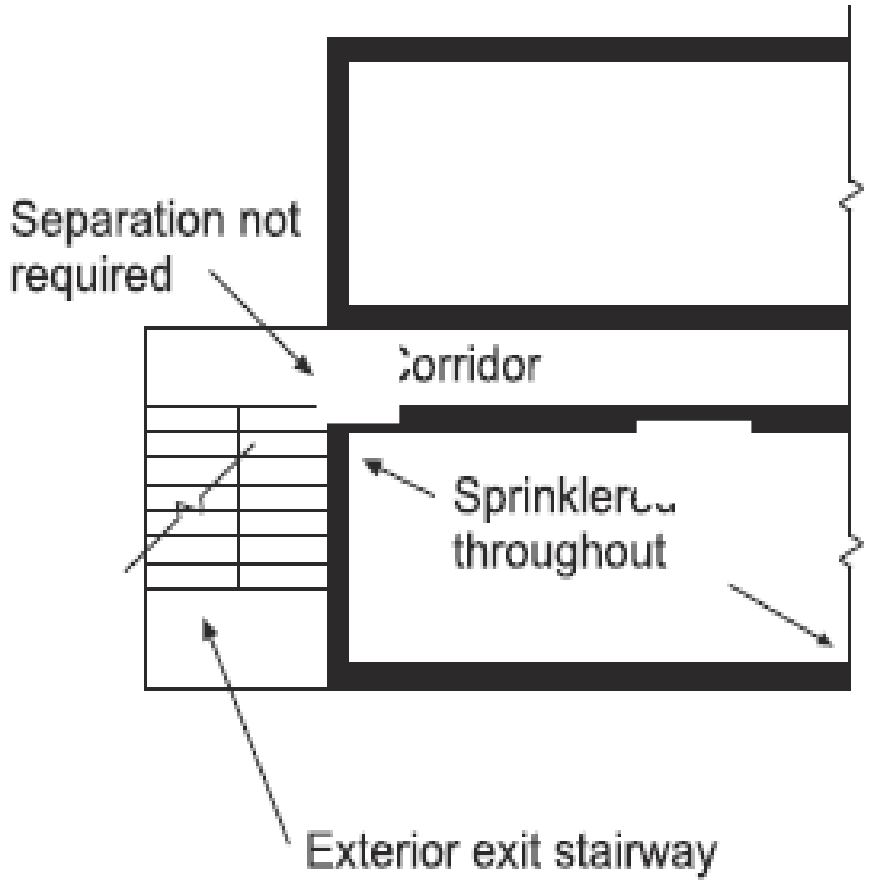
Exterior Exit Stairways and Ramps
Section 1027

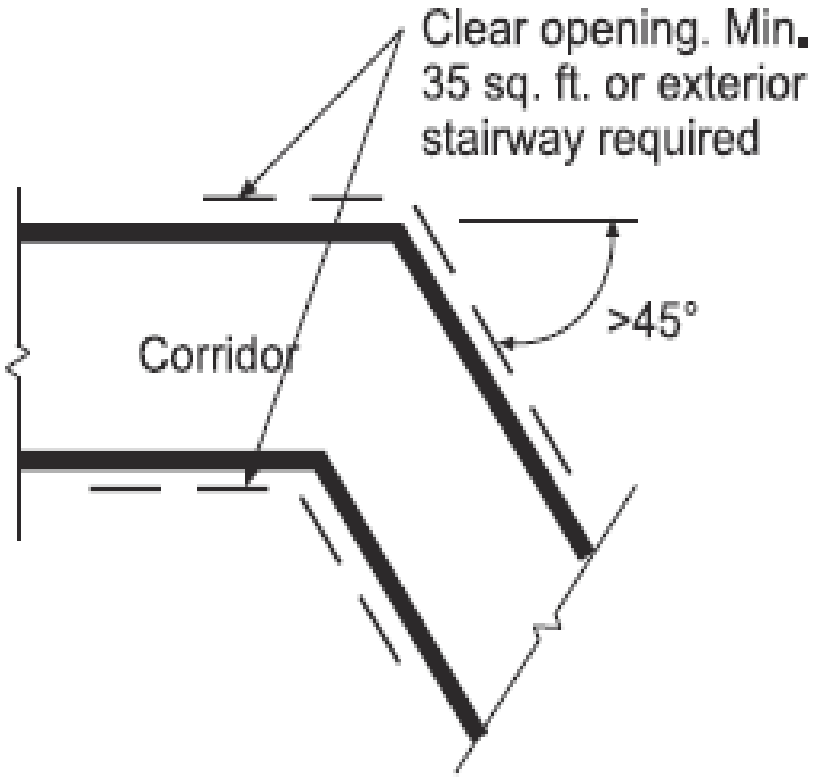


Exterior Ramps and Stairways Protection Section 1027.6



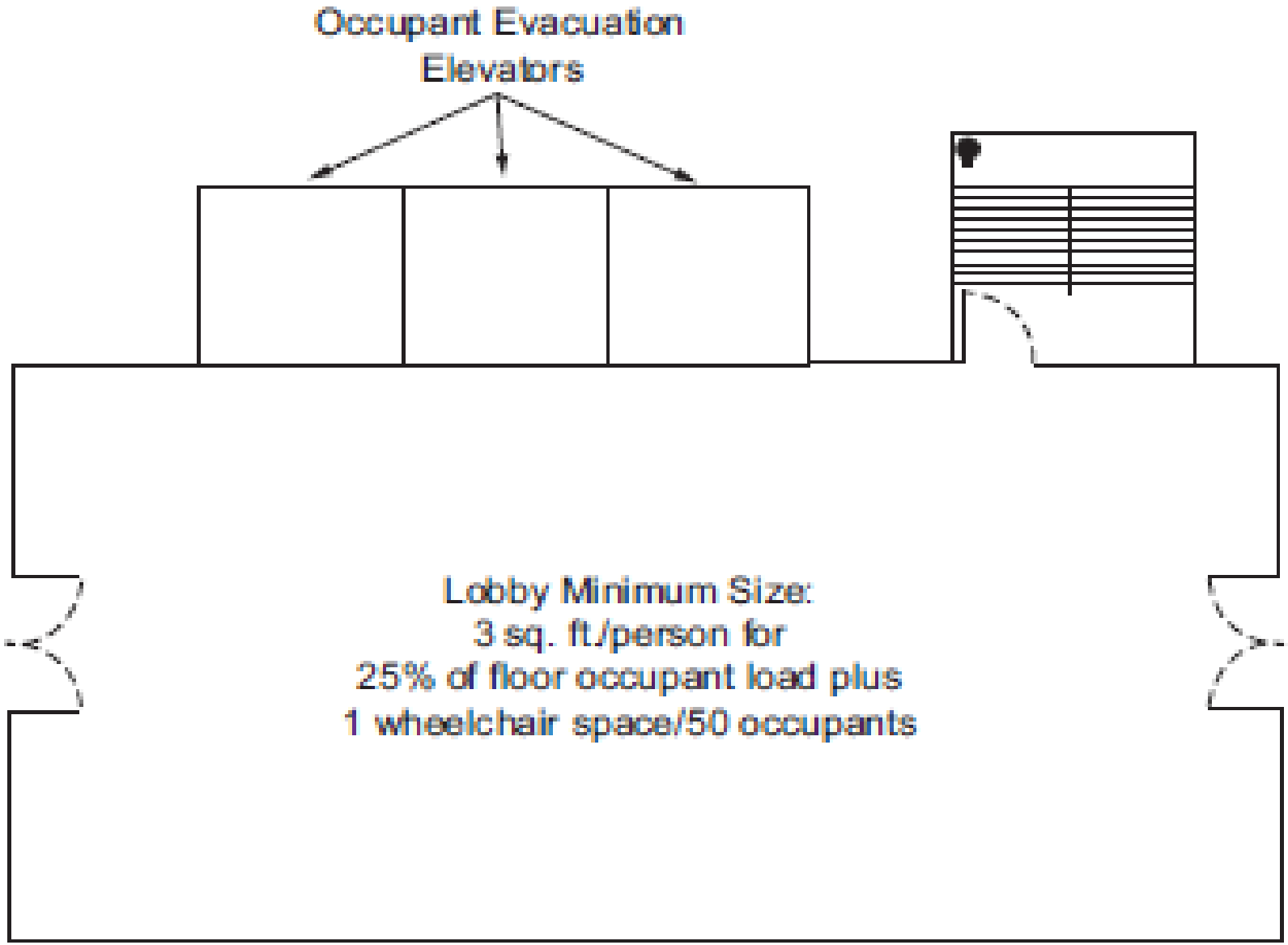
Open-ended Corridors
Section 1027.6. Exception 3



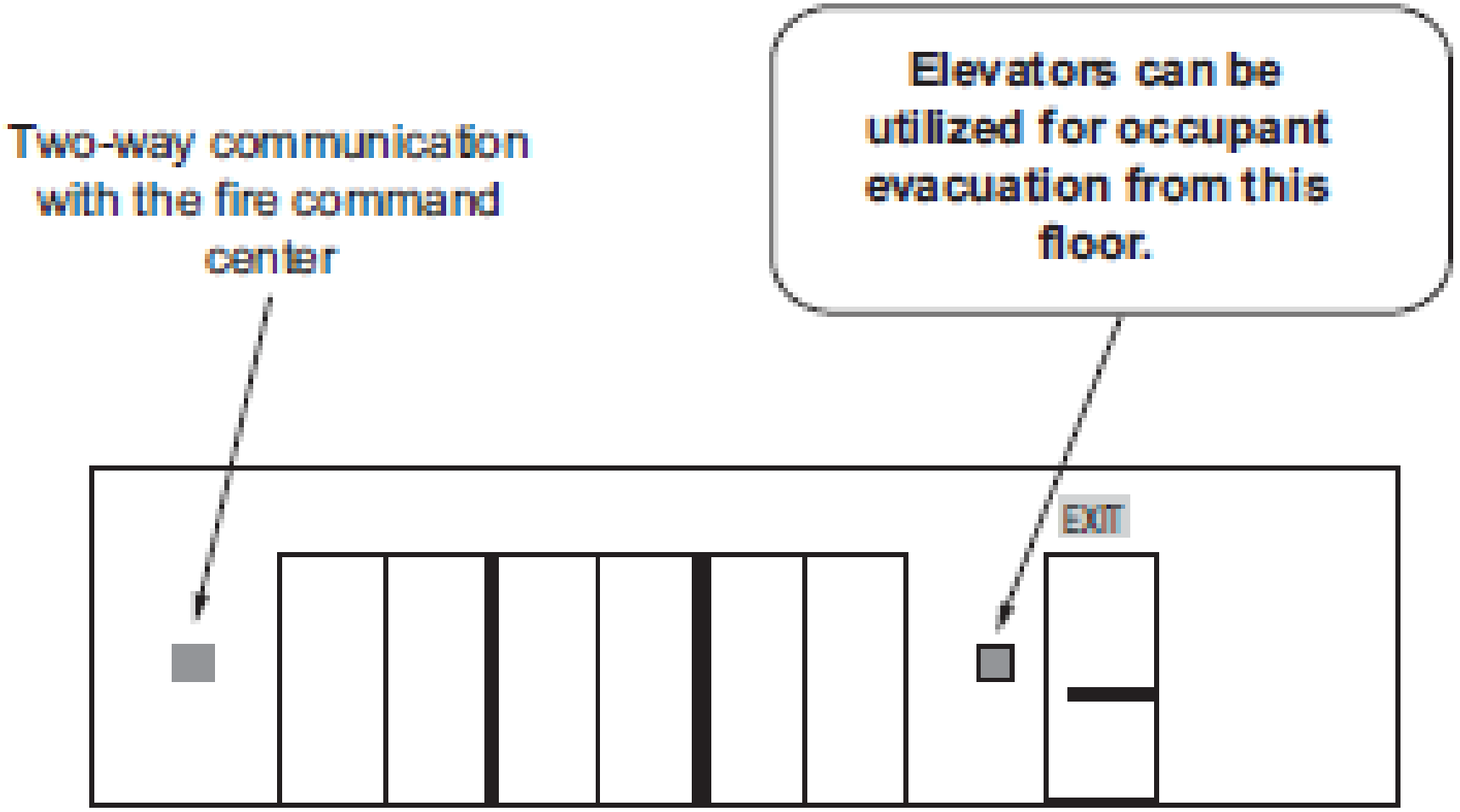


- Provide min. 35 sq. ft. of open area (not less than 42 in. above floor level)

Occupant Evacuation Elevators
Section 403.6.2



Occupant Evacuation Elevators Section 3008

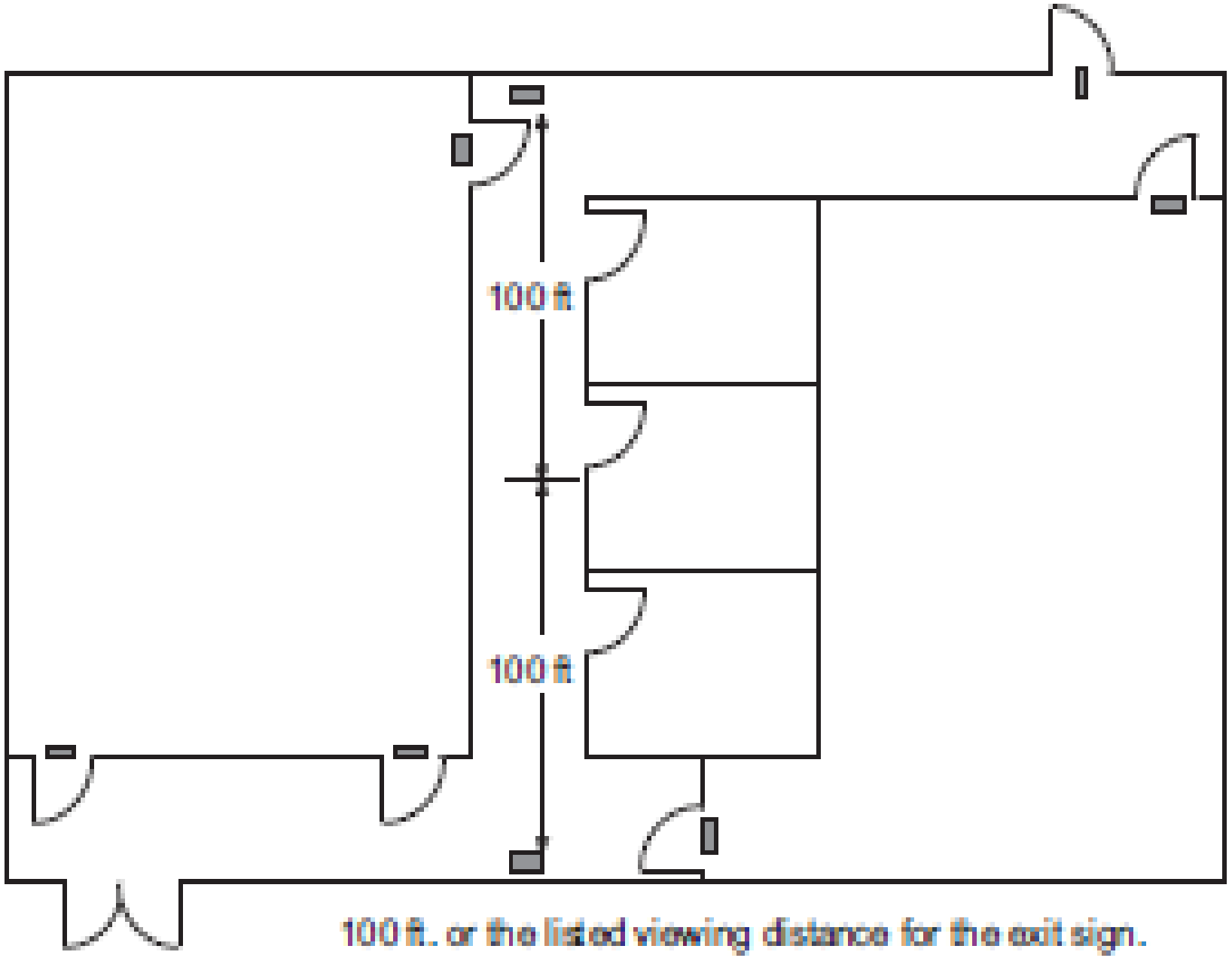


Egress Lighting and Exit Signs

Egress Lighting and Exit Signs

- Exit Signs – Section 1013
- Floor Level Exit Signs in Group R-1 – Section 1013.2
- Raised Character and Braille Exit Signs – Section 1013.4
- Illumination of Exit Signs – Sections 1013.5 and 1013.6
- Power Source – Section 1013.6.3
- Means of Egress Illumination – Section 1008
- Luminous Egress Path Marking – Section 1025

Exit Signs
Section 1013



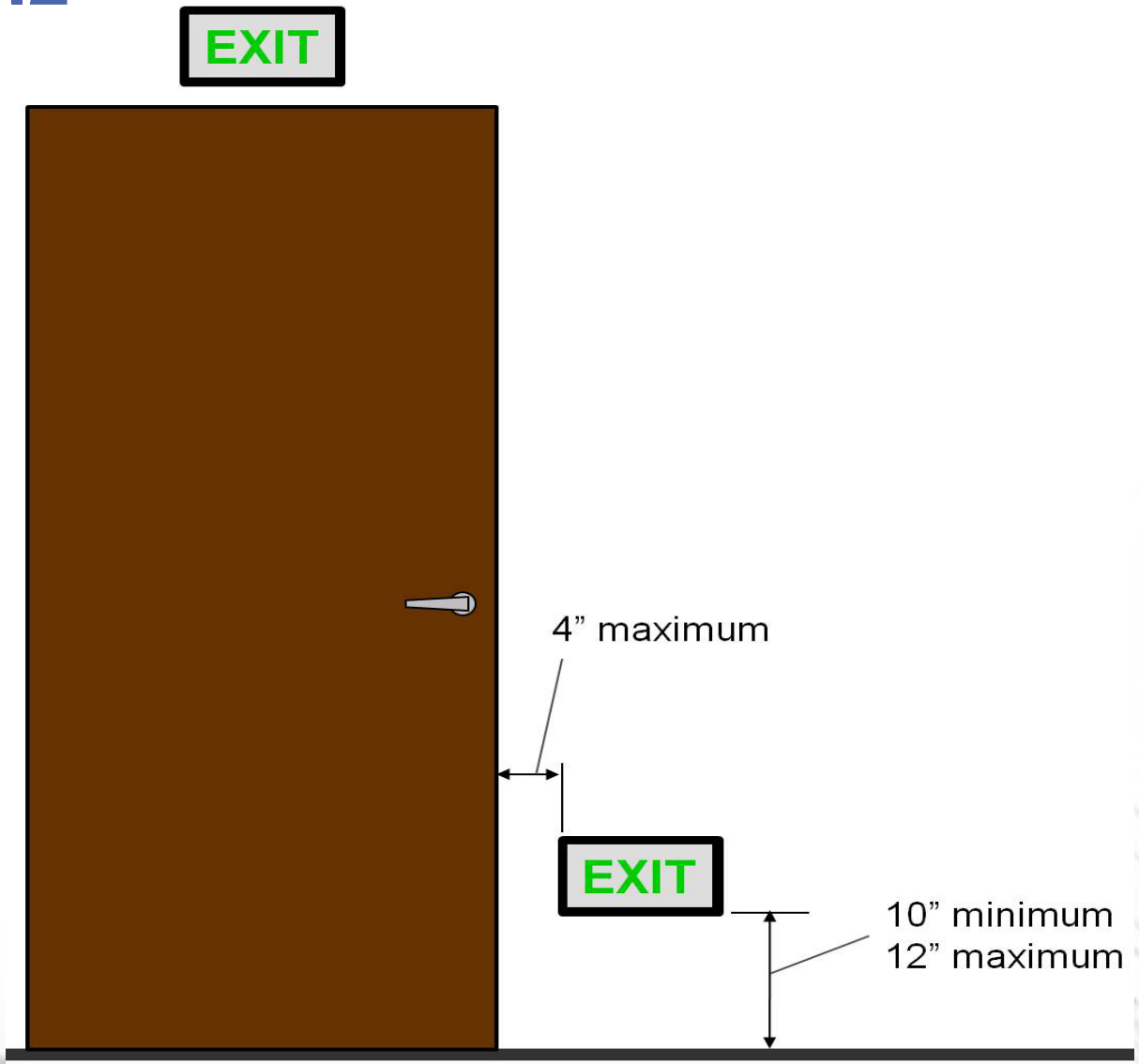
100 ft., or the listed viewing distance for the exit sign.
Exit signs also required within exits.

Exit Signs
Section 1013.1, Exceptions

Exit signs not required in:

1. Rooms or areas with one exit or exit access
2. Main exterior exit doors that are clearly identifiable as exits when approved by the building official
3. Group U occupancies and individual sleeping units or dwelling units in Groups R-1, R-2 or R-3
4. Sleeping areas in Group I-3
5. Group A-4 and A-5 occupancies on the seating side of vomitories

Floor Level Exit Signs in Group R-1
Section 1013.2



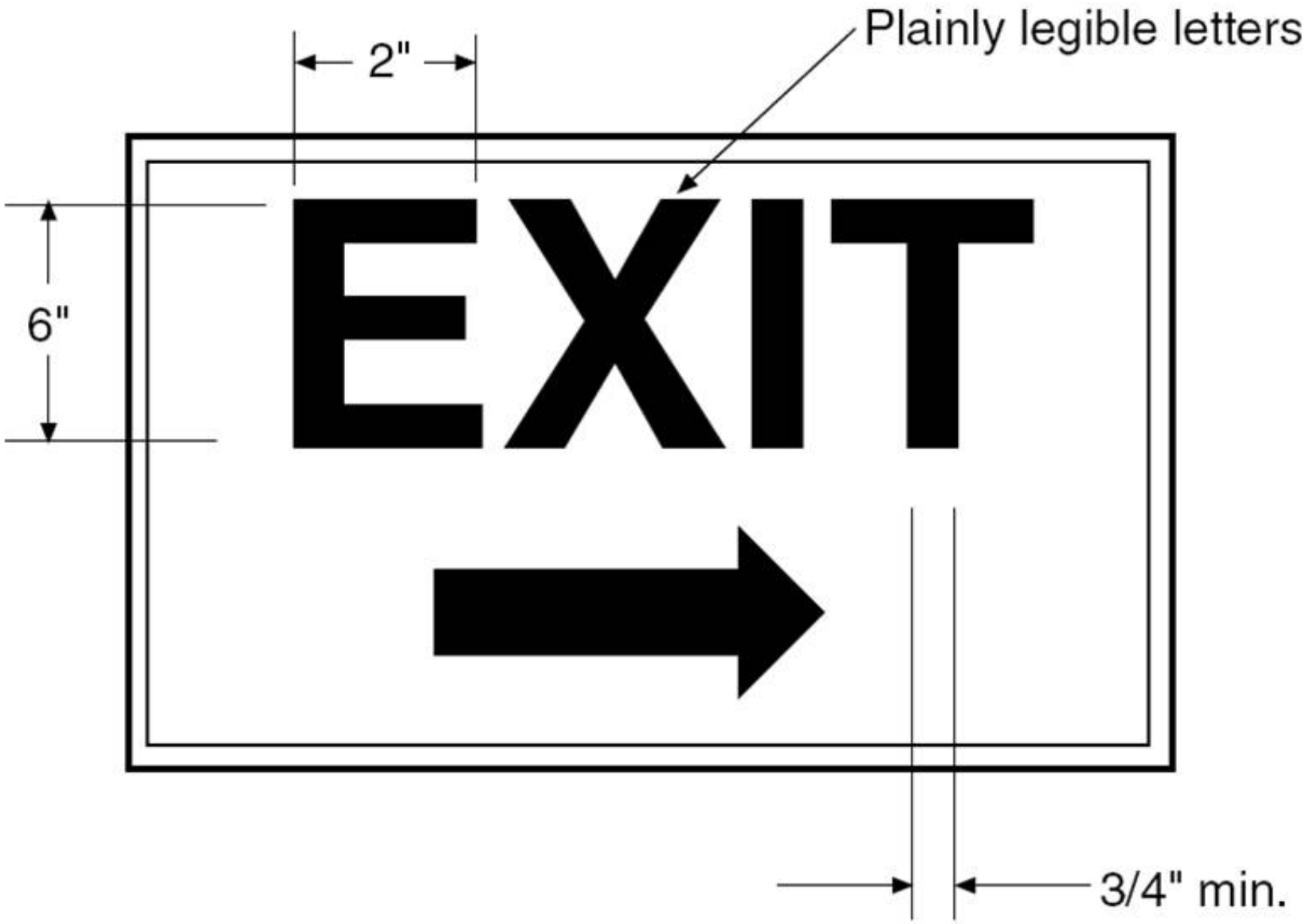
Raised Character and Braille Exit Signs
Section 1013.4

- Tactile signs consist of:
  - Visible characters
  - Raised characters
  - Braille
- Required at:
  - Area of refuge
  - Exterior area for assisted rescue
  - Exit stairway
  - Exit ramp
  - Exit passageway
  - Exit discharge

Illumination of Exit Signs
Sections 1013.5, 1013.6

- Exit signs shall be lighted at all times
- Lighting by one of the following methods:
  - Internally illuminated (IBC Section 1013.5)
  - Externally illuminated (IBC Section 1013.6)
  - Of an approved self-luminous type
- Tactile signs do not require illumination.

Externally Illuminated Exit Signs
Section 1013.6



Self-luminous or Photoluminescent
Section 1013.5

- Listed to UL 924

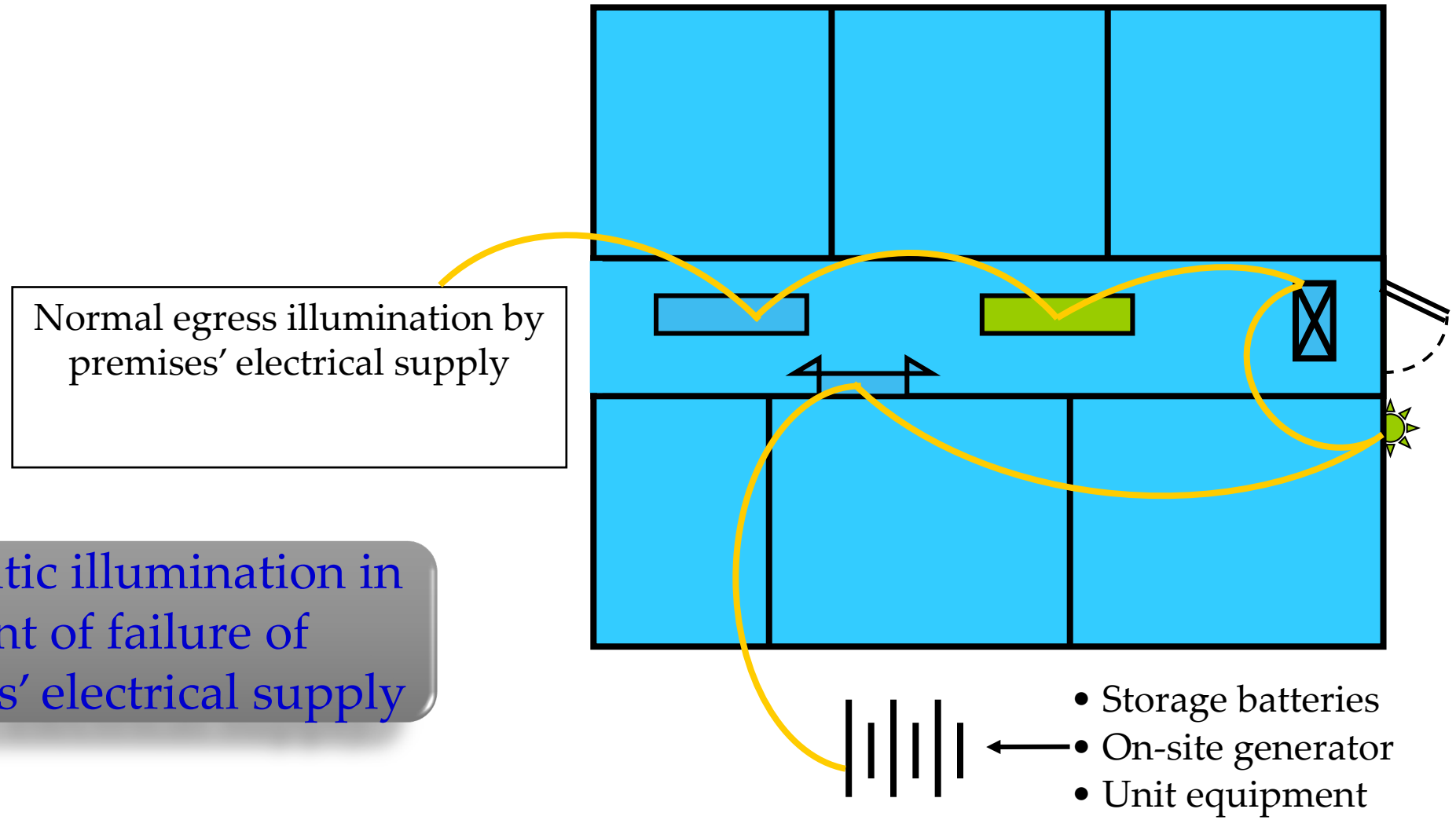
Power Source
Section 1013.6.3

- Illumination required for a minimum of 90 minutes after power loss

Illumination Required
Section 1008.2

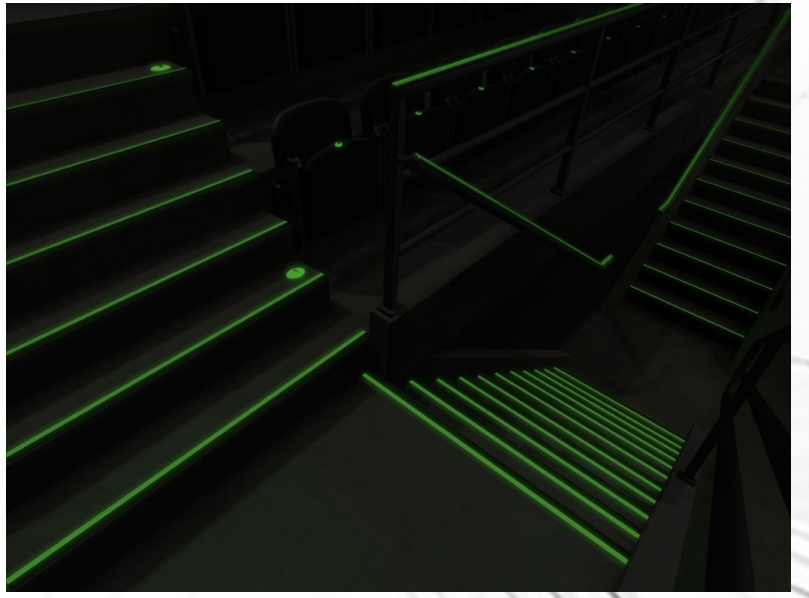
- Different than exit sign illumination
- But can be combined devices providing both exit sign illumination and means of egress illumination

Emergency Power for Illumination
Section 1008.3



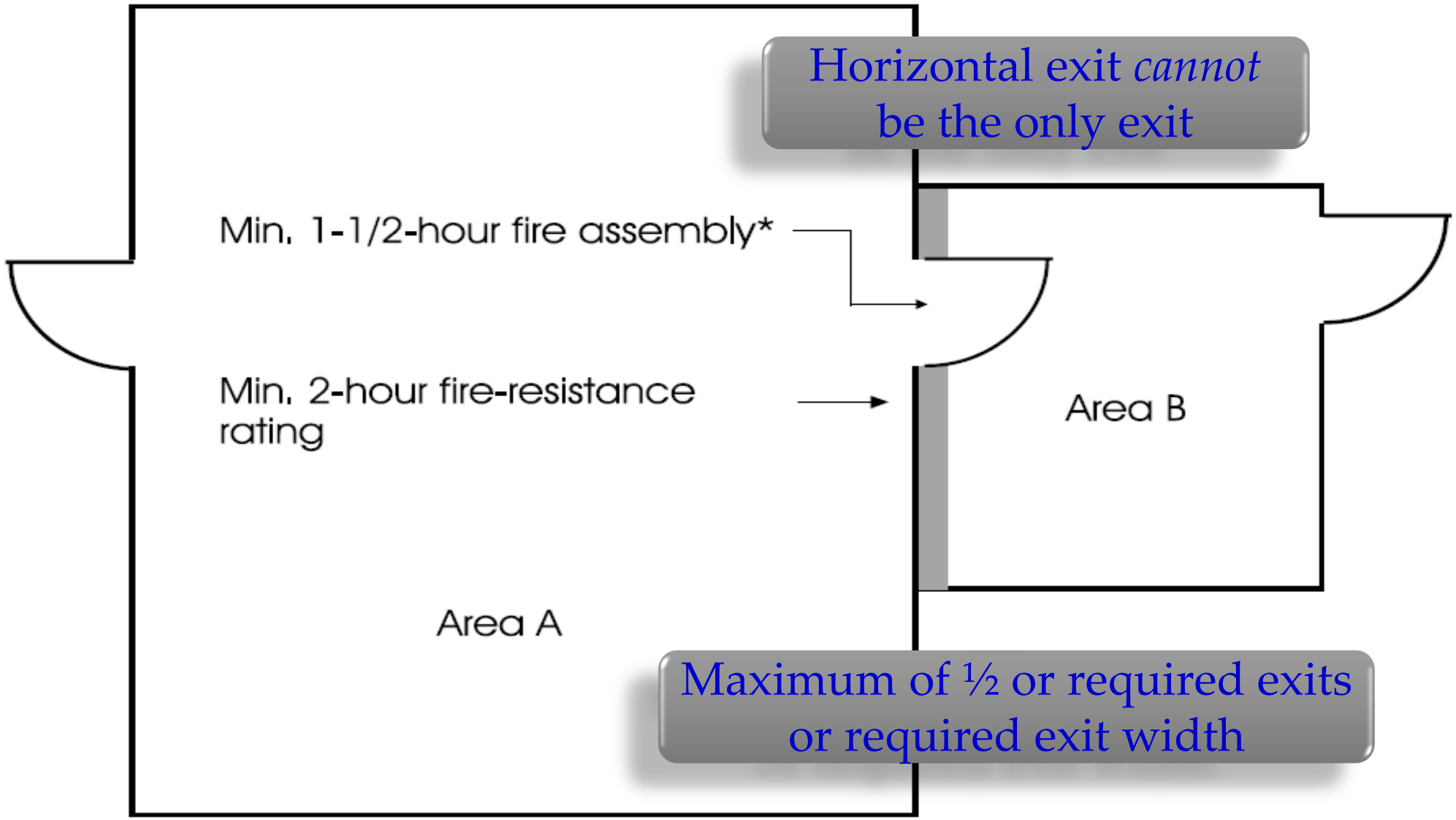
Luminous Egress Path Marking
Section 1025

- High-rise Group A, B, E, I-1, M and R-1
- Egress path markings in interior exit stairways and exit passageways
- Markings on:
  - Stair treads
  - Landings
  - Handrails
  - Door Frames
- Listing:
  - UL 1994
  - ASTM E 2072 with specific conditions



Horizontal Exits

Horizontal Exits - Section 1026.1

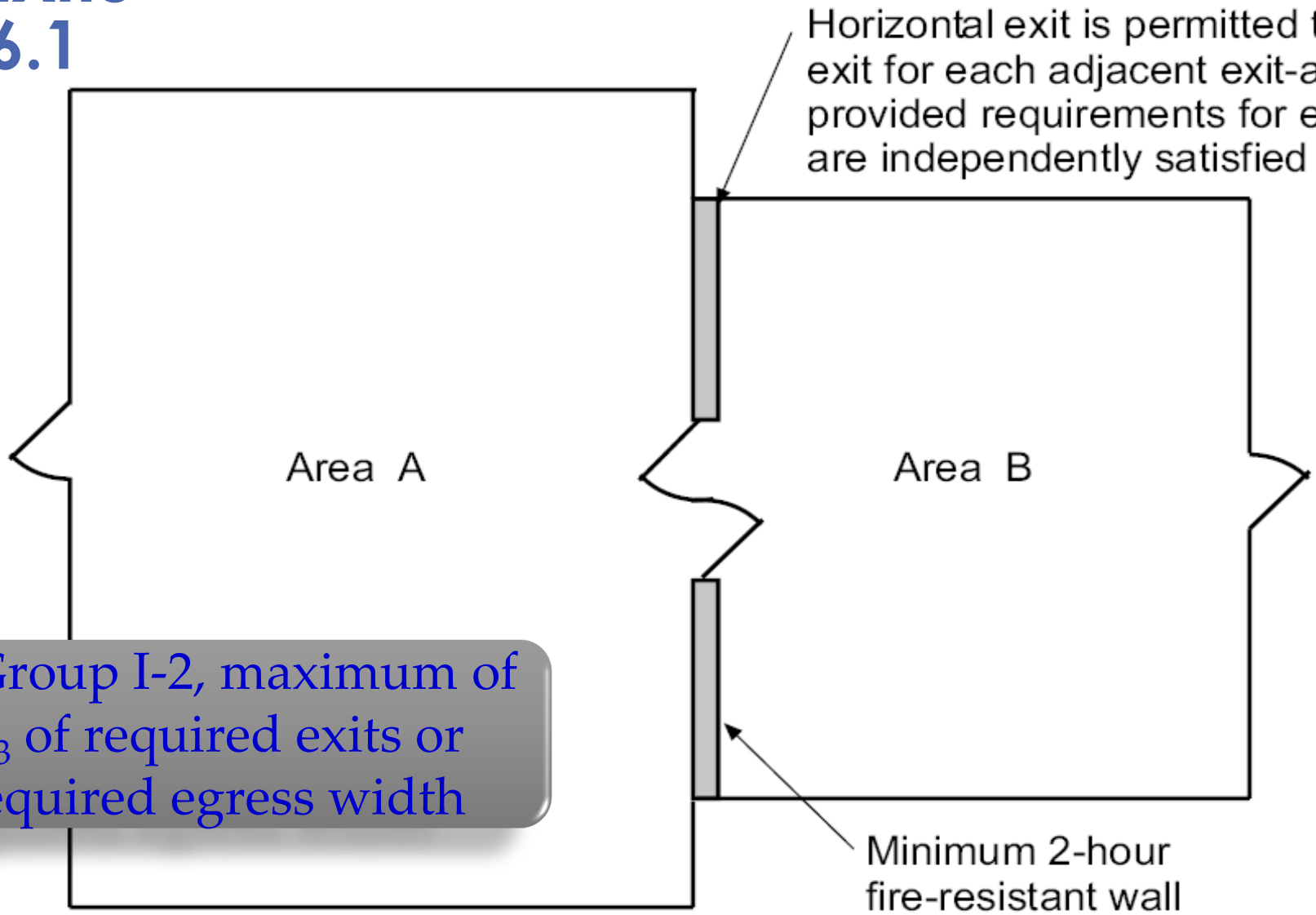


Horizontal exit *cannot* be the only exit

Maximum of ½ or required exits or required exit width

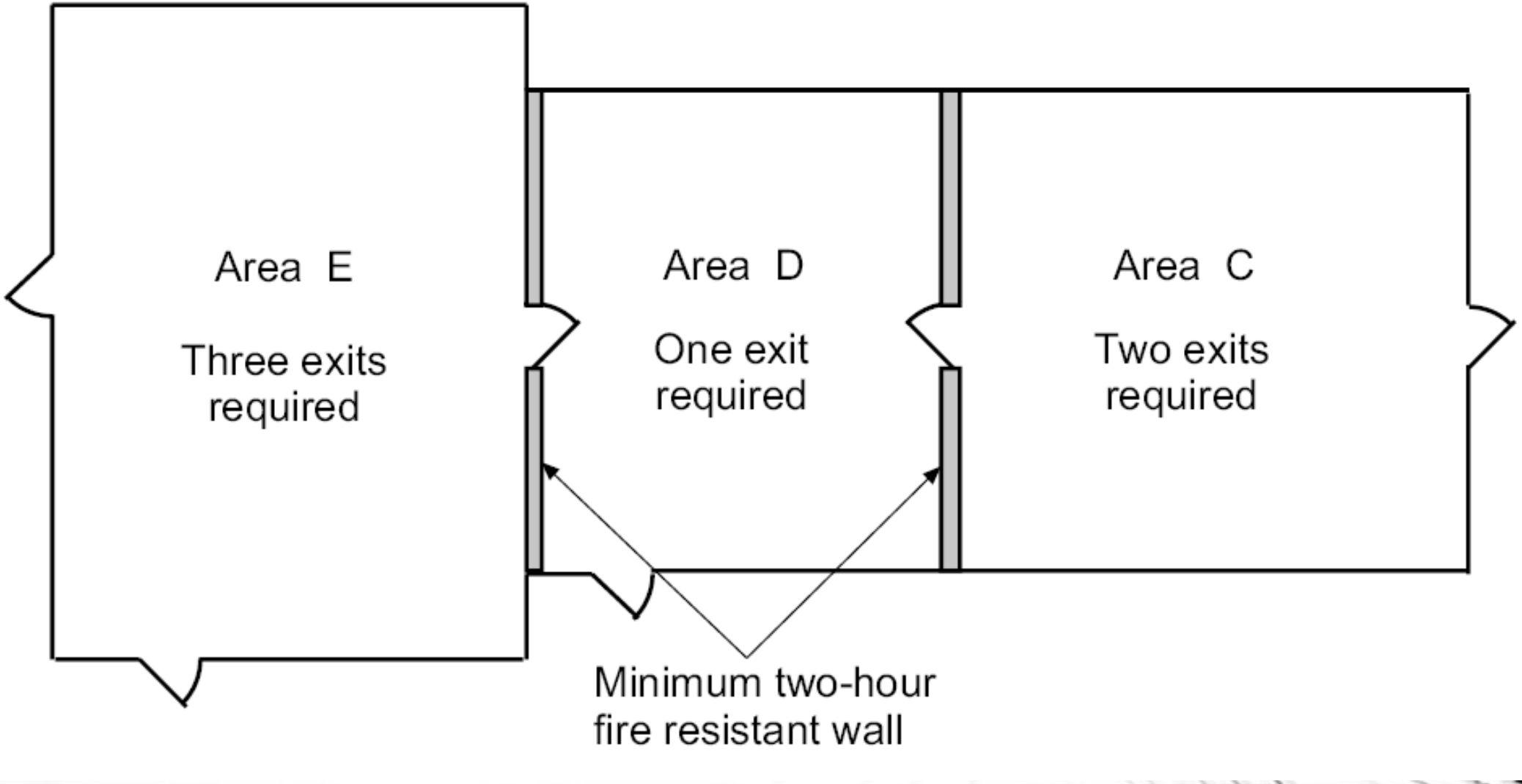
* must be self-closing or automatic closing upon activation of a smoke detector

Horizontal Exits
Section 1026.1

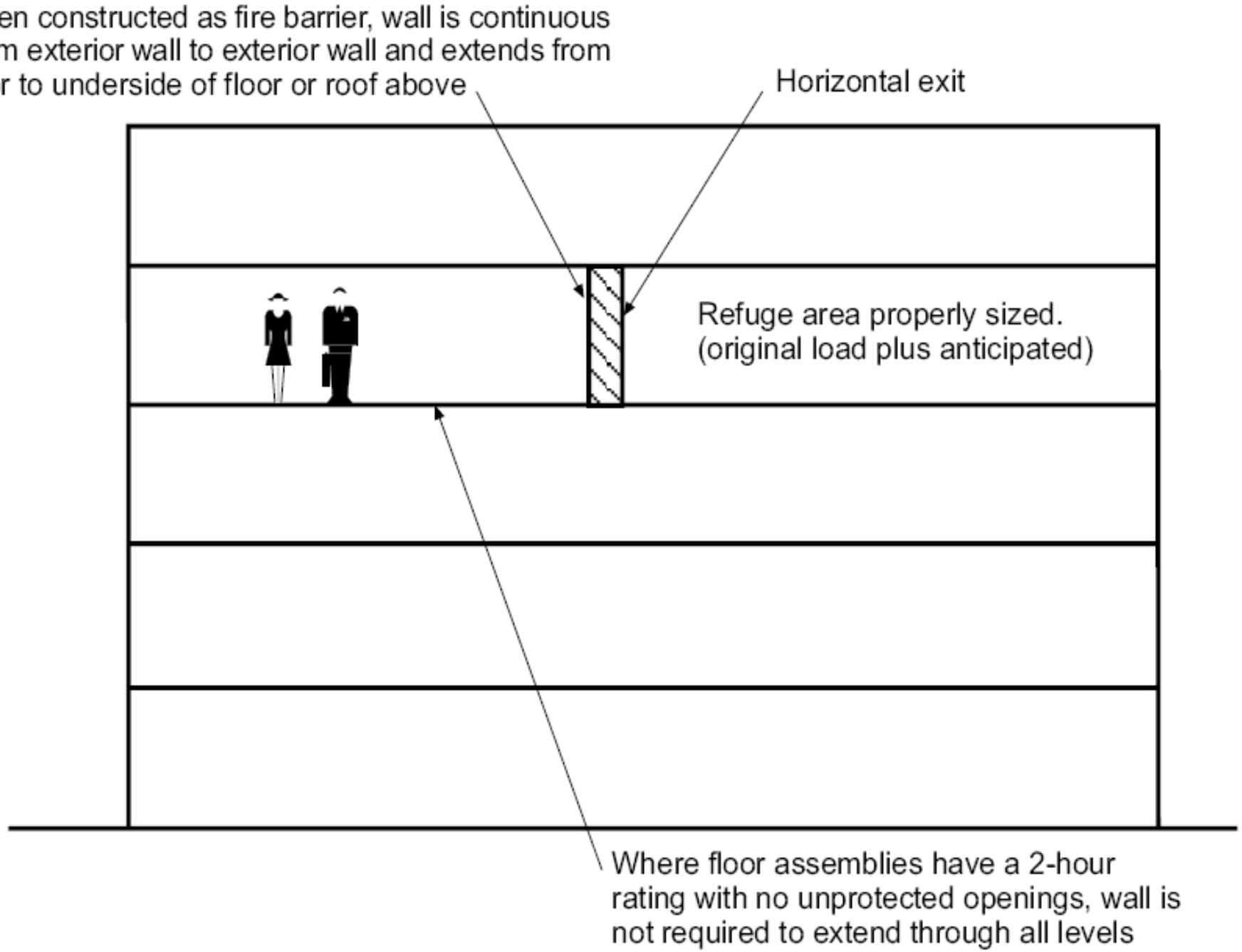


In Group I-2, maximum of $^{2}/_{3}$ of required exits or required egress width

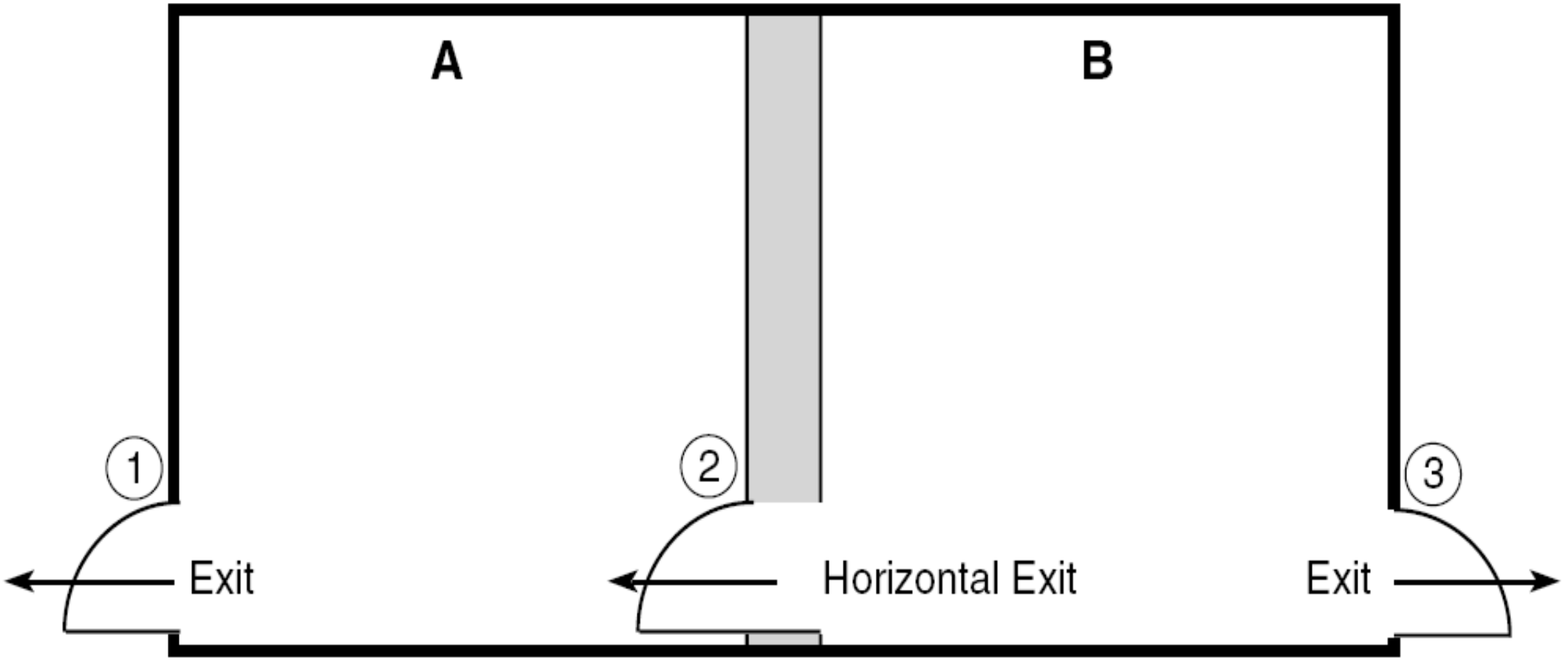
Horizontal Exit
Section 1026.1



Separation
Section 1026.2

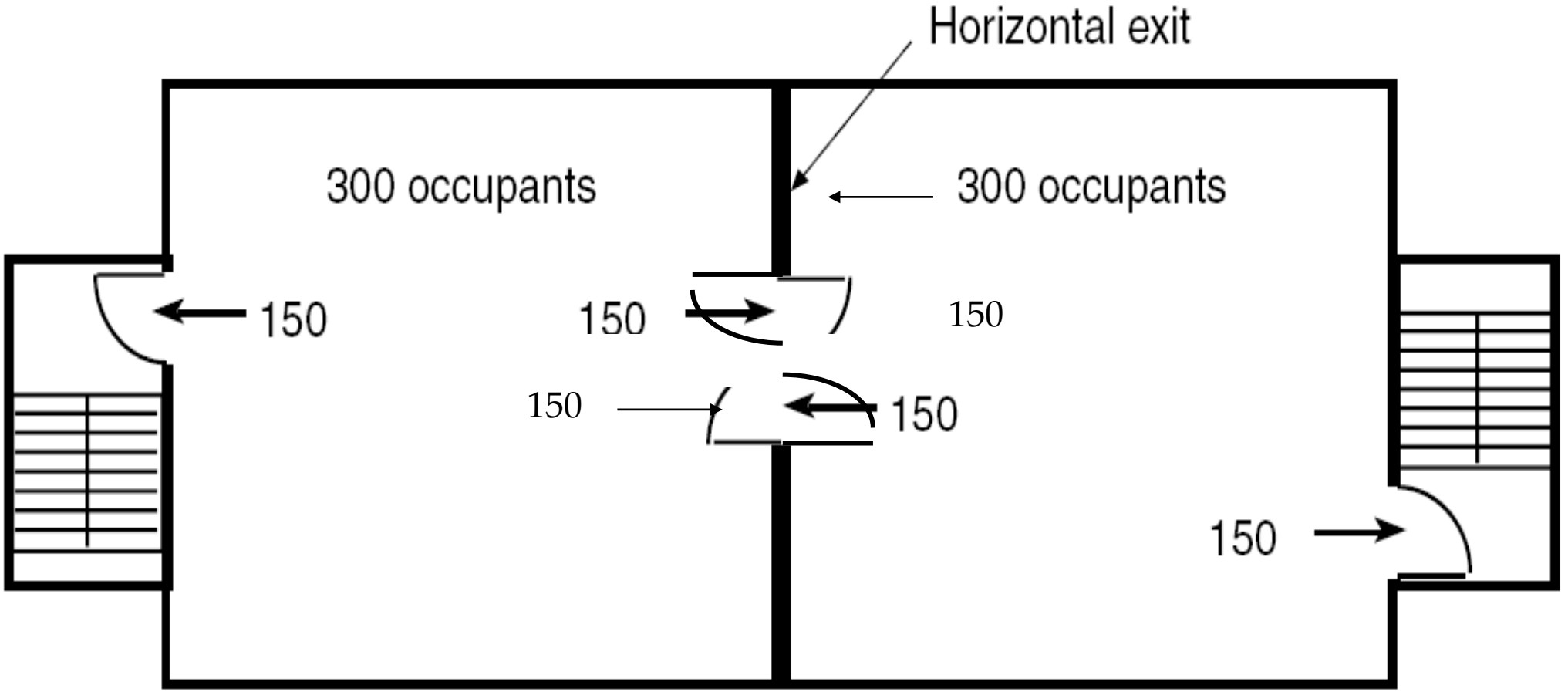


Refuge Area
Section 1026.4

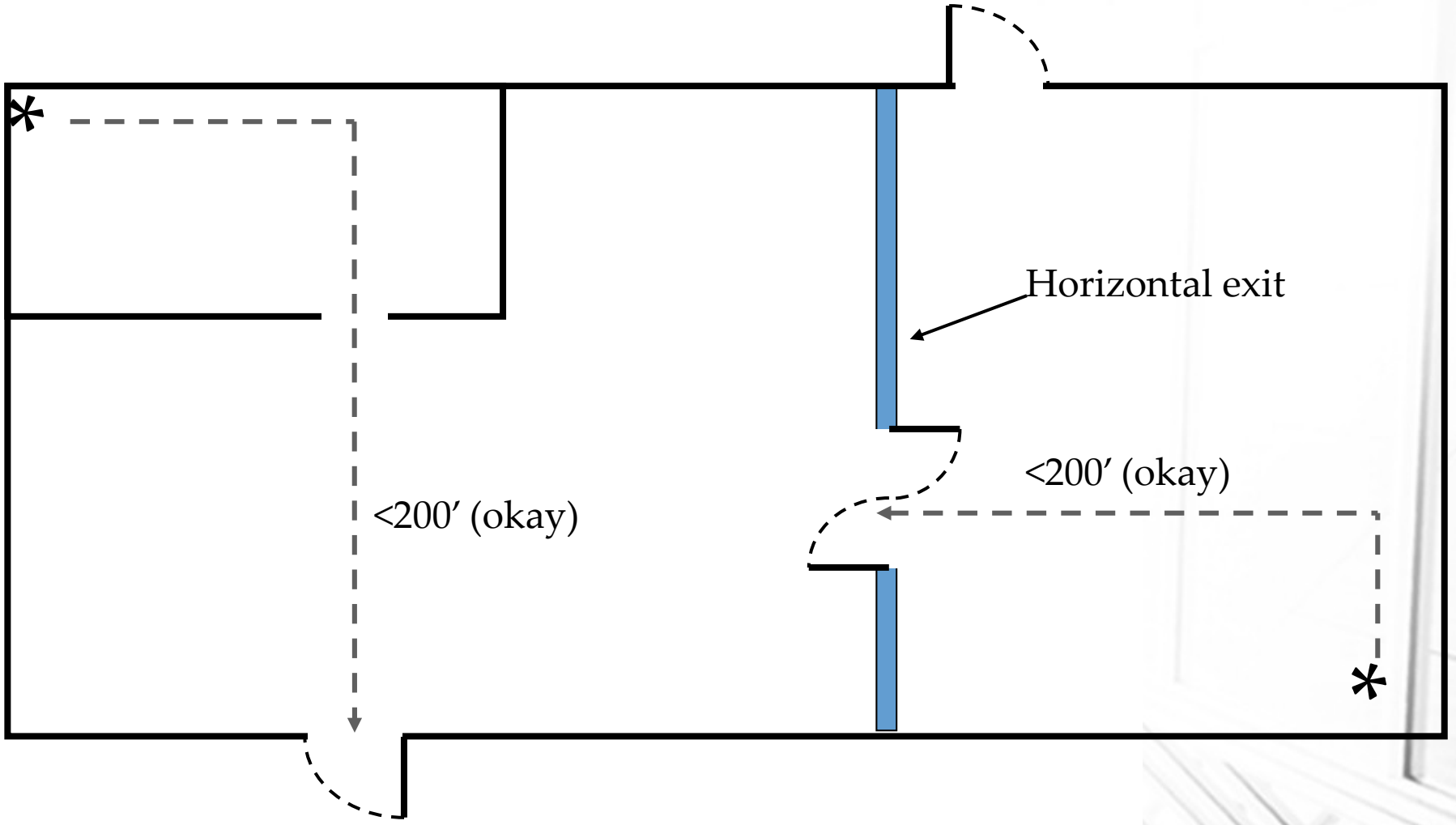


NOTE: Exit for "A" adequate to meet the provisions of Chapter 10 but need not include added capacity imposed by occupants entering through horizontal exit from "B".

Horizontal Exits
Section 1026.1

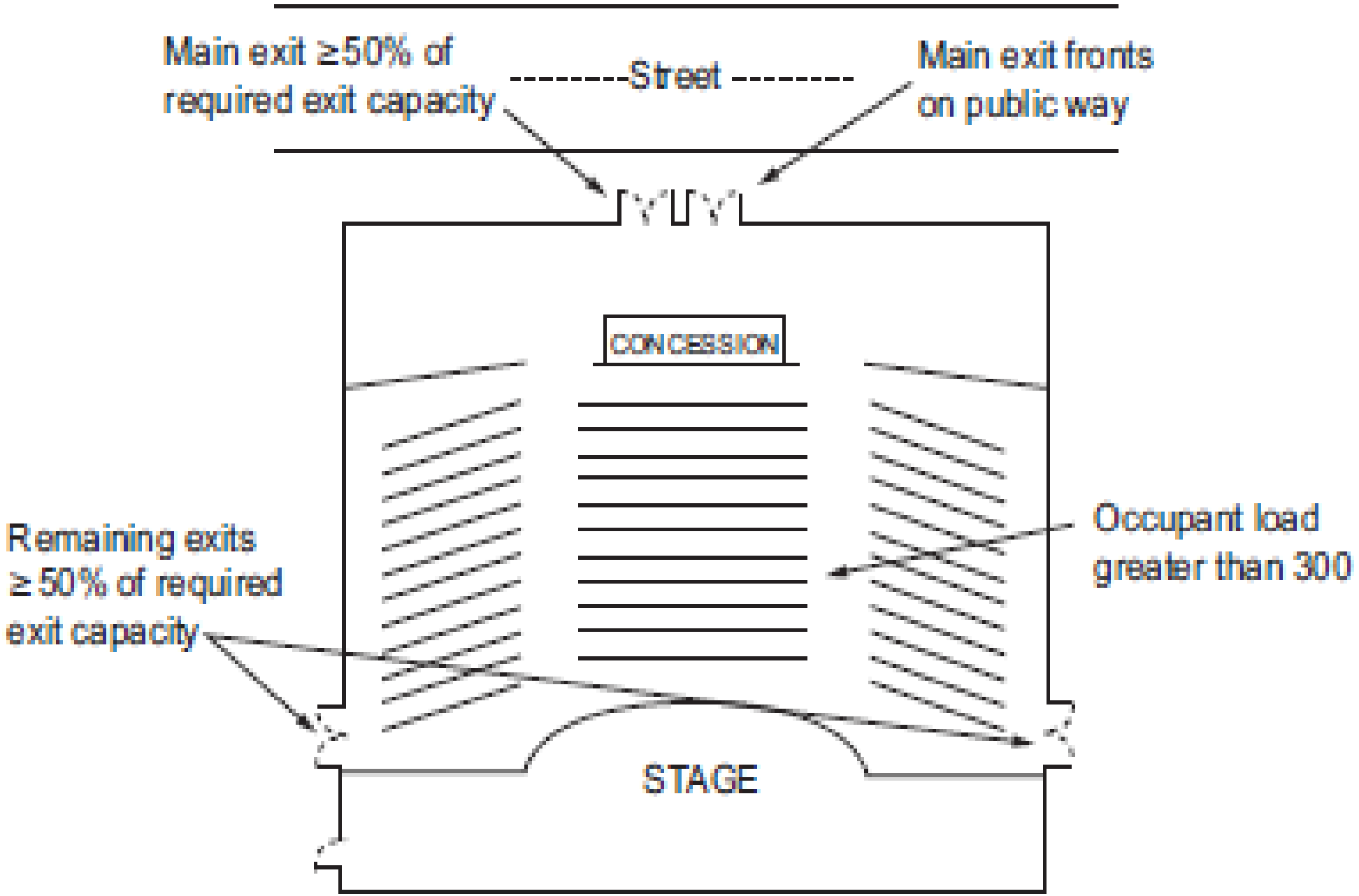


Meeting Travel Distance Limits with Horizontal Exits



Assembly Seating

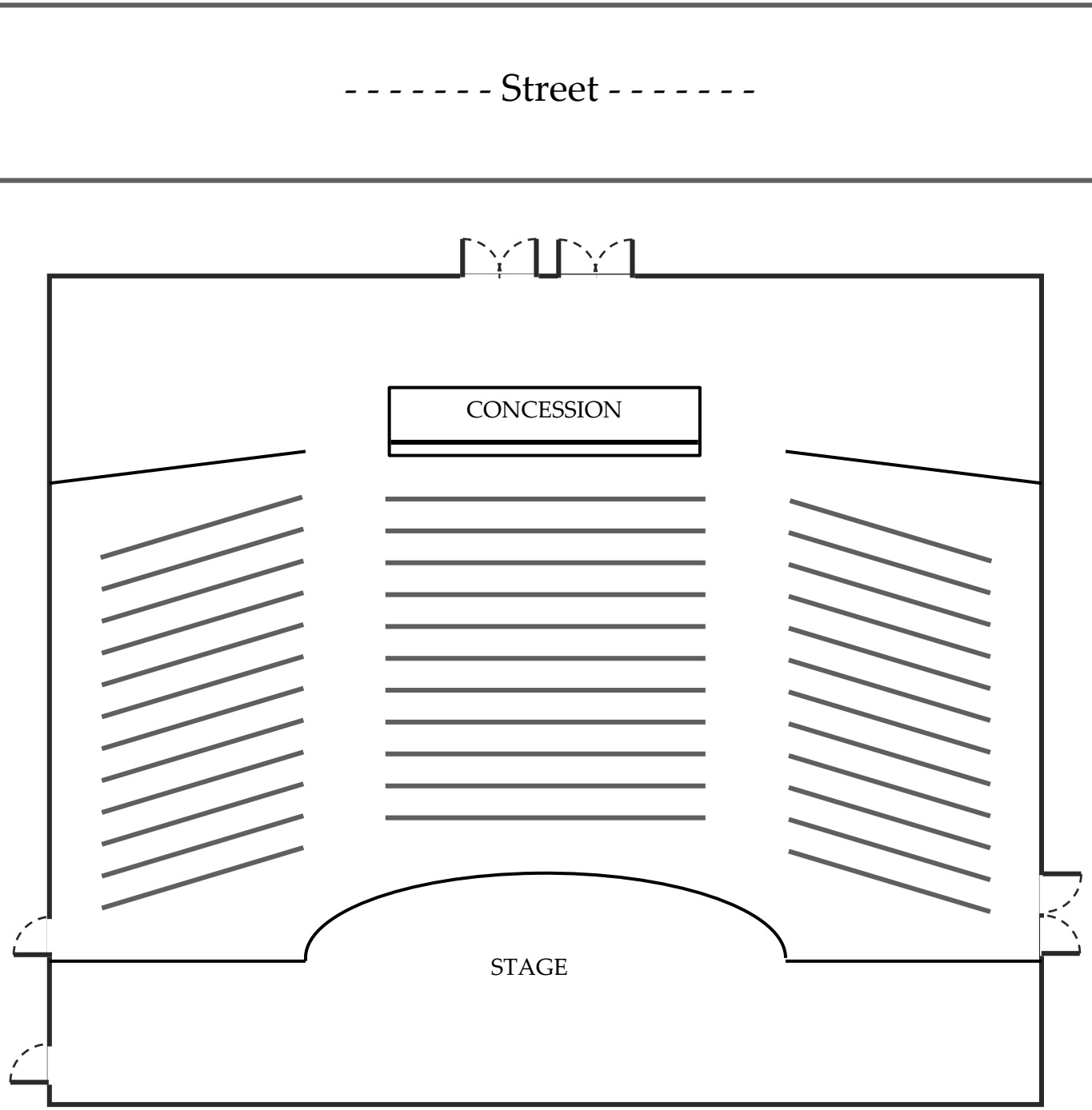
Assembly
Section 1029



Assembly Exits Activity

Given:

- OL = 1,100 persons
- Exterior exit door from the stage is not accessible to the audience
- All exit doors provide 32″ clear width
- Building is fully sprinklered and is provided with an EV/AC system



Assembly Exits Activity

1. How many exits are required?

4
Table 1006.3.1

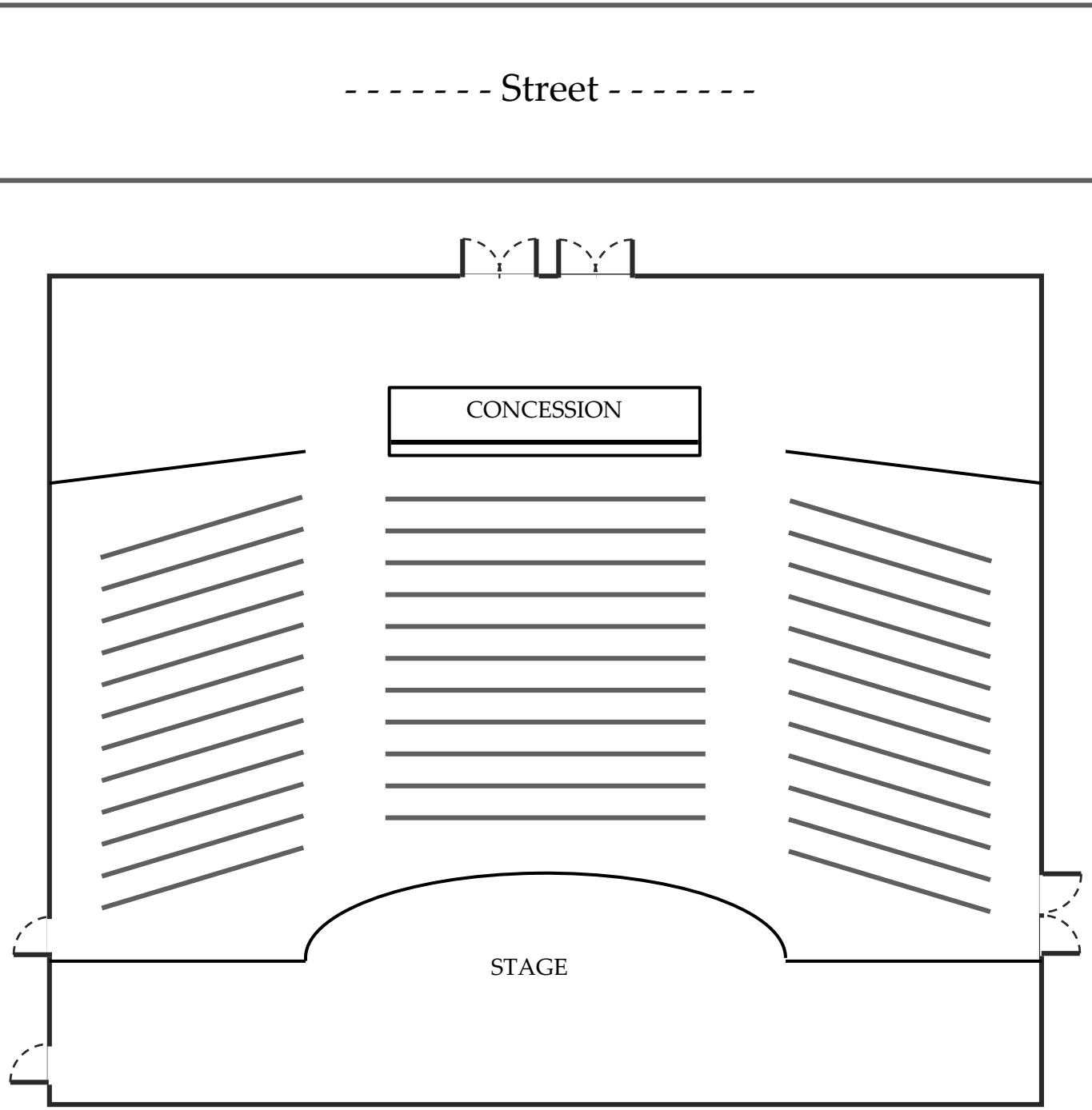
2. Are the exits separated adequately?

No. The two pairs of doors at the main entrance are located too close together to be considered as two independent exits.
Section 1007.1.2

Assembly Exits Activity

Given:

- OL = 1,100 persons
- Exterior exit door from the stage is not accessible to the audience
- All exit doors provide 32″ clear width
- Building is fully sprinklered and is provided with an EV/AC system



Assembly Exits Activity

3. What is the minimum required capacity of the main exit?

82.5”; Sections 1005.3.2, Exception 1 and 1029.2. 50 percent of 1,100 times 0.15/occupant.

4. What is the egress capacity provided at the main exit?

128”

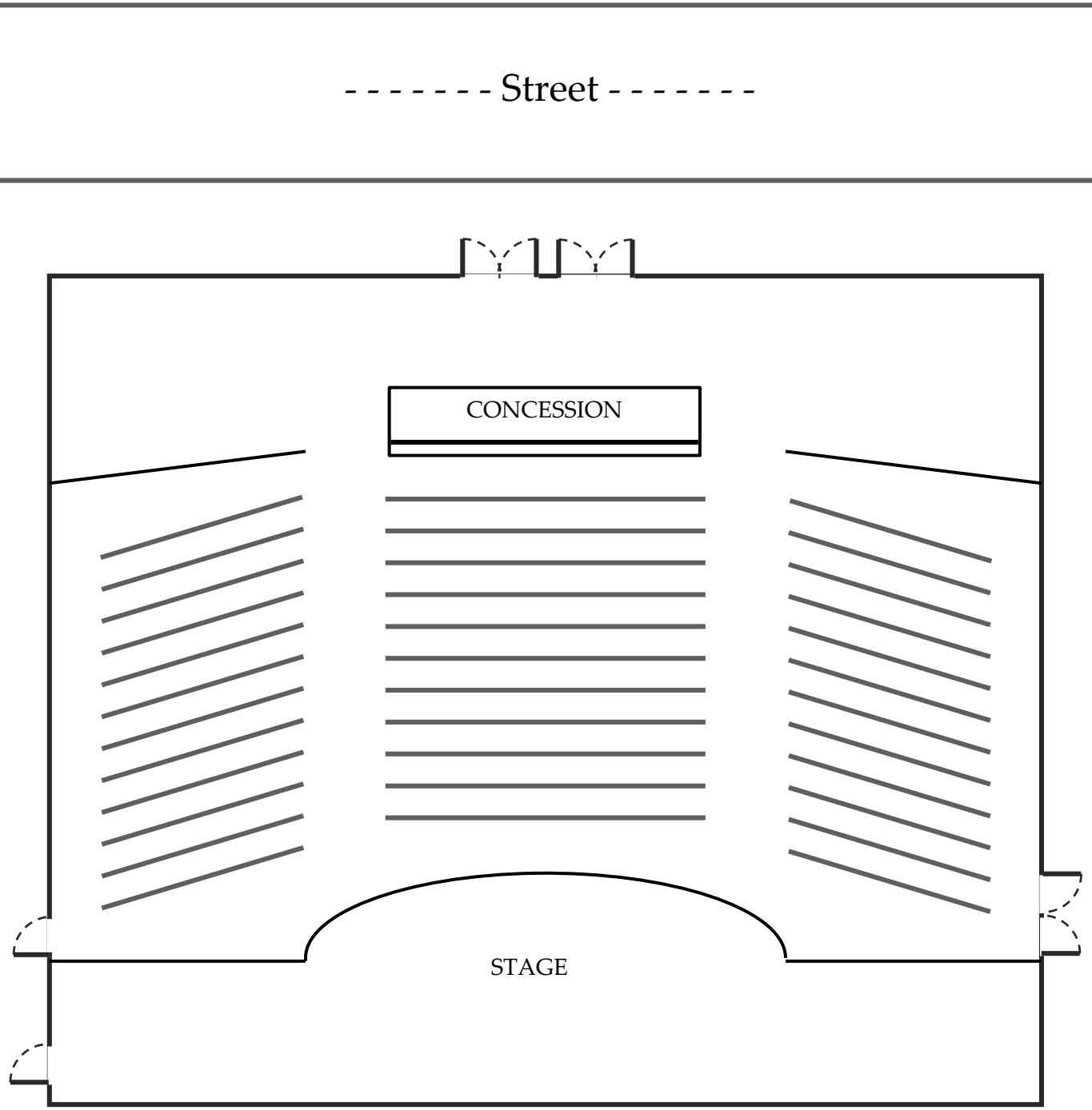
5. What is the minimum required capacity of the remaining exits?

82.5”
Section 1029.2

Assembly Exits Activity

Given:

- OL = 1,100 persons
- Exterior exit door from the stage is not accessible to the audience
- All exit doors provide 32″ clear width
- Building is fully sprinklered and is provided with an EV/AC system



Assembly Exits Activity

6. What is the egress capacity provided at the remaining exits?

128”

Table 1029.6.2
Capacity for Aisles for Smoke-protected Assembly Seating

TABLE 1029.6.2
CAPACITY FOR AISLES FOR SMOKE-PROTECTED ASSEMBLY

TOTAL NUMBER OF SEATS IN THE SMOKE-PROTECTED ASSEMBLY SEATING	INCHES OF CAPACITY PER SEAT SERVED			
	Stepped aisles with handrails within 30 inches	Stepped aisles without handrails within 30 inches	Level aisles or ramped aisles not steeper than 1 in 10 in slope	Ramped aisles steeper than 1 in 10 in slope
Equal to or less than 5,000	0.200	0.250	0.150	0.165
10,000	0.130	0.163	0.100	0.110
15,000	0.096	0.120	0.070	0.077
20,000	0.076	0.095	0.056	0.062
Equal to or greater than 25,000	0.060	0.075	0.044	0.048

For SI: 1 inch = 25.4 mm.

COMPARE: Indoor vs. Outdoor Smoke-protected Assembly Seating

Examples—Smoke Protection

Occupant Loads	Section 1029.6.2 (indoors)		Section 1029.6.3 (outdoors)	
	Stepped aisle ≤ 30″ to handrail	Level or ramped aisle ≤ 1:10	Stepped aisle ≤ 30″ to handrail	Level or ramped aisle ≤ 1:10
5,000	1,000″	750″	400″	300″
10,000	1,300″	1,000″	800″	600″
20,000	1,520″	1,120″	1,520″	1,120″
30,000	1,800″	1,320″	1,800″	1,320″

For SI: 1 inch = 25.4 mm.

Travel Distance
Section 1029.7

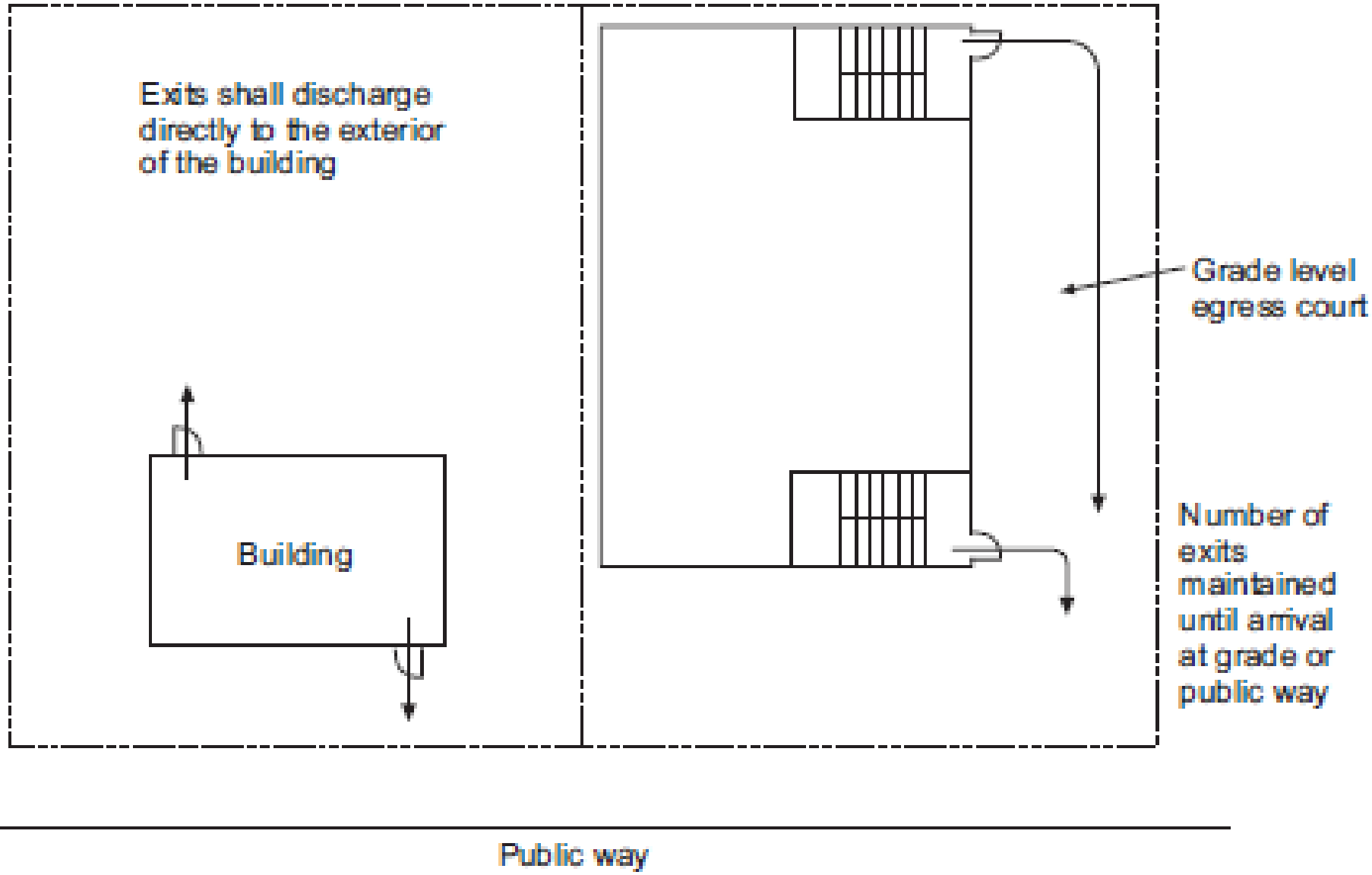
- Allowed travel distance for assembly spaces without smoke protection are consistent with other occupancies

Common Path of Egress Travel
Section 1029.8

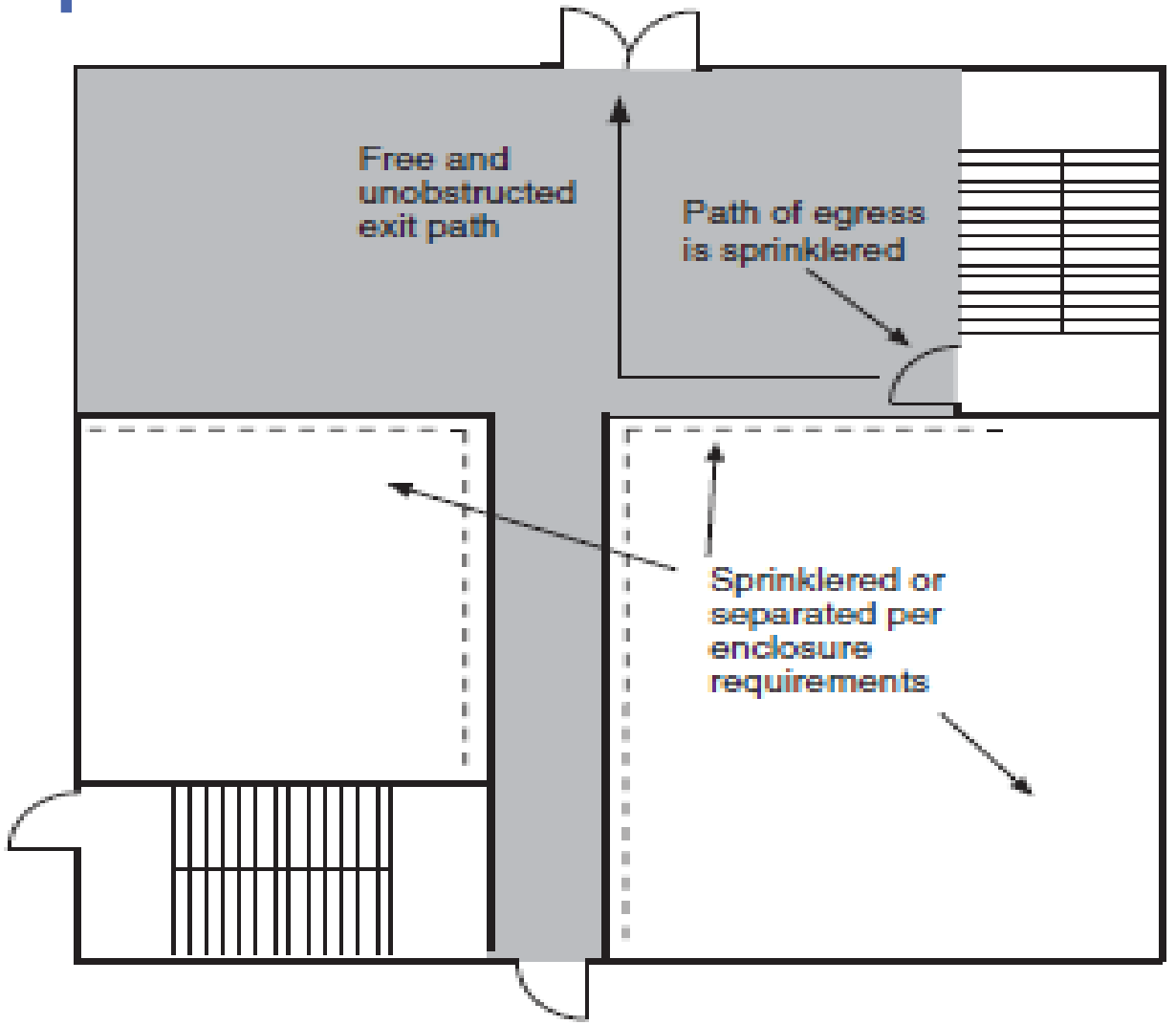
- In assembly occupancies
  - Maximum of 30′ from any seat to a point where an occupant has a choice of two paths of egress travel
  - When <50 occupants, the common path of egress travel ≤75′
  - For smoke-protected assembly seating, the common path of egress travel ≤50′

Exit Discharge

General Exit Discharge Requirements
Section 1028.1



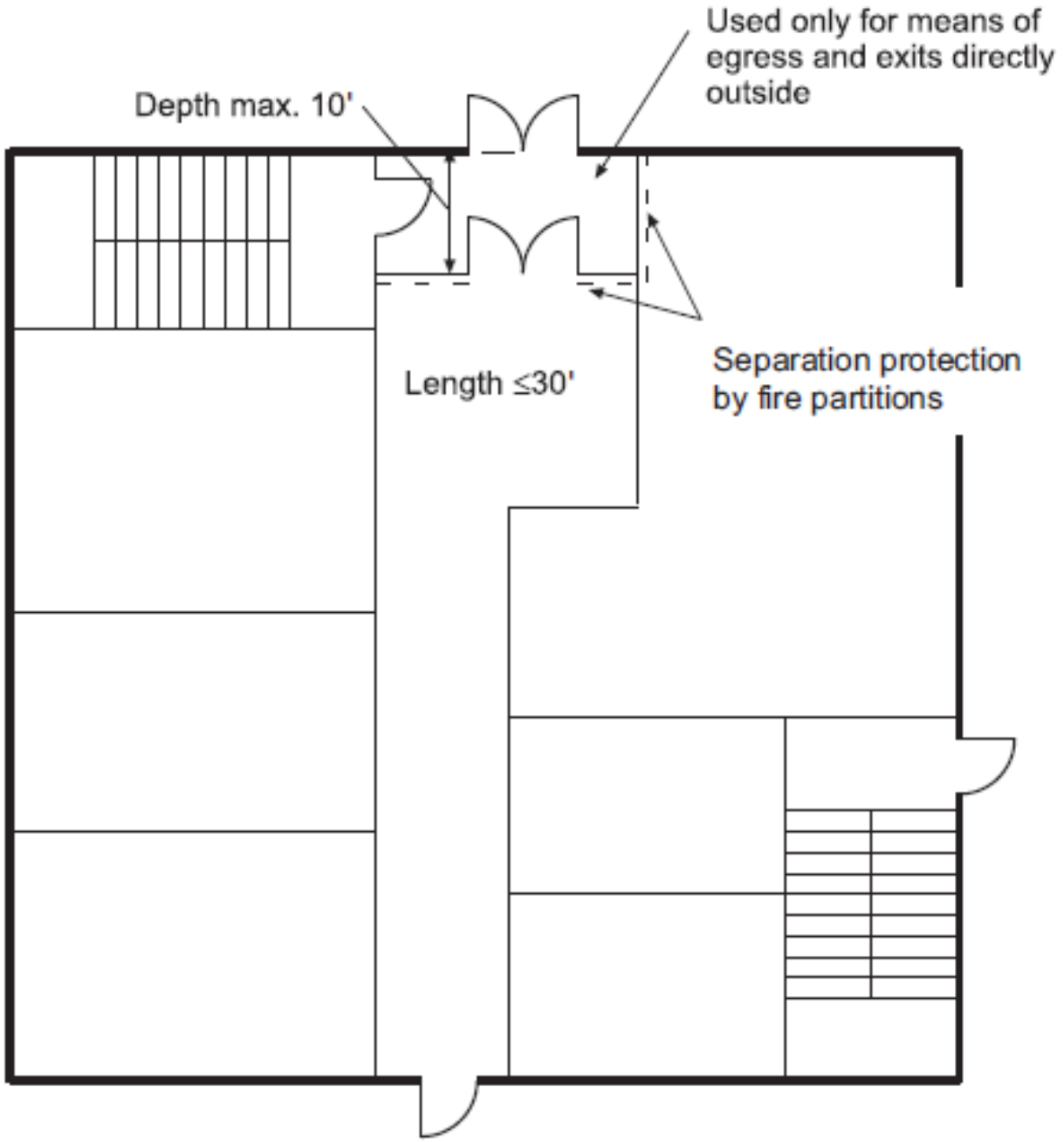
Exit Discharge
Section 1028.1, Exception 1



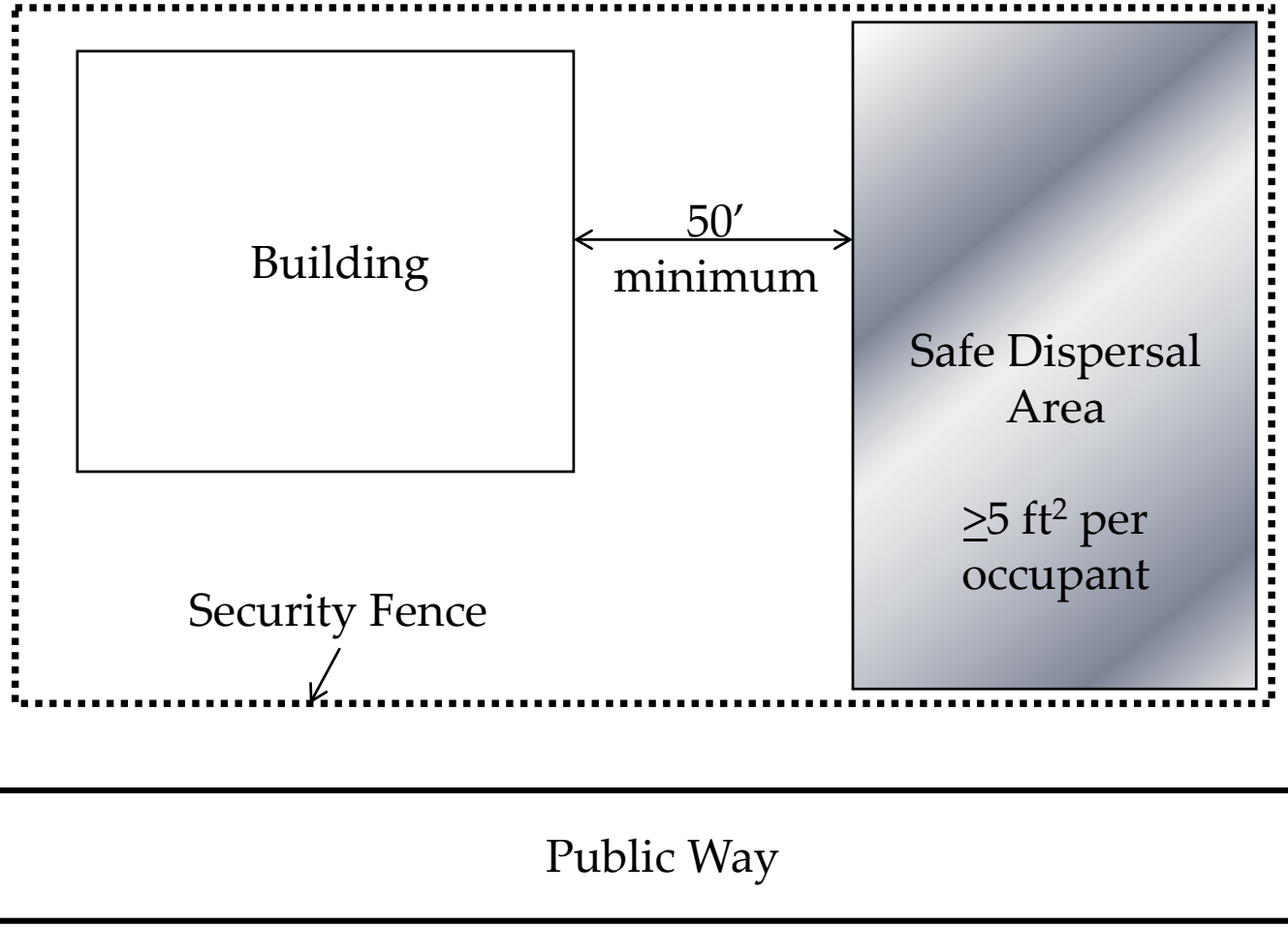
Maximum 50% of exits and exit discharge back onto level of exit discharge

Exit Discharge
Section 1028.1, Exception 2

Not more than 50 percent of the number and minimum width or required capacity of the interior exit stairways and ramps is permitted to egress through a vestibule.



Access to a Public Way
Section 1028.5



Accessible Means of Egress

Accessible Means of Egress
Section 1009

- Accessible routes – Section 1104
- Interior exit stairways – Sections 1009.3 and 1023
- Exit access stairways – Sections 1009.3 and 1019.4
- Exterior exit stairways – Sections 1009.3 and 1027
- Elevators – Section 1009.4
- Platform lifts – Section 1009.5
- Horizontal exits – Section 1026
- Ramps – Section 1012
- Areas of refuge – Section 1009.6
- Exterior area for assisted rescue – Section 1009.7

Scoping Requirements for Accessible Means of Egress

- In spaces required to be accessible
  - One accessible means of egress is required when only one means of egress is required
  - Two accessible means of egress are required if two or more means of egress are required
- In buildings ≥4 stories:
  - Minimum of one of the accessible means of egress must be via an elevator with standby power
  - The elevator must be accessed from an area of refuge or a horizontal exit, except in sprinklered buildings
- In alterations to existing buildings, accessible means of egress are not required

Accessible Means of Egress

- An accessible route from every accessible space to the required accessible exit elements must be provided
- While only one accessible route is required into a space, more than one accessible route *may* be required for egress

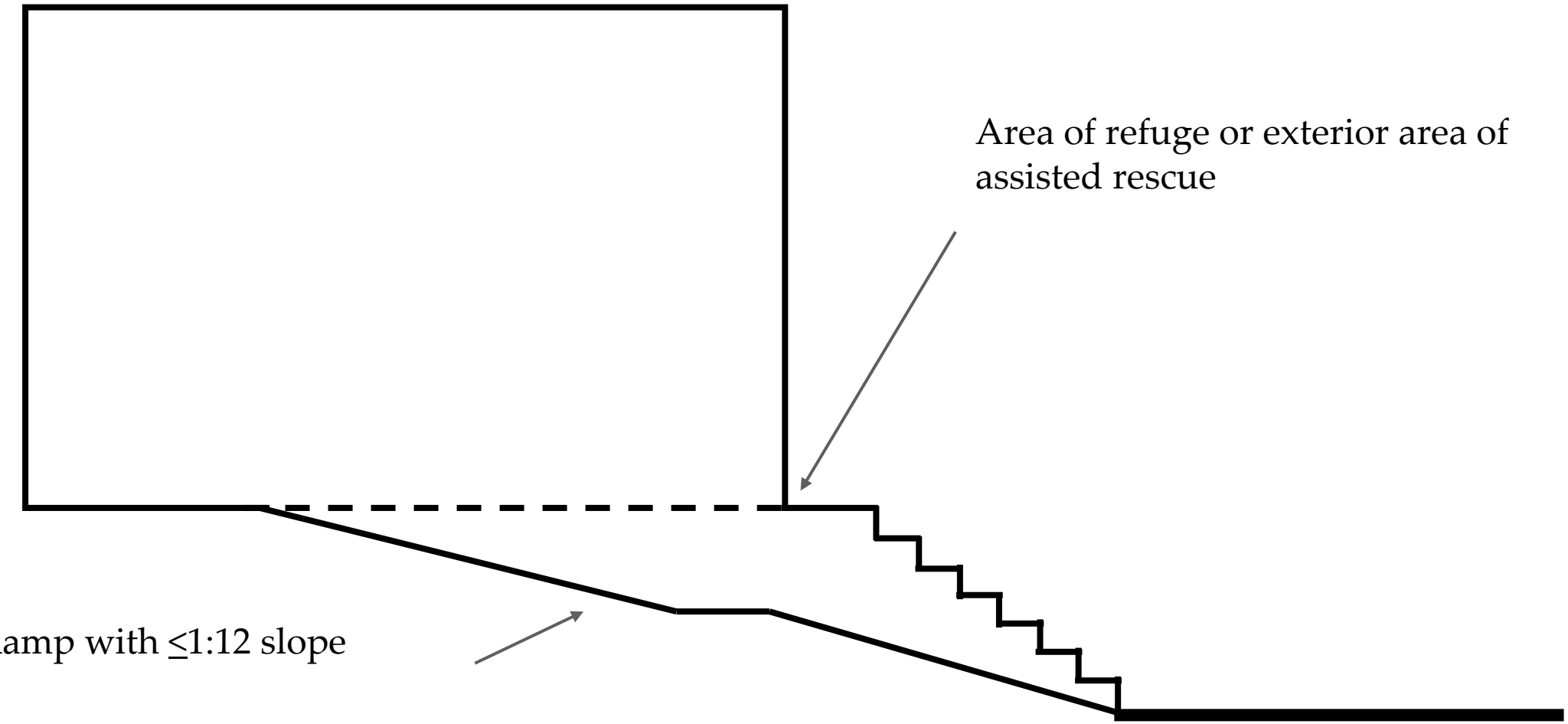
Exit Doors
Section 1010.1

- **Concerns with exit doors include:**
  - Maneuvering clearances
  - Elevation of floor surfaces
  - Clear width
  - Operating controls within reach ranges and hardware options

Elevators
Section 1009.4

- In building with four or more stories:
  - At least one elevator with standby power
  - High rises have no exceptions allowed
- Exceptions:
  - Fully sprinklered buildings with horizontal exits
  - Fully sprinklered buildings with ramps
  - Standby power for the elevators is required for high rises
- Not required to be accessed from Area of Refuge or Horizontal Exit if building is sprinklered

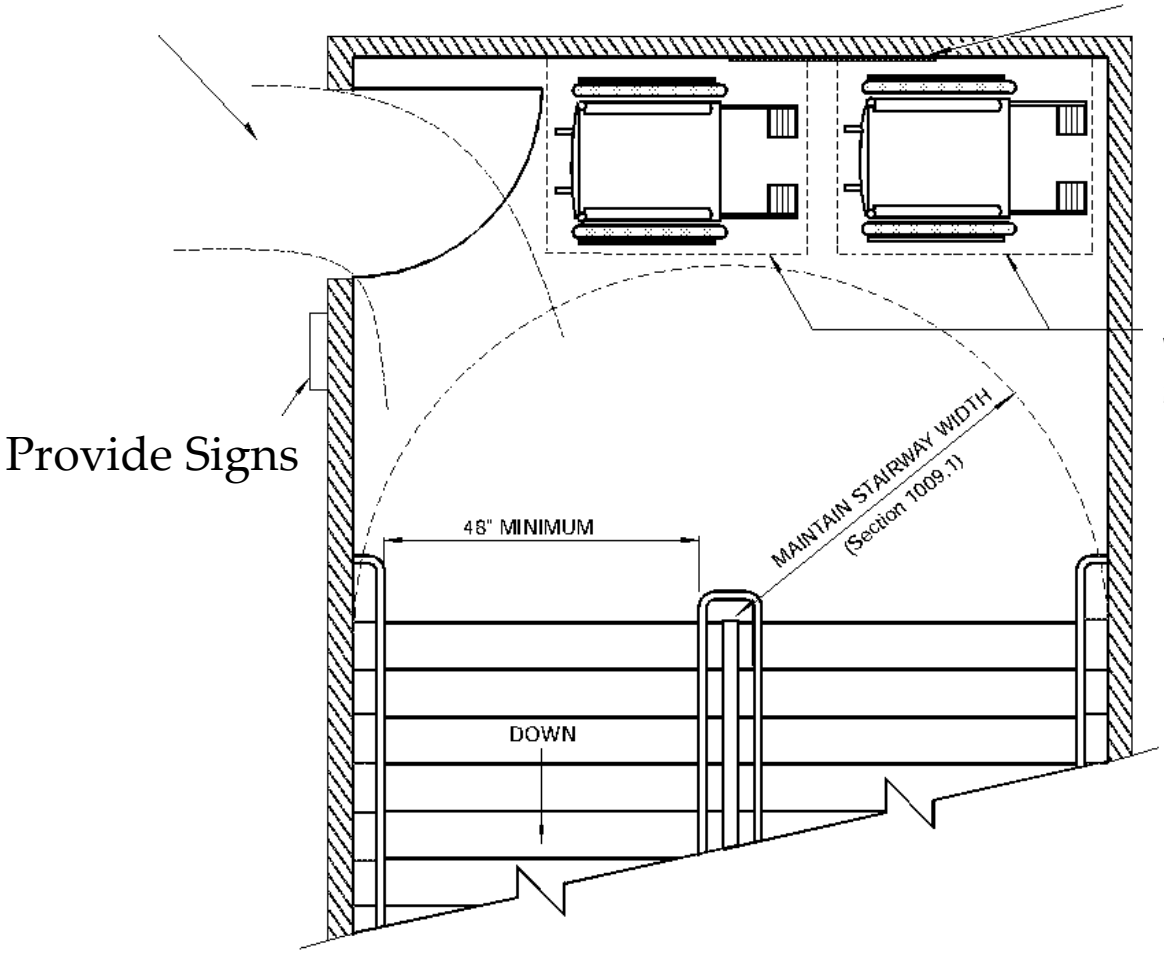
Exit Discharge
Section 1009.3



Areas of Refuge – Stairways
Section 1009.6

Maintain minimum clear egress width

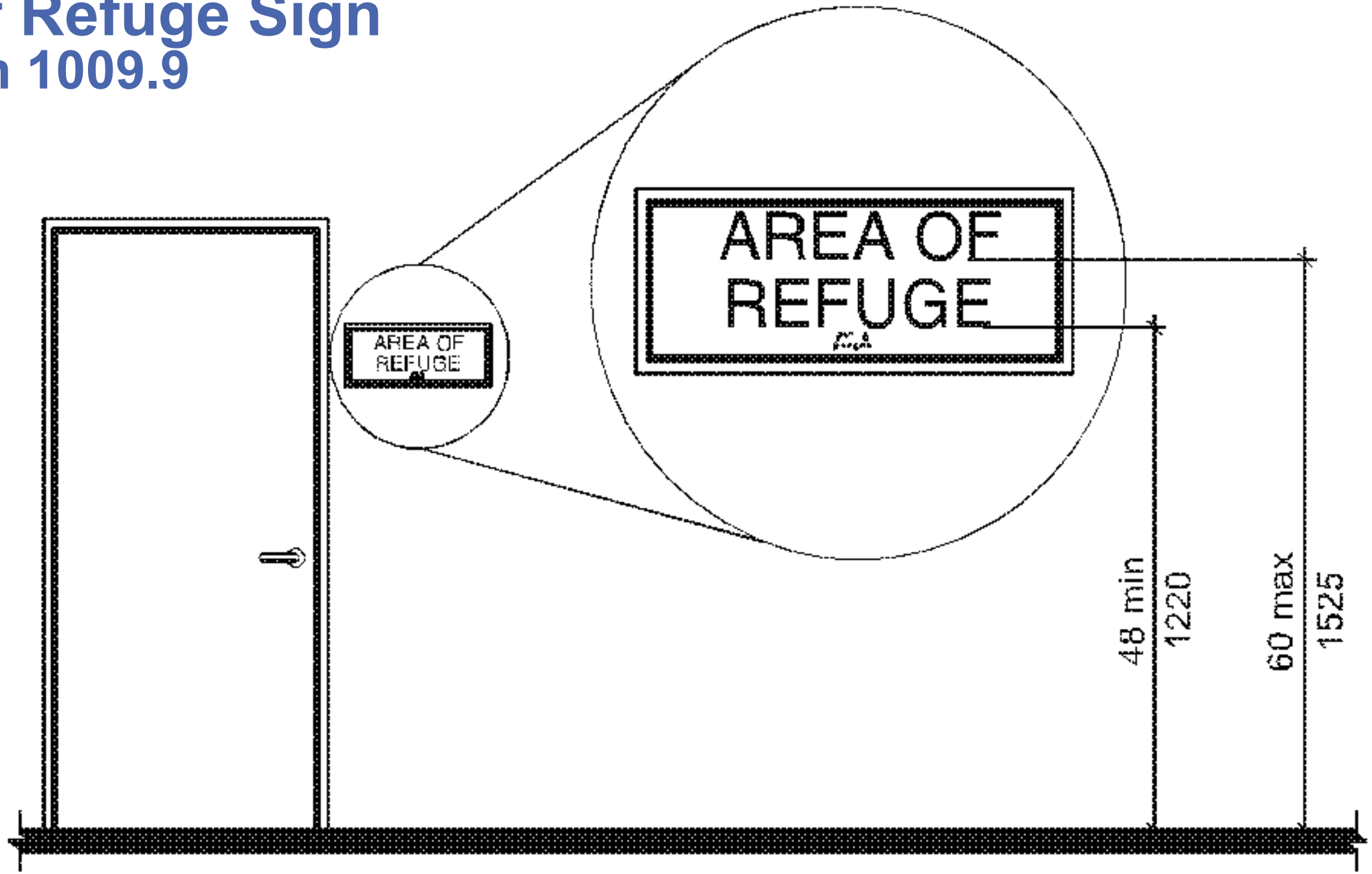
Signs, Instructions and two-way communication



30" x 48" Wheelchair space

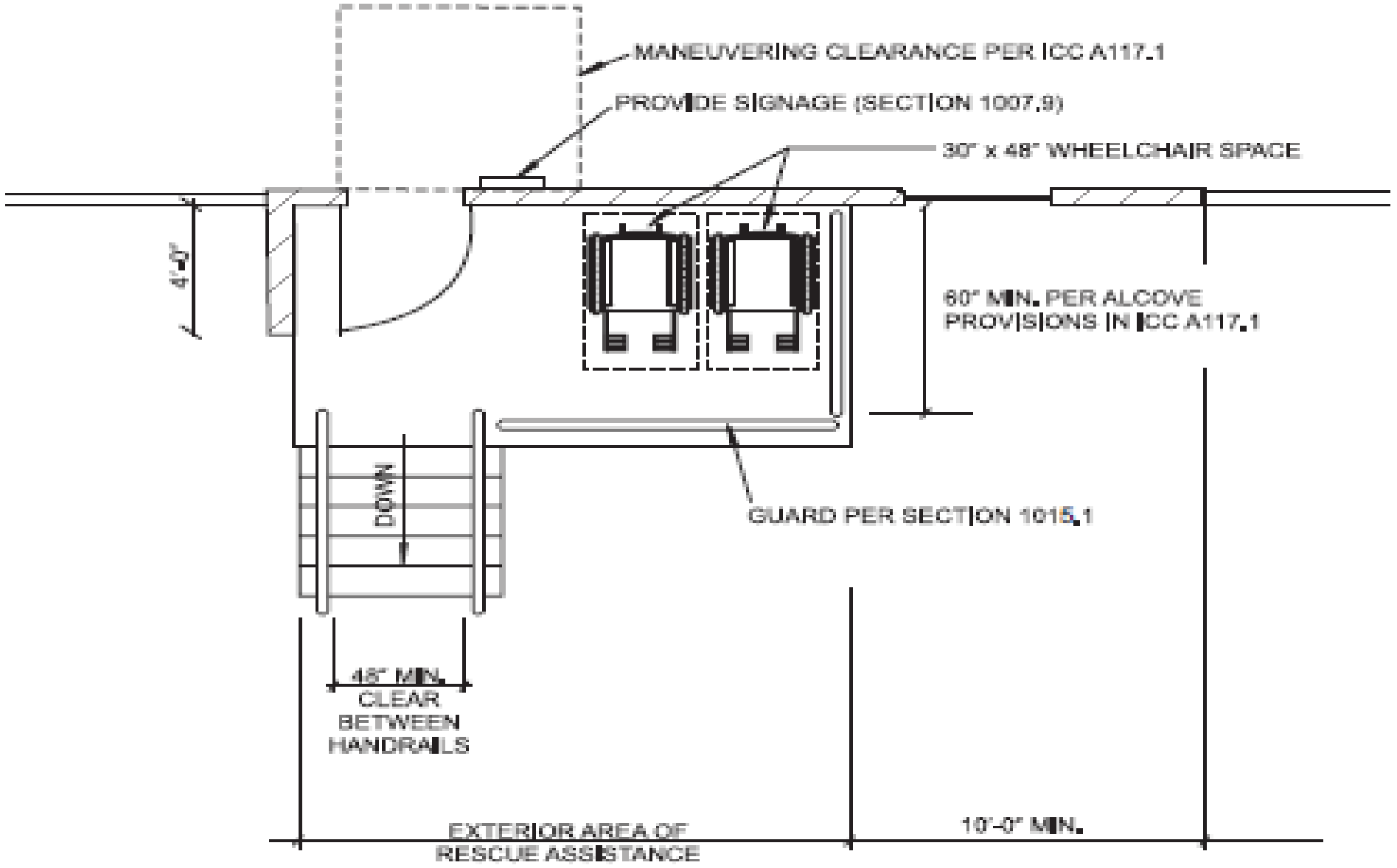
Provide Signs

Area of Refuge Sign
Section 1009.9



Exterior Areas for Assisted Rescue

Section 1009.7



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