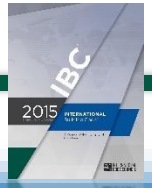
2015 IBC Exit Systems

Based on the 2015 *International Building Code*

Course Description

- This seminar addresses the provisions of Chapter 10 of the 2015 International Building Code (IBC) regarding specific aspects of the means of egress, those components regulated as “**exits**”



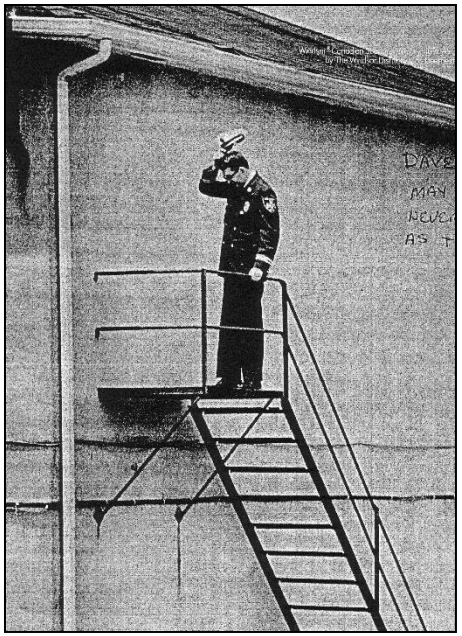
Objectives

Upon completion, participants will be better able to:

- **Determine** those means of egress components that are defined as “**exits**”
- **Identify** where exit elements are **required**
- **Identify** the specific **technical criteria** for exits
- **Describe** the **regulation** of the exit discharge system

Course Overview

- Module 1 – Definition of an Exit
- Module 2 – Use of Exit Components
- Module 3 – Specifics of Exit Components
- Module 4 – Exit Discharge



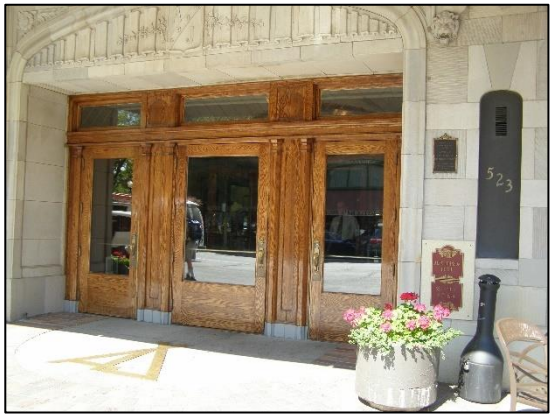
Module 1

Definition of an Exit

Definition of Exit

- The term “**exit**” is used in the code to describe one of **three parts** of the means of egress system
- The means of egress includes:

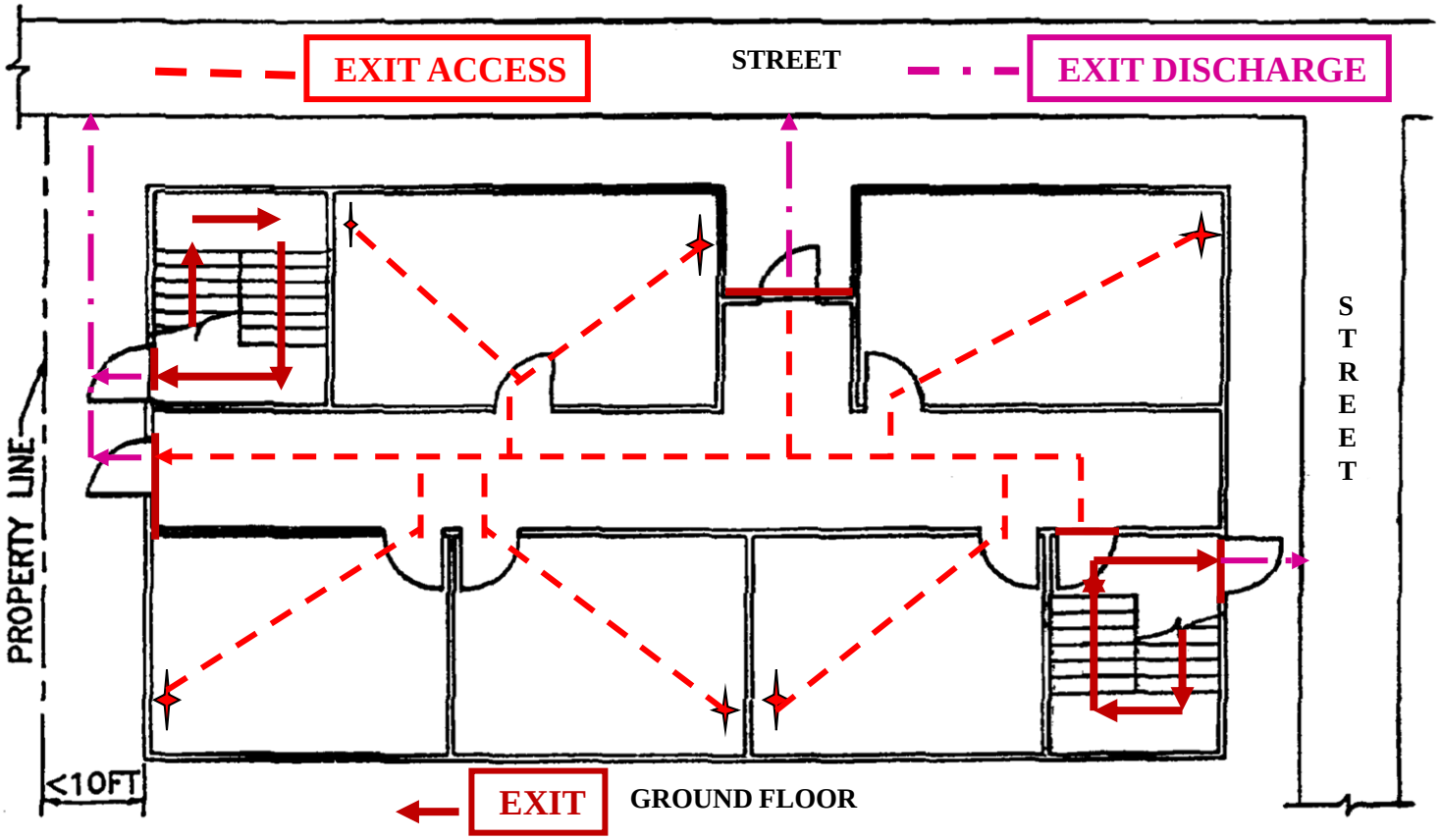
Exit Access



Exit

Exit discharge

Three Parts of a Means of Egress

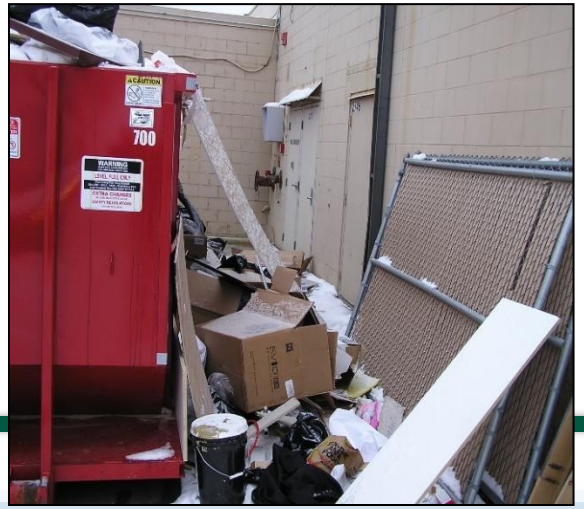


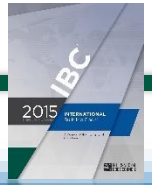
Basic Concepts of Exiting

- Exits must be provided for all building occupants
- Occupants must have control of all elements of the exiting system
- Once size and number of exits have been established, they cannot be reduced
- Once level or degree of fire safety has been established, they cannot be reduced

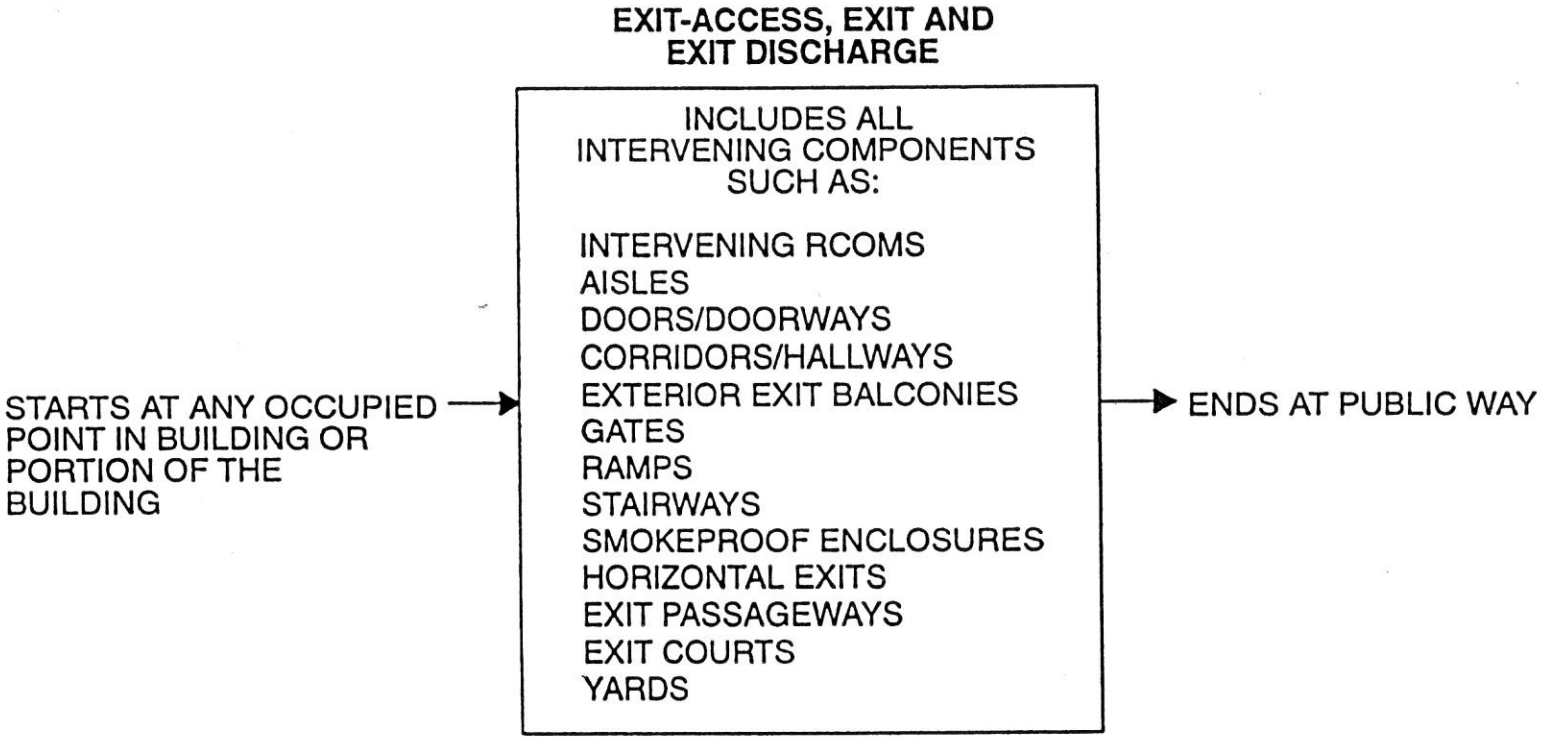
Definition of Exit

- The means of egress is defined as “a **continuous and unobstructed path** of vertical and horizontal egress travel from any occupied portion of a building or structure to a public way
- A means of egress consists of **three** separate and distinct **parts**: the exit access, the exit and the exit discharge





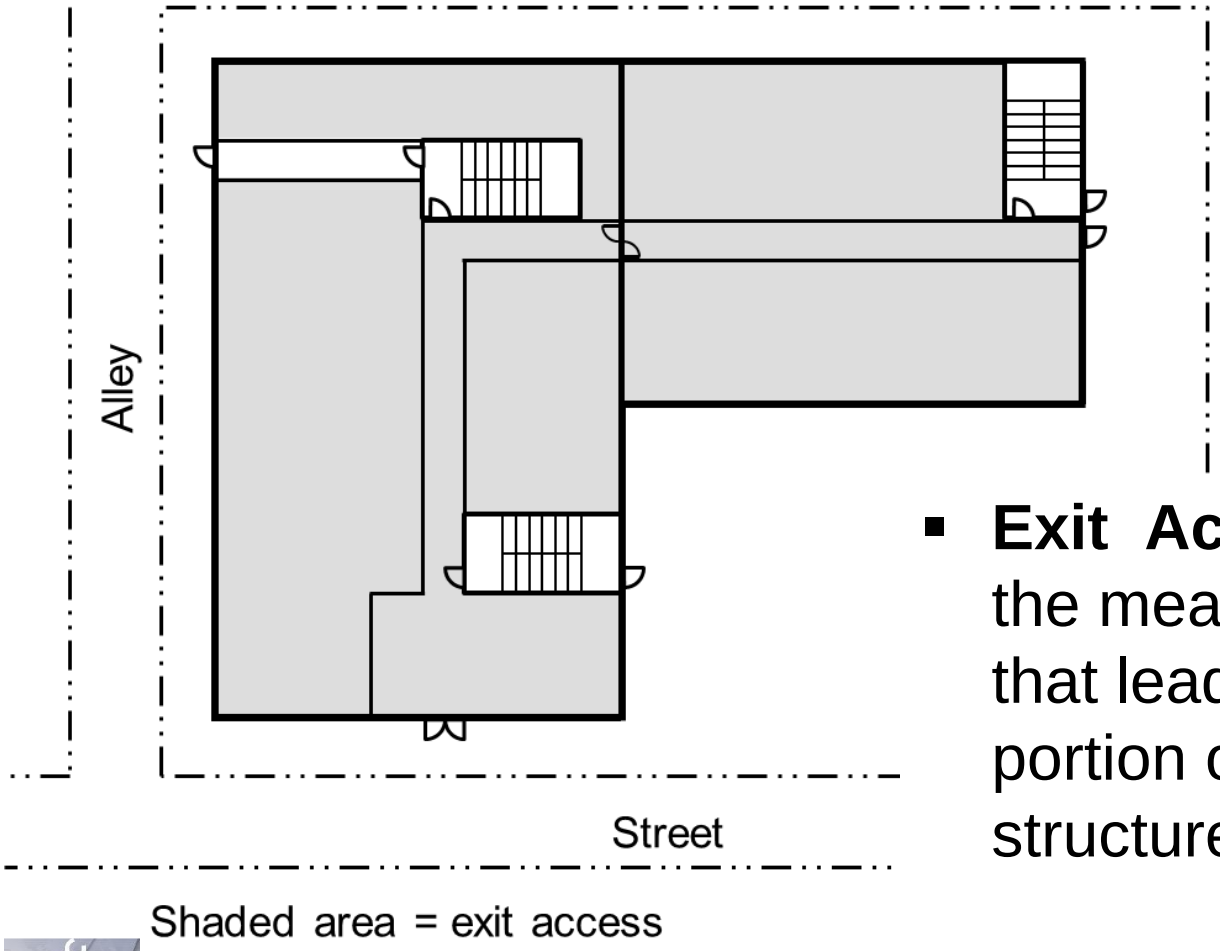
Means of Egress Definition Section 1002



DEFINITION OF A MEANS OF EGRESS

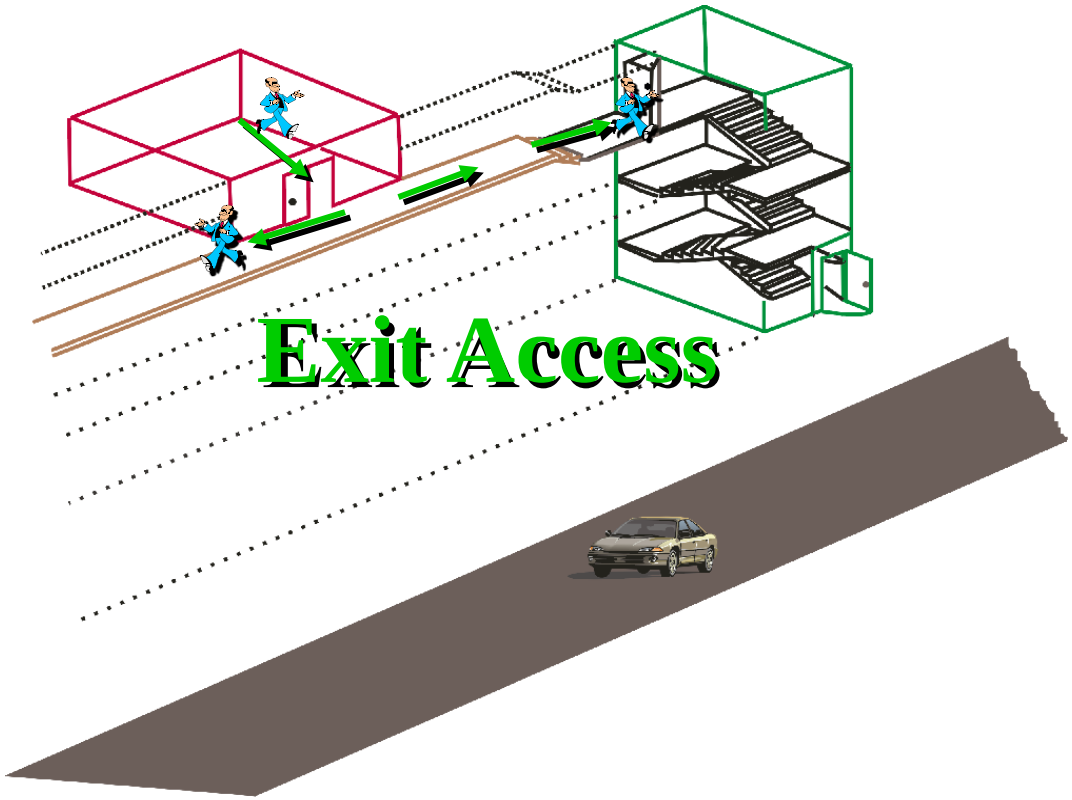
CONTINUOUS, UNOBSTRUCTED & UNDIMINISHED

Exit Access

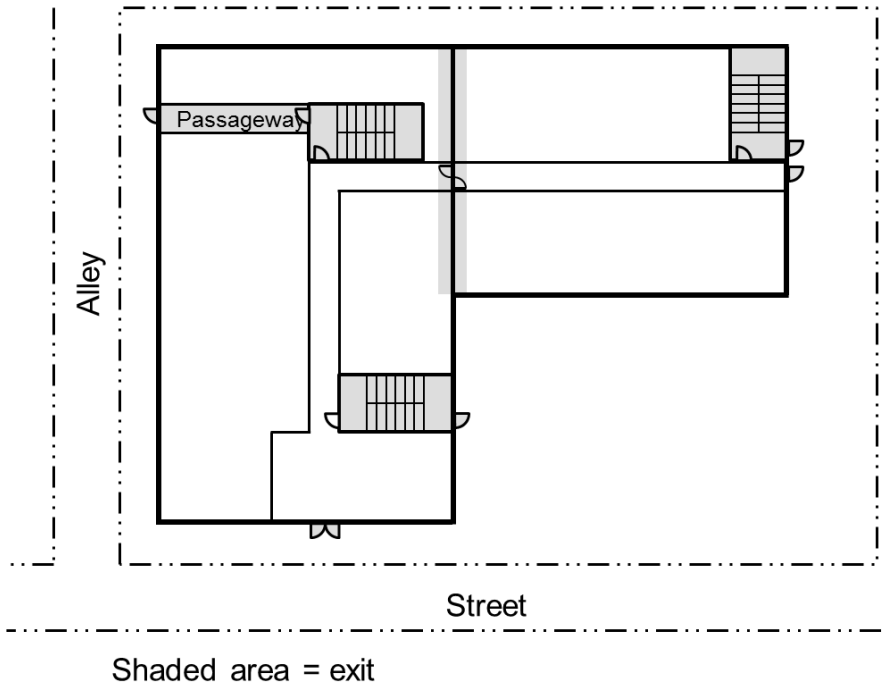


- **Exit Access** - That portion of the means of egress system that leads from any occupied portion of a building or structure to an exit.

Exit Access



Exit



Exit components include:

- Exterior exit doors at ground level
- Vertical exit enclosures
- Exit passageways
- Horizontal exits
- Exterior exit stairways/ramps

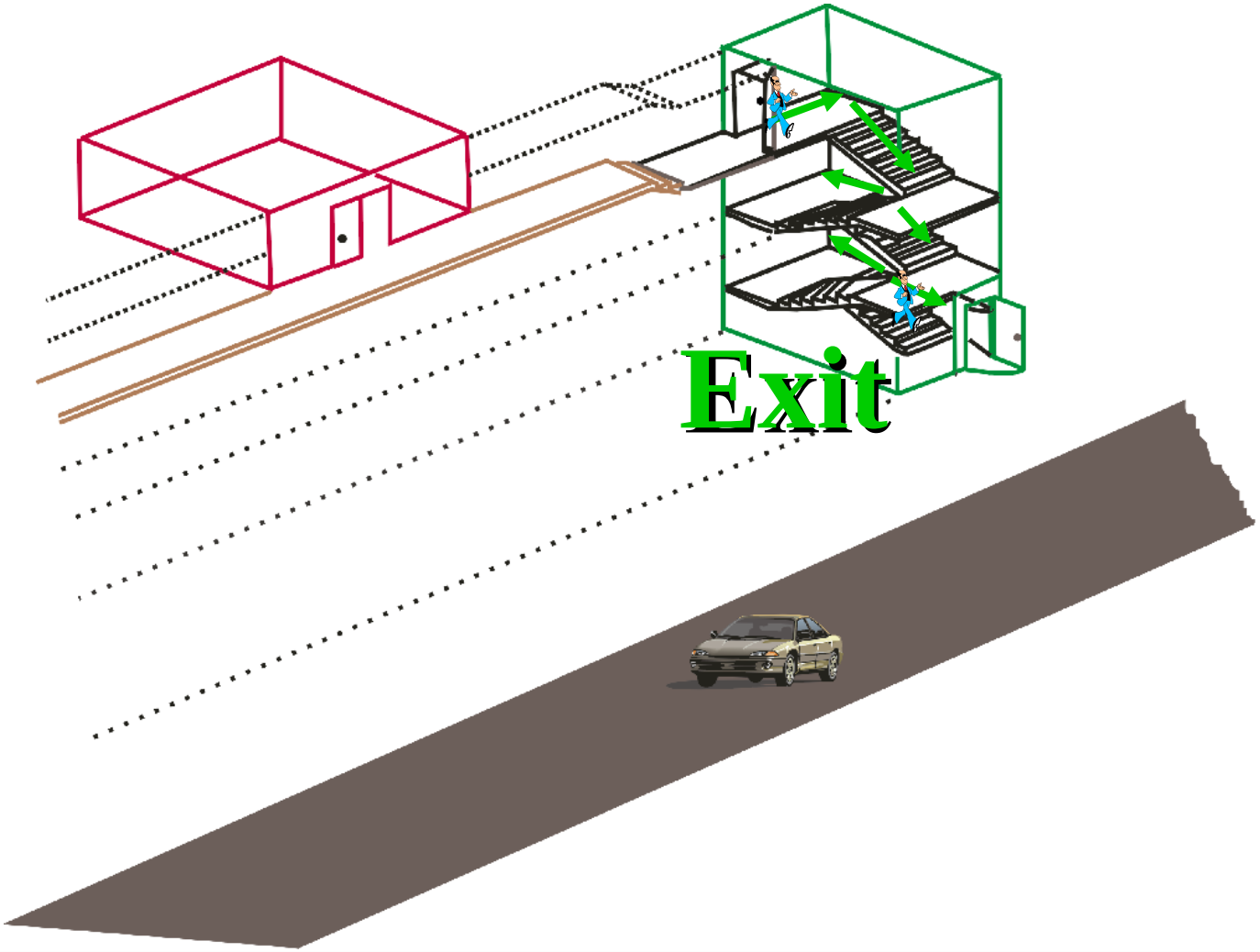
- **Exit** - That portion of the means of egress that provides a protected path of egress travel between the exit access and the exit discharge.

Exit

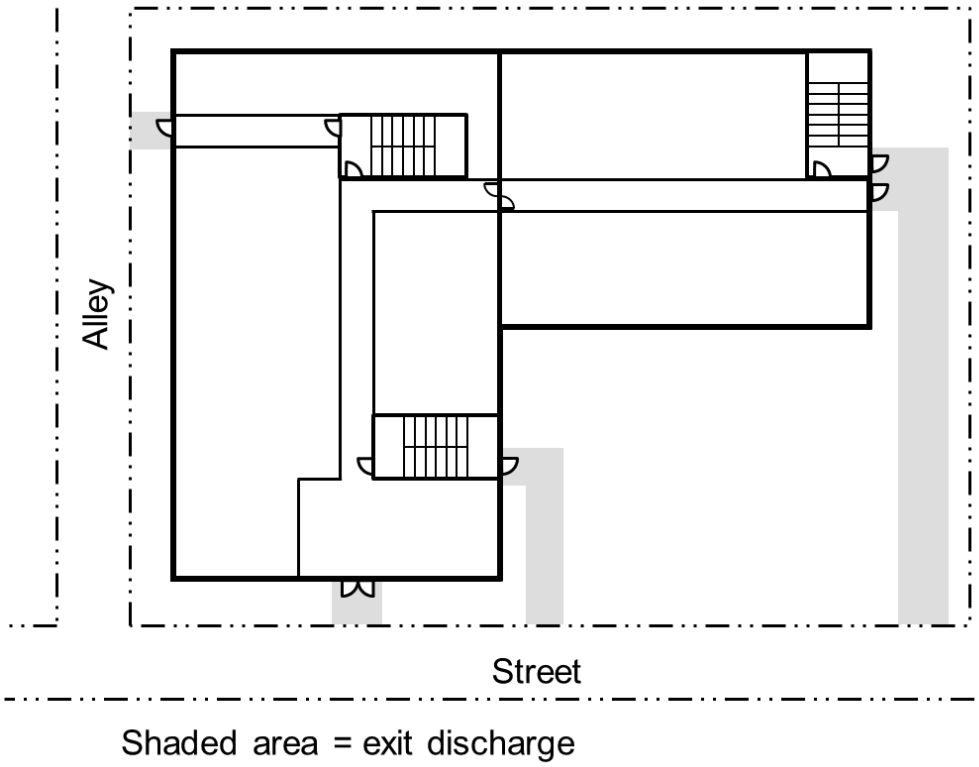
Exit

Horizontal Exit

Exit

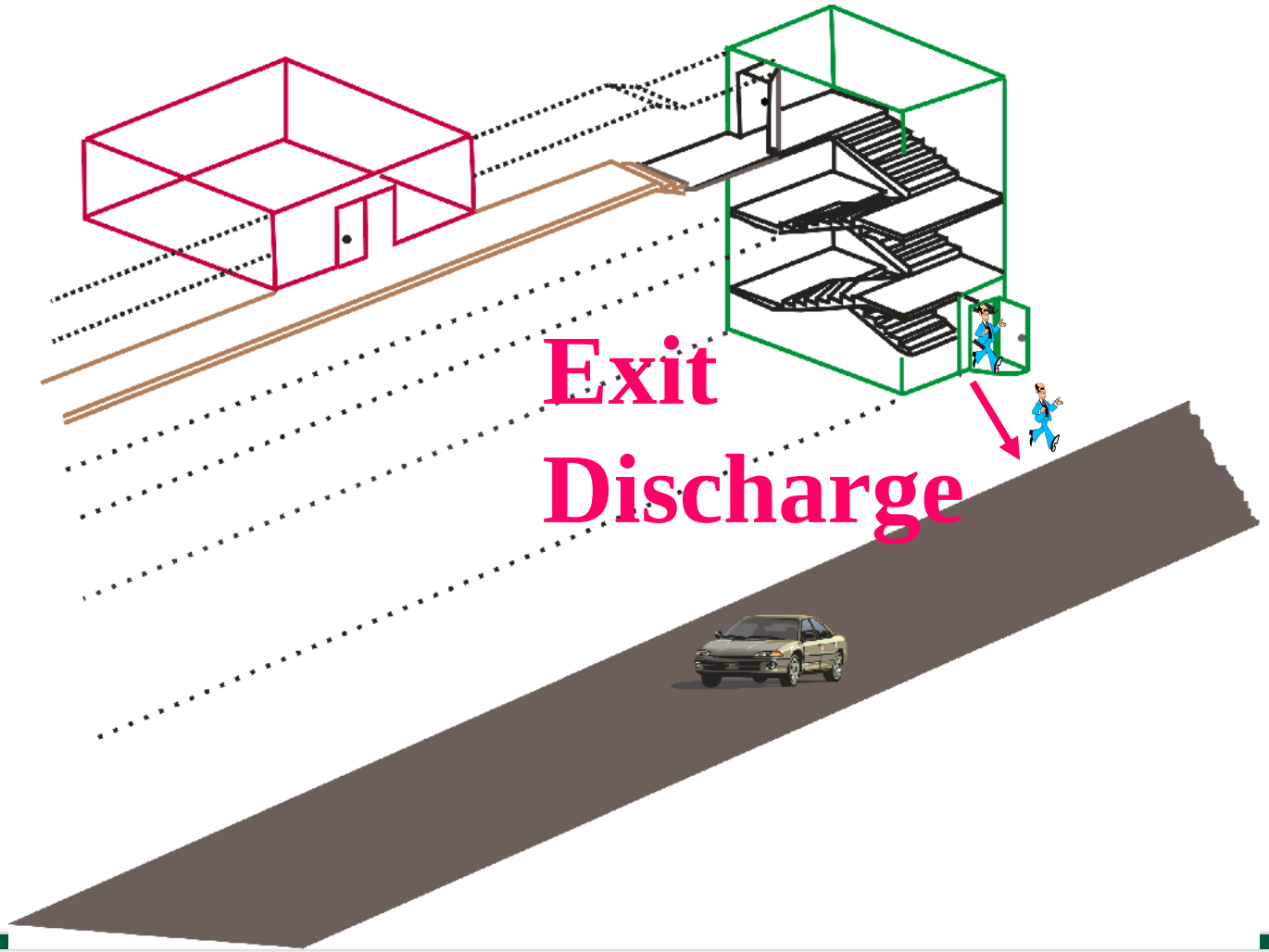


Exit Discharge

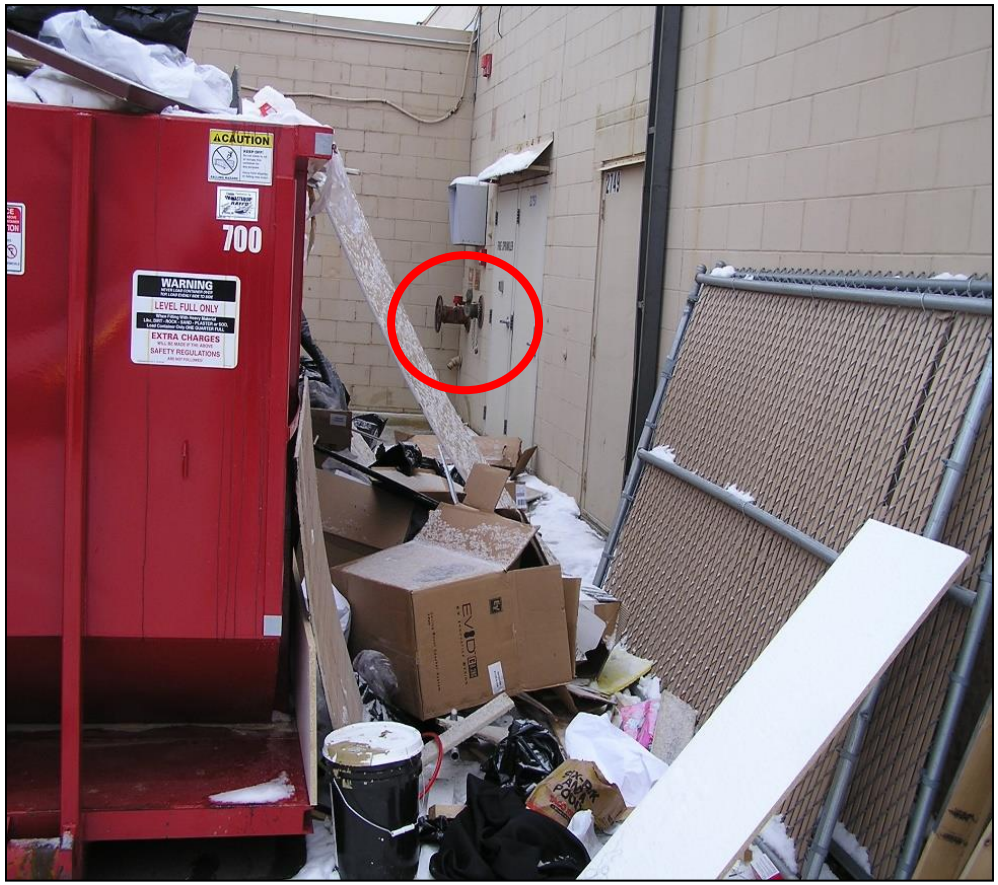


- **Exit discharge** – That portion of the means of egress between the termination of an exit and a public way.

Exit Discharge



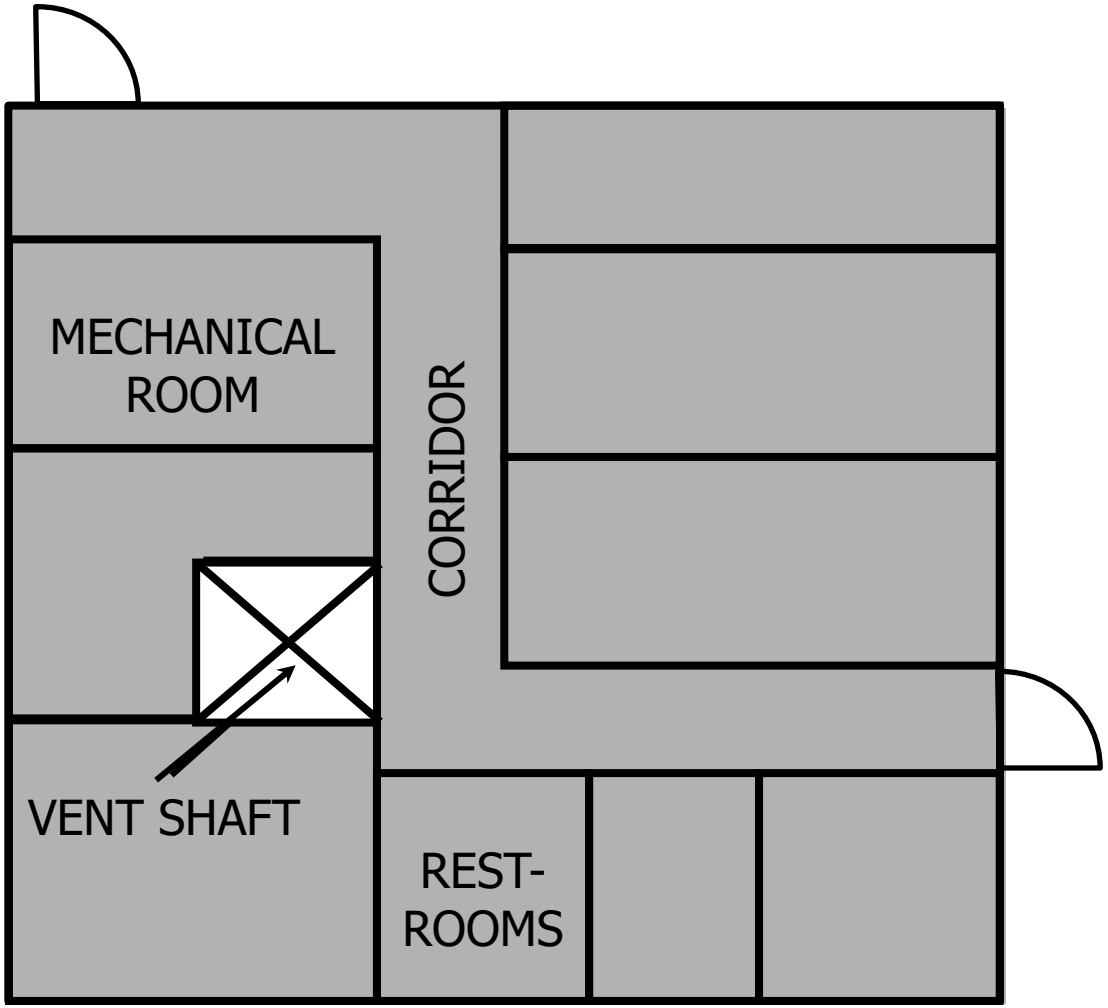
Exit Discharge



Unobstructed?

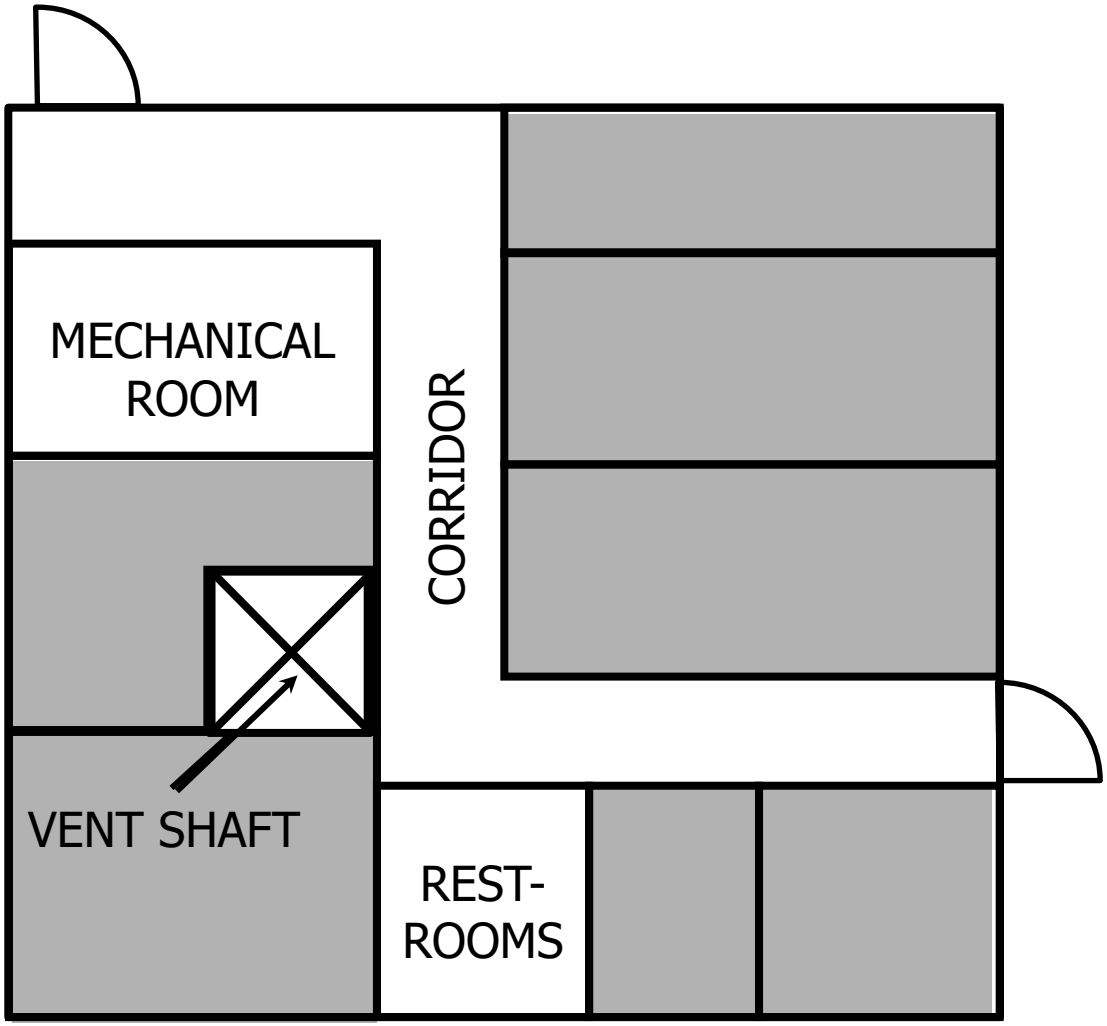
Floor Area - Gross

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



Floor Area, Net

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



Public Way

- **PUBLIC WAY** - A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of **not less than 10’**

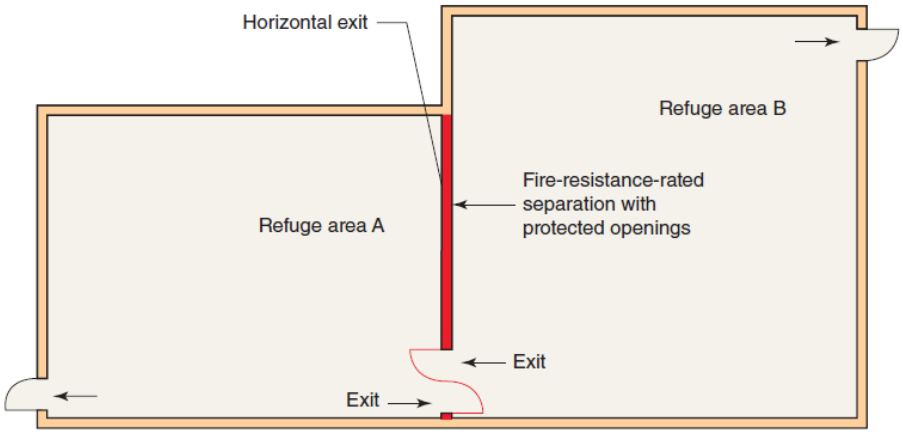
Definitions of Exit Components

- The individual exit components are also specifically defined in the IBC:
  - Exit, horizontal
  - Exit passageway
  - Interior exit stairways
  - Exterior stairway

- The components are further defined by their applicable technical provisions

Definition of Horizontal Exit

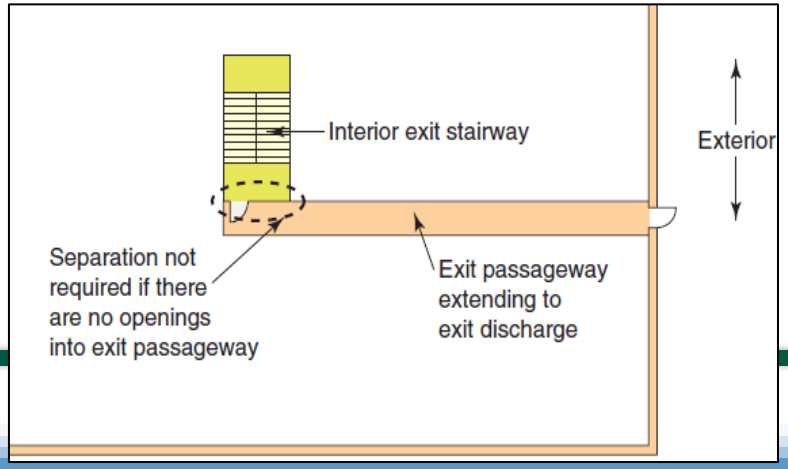
- A horizontal exit is defined as “an exit component consisting of fire-resistance-rated construction and opening protectives intended to **compartmentalize portions of a building** thereby **creating refuge areas** that afford safety from the fire and smoke from the area of fire origin”

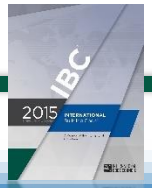


Horizontal exits

Definition of Exit Passageway

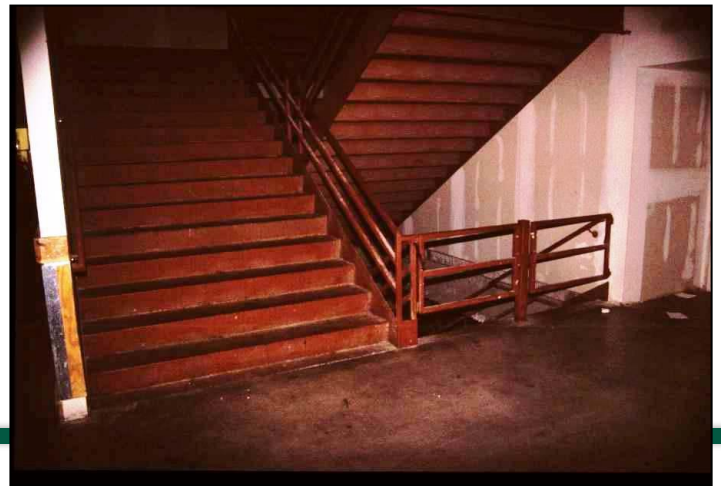
- An exit passageway is defined as “an exit component that is **separated** from other interior spaces of a building or structure **by fire-resistance-rated construction and opening protectives**, and **provides for a protected path** of egress travel in a horizontal direction to an exit or to the exit discharge”

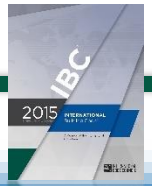




Definition of Interior Exit Stairway

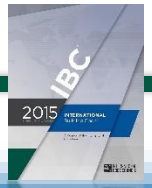
- An interior exit stairway is defined as “an exit component that serves to meet **one or more** means of egress design requirements, such as required number of exits or exit access travel distance, and provides for a protected path of egress travel to the exit discharge or public way”





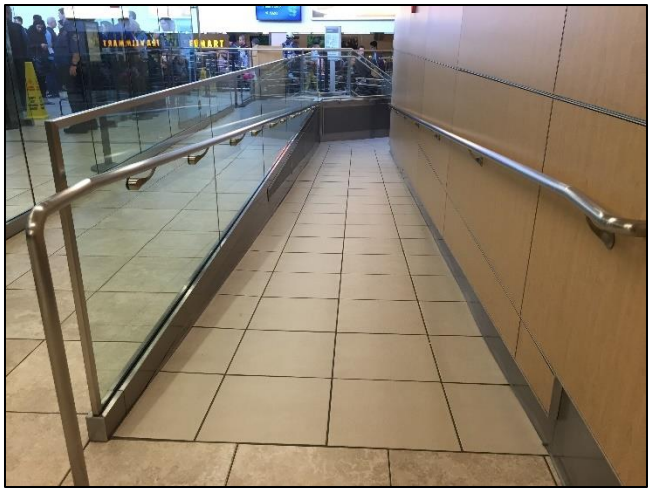
Definition of Exterior Exit Stairway

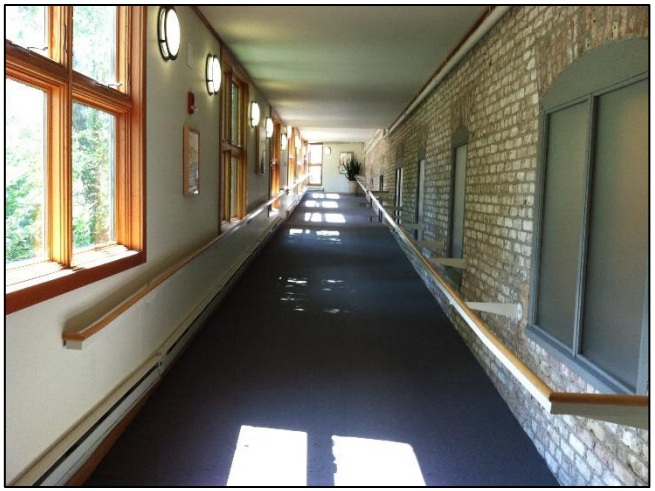
- An exterior exit stairway is defined as “an exit component that serves to meet **one or more** means of egress design requirements such as required number of exits or exit access travel distance, and is open to yards, courts or public ways”

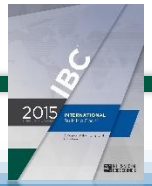


Exit Ramps

- Interior exit ramps and exterior exit ramps are also considered as exit components
- The definitions and protective provisions for such ramps are consistent with those for interior exit stairways and exterior exit stairways, respectively

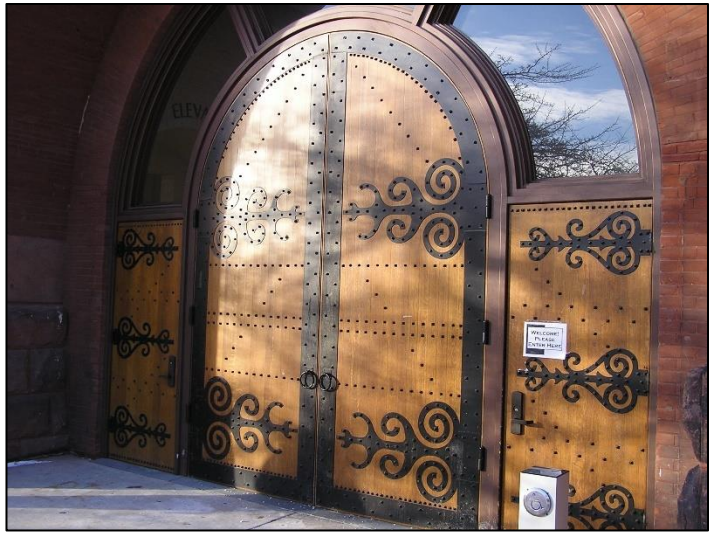






Exterior Exit Doors

- The most common exit component is an exterior exit door at the level of exit discharge
- Exit doors, whether interior or exterior, are regulated under the provisions of Section 1010



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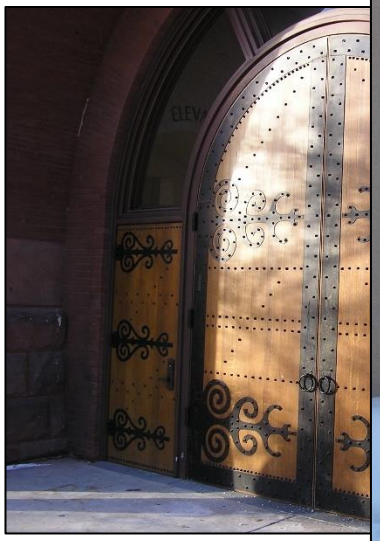

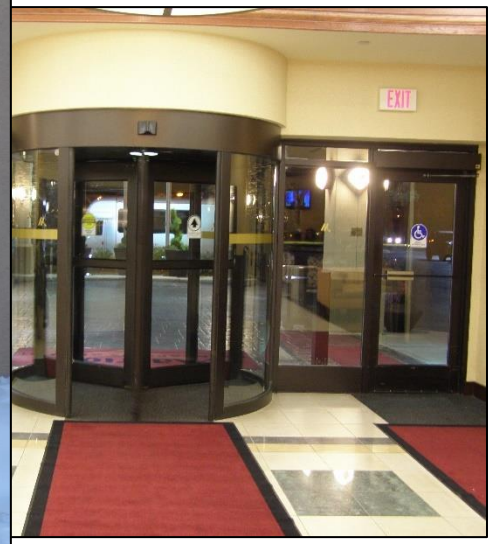

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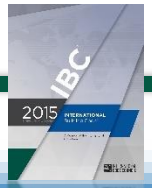
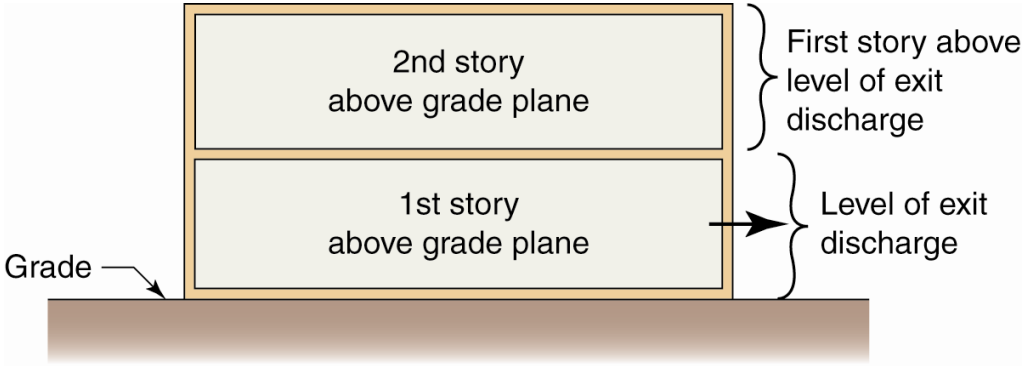


Level of Exit Discharge

- The level of exit discharge is also specifically defined as “the story at the point at which an **exit terminates** and an **exit discharge begins**
- Exit discharge is “that portion of a means of egress system between the termination of an exit and a public way”



Level of exit discharge defined

Module 2

Use of Exit Components

Concept of Exit Components

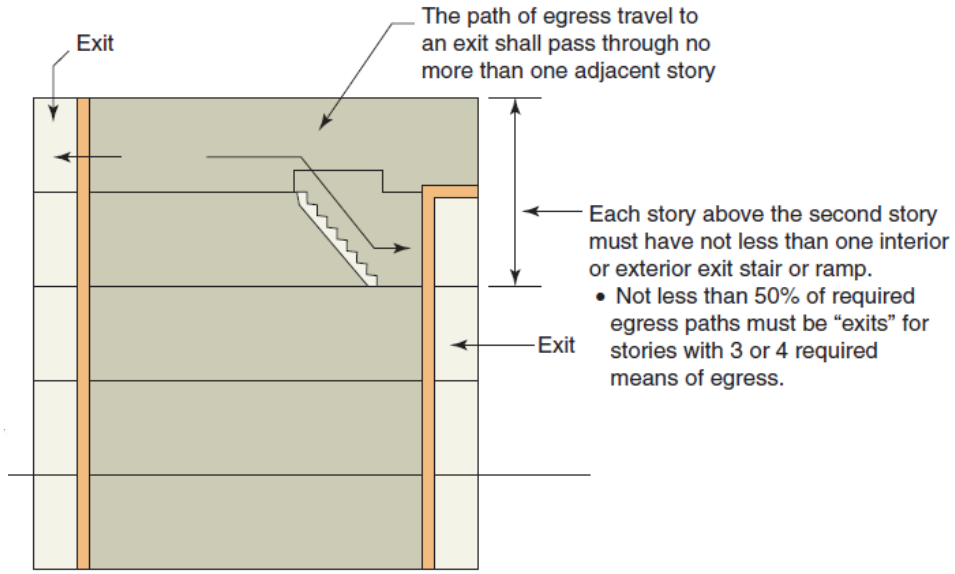
- Once reaching an exit component, the occupant is provided with an established degree of protection from fire and smoke
- Fire-resistance-rated exitways are provided for interior travel, while exterior travel, although above the discharge level, is separated from an interior fire and smoke accumulation such that it is not a concern

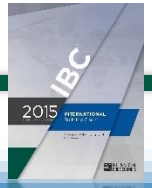
Concept of Exit Components

- Exits are **key elements** in the design of the means of egress for a variety of reasons, including:
  - Termination point for travel distance limits
  - Number of means of egress from a story

TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE[a]

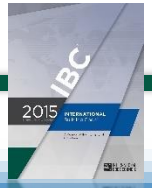
OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200	250[b]
I-1	Not Permitted	250[b]
B	200	300[c]
F-2, S-2, U	300	400[c]
H-1	Not Permitted	75[d]
H-2	Not Permitted	100[d]
H-3	Not Permitted	150[d]
H-4	Not Permitted	175[d]
H-5	Not Permitted	200[c]
I-2, I-3, I-4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





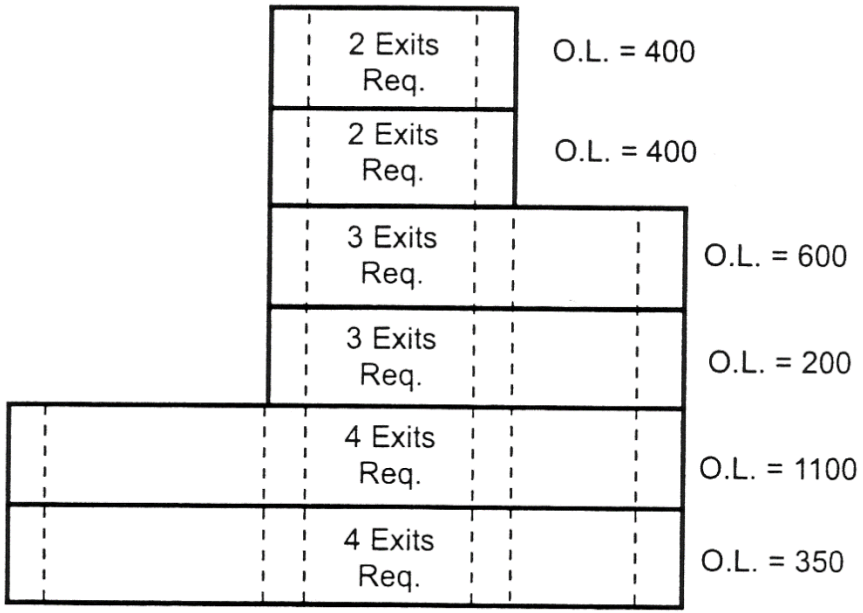
Exits
Section 1022.1

- An exit shall not be used for any purpose that **interferes** with its function as a means of egress
- Exit components are primarily required by Sections 1006 and 1007 addressing the number and configuration of exits



Exits
Section 1022.1

- Once a given level of exit protection is provided, that protection level **shall not be reduced** until arrival at the exit discharge



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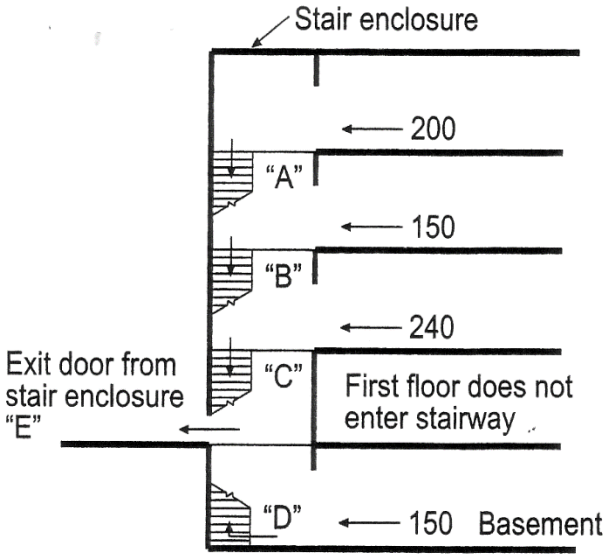
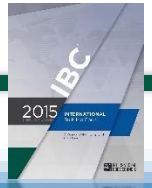


Exit Element	Occupant Load Served	Required Width
"A"	200	
"B"	150	
"C"	240	
"D"	150	
"E"	390	
.		

O.L. X 0.3" for stairways
O.L. X 0.2" for other components

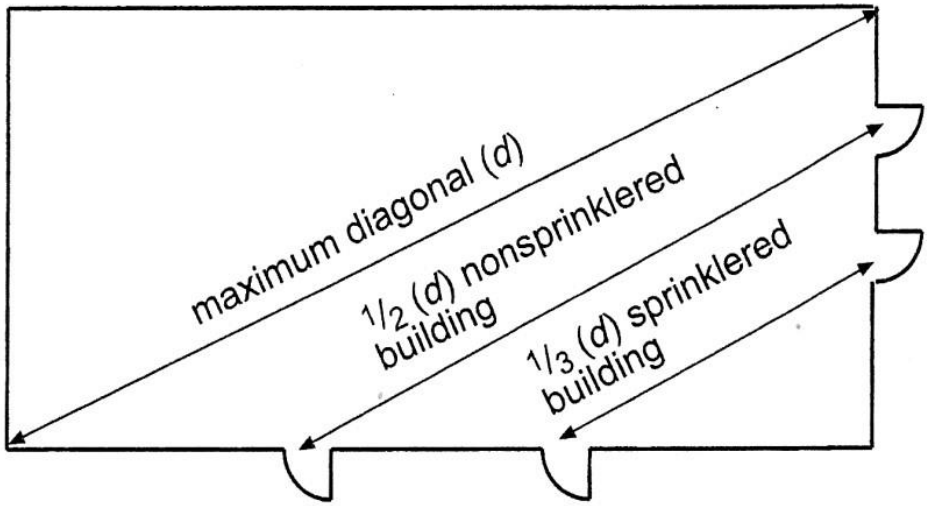
Exits
Sections 1006 and 1007

- Exits, in addition to the minimum number required by Section 1006, may also need to be provided in order to meet various means of egress design requirements in **Chapter 10**
- The most common application is the limit placed on travel distance to an exit component
  - Other applications include the required separation of exits per Section 1007



Egress from Spaces Section 1006.2.1

- Two exits or exit access doorways shall be provided from a room or space where the design occupant load or the common path of egress travel distance exceeds the values set forth in Table 1006.2.1



Egress from Spaces
Table 1006.2.1

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	10	NP	NP	125[a]
R-3[e]	10	NP	NP	125[a]
R-4[e]	10	75	75	125[a]
S[f]	29	100	75	100[a]
U	49	100	75	75[a]

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 length of *common path of egress travel* distance in a Group R-3 occupancy located in a mixed occupancy building or within a Group R-3 or R-4 *congregate living facility*.

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.

Egress from Spaces Section 1006.2.1.1

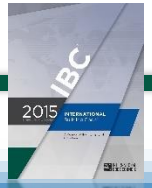
- A minimum of **three** exits or exit access doorways are required from rooms or spaces having an occupant load of **501 - 1000**
- A minimum of **four** exits or exit access doorways are required from rooms or spaces having an occupant load of **>1000**

TABLE 1006.3.1
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY

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

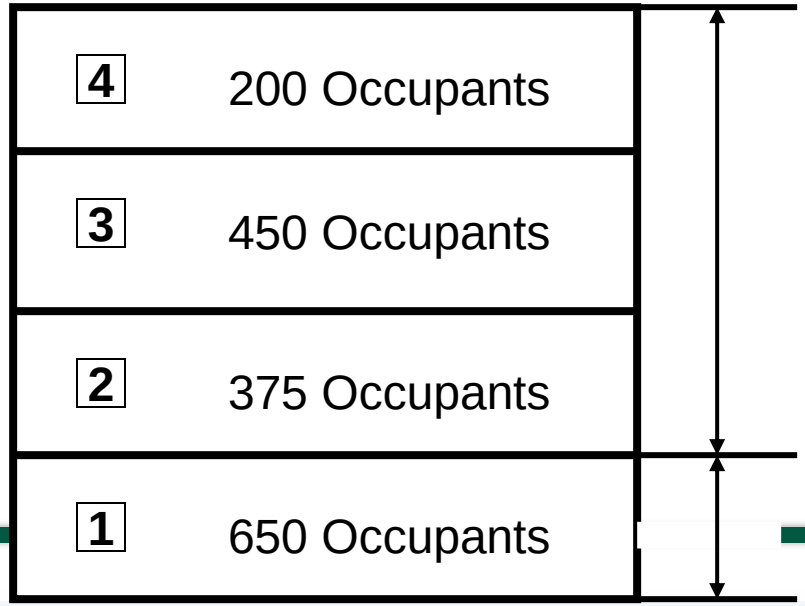
Sections 1004.1, 1006.2, &Table 1004.1.2 Design Load Example

Given: 5,000 sq.ft. 1-story building		
USE	**Occupant Load Factor (sq.ft./occupant)**	**Occupant Load**
Warehouse	500	
Office	100	
Retail	30	
Assembly-Meeting Room	15	
Assembly-Chairs only	7	
Theater Lobby	5	



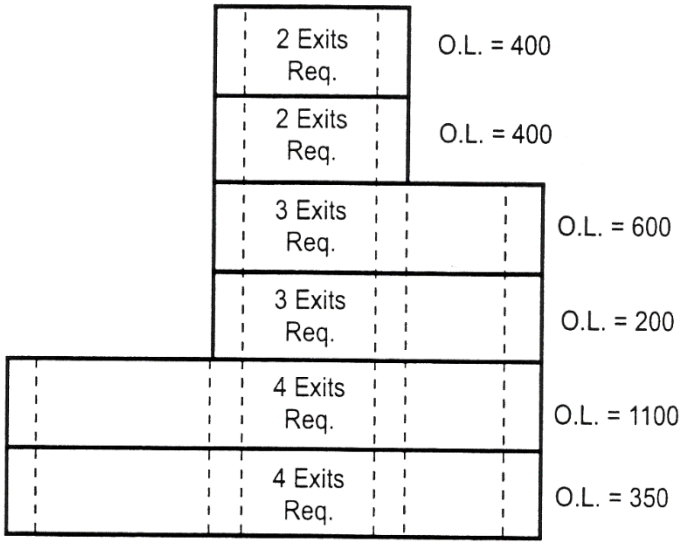
Egress from Stories Section 1006.3

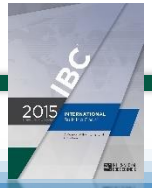
- The minimum required number of exits from a story or occupied roof is based on the **aggregate occupant load served**
- In multistory buildings, the use of exit access stairways is selectively permitted
  - In all other cases, exit components must be utilized as a continuation of the means of egress system



Number of Exits
Section 1006.3

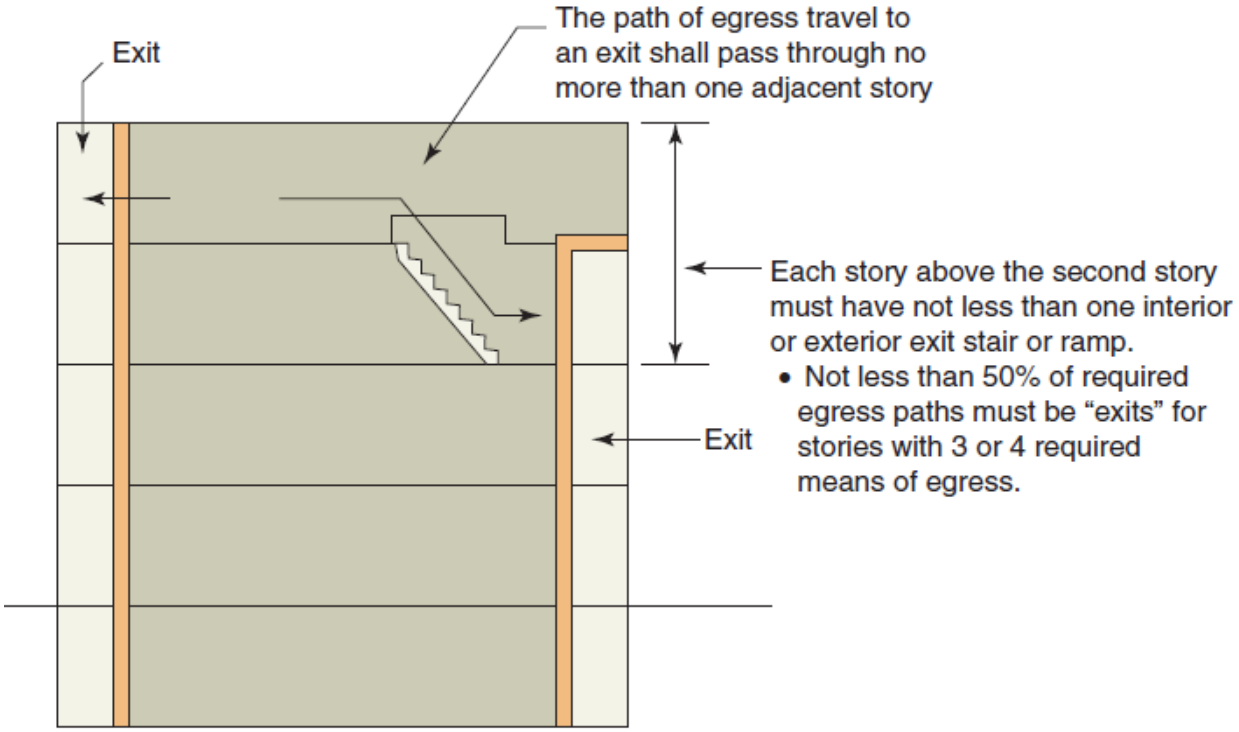
- Each story **above the second story** must have **at least one** interior or exterior stairway
  - An exit access stairway can provide the remaining required means of egress under specified conditions
- Where **three or more** exits, or access to exits, are required on a story above the second, **at least 50%** of the required exits shall be interior or exterior exit stairways





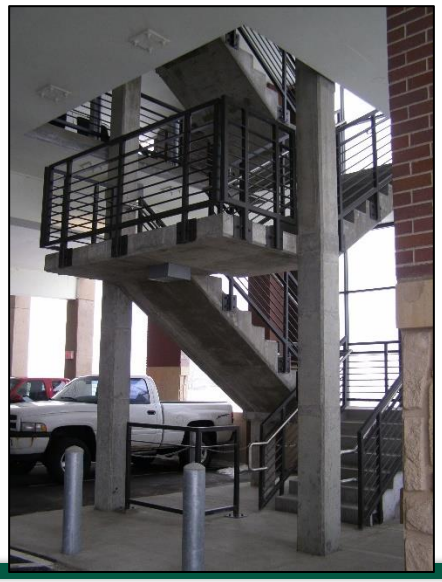
Access to Exits at Adjacent Levels Section 1006.3

- Access to exits at other levels shall be from an adjacent story



Number of Exits
Section 1006.3, Exceptions

- Interior exit stairways and ramps are not required in:
  - Open parking garages where the means of egress serves only the garage
  - Outdoor facilities where all portions of the means of egress are essentially **open to the outside**



Number of Exits
Section 1006.3.1

- Each story or occupied roof must have the minimum number of exits, or access to exits, as set forth in **Table 1006.3.1**

TABLE 1006.3.1
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY

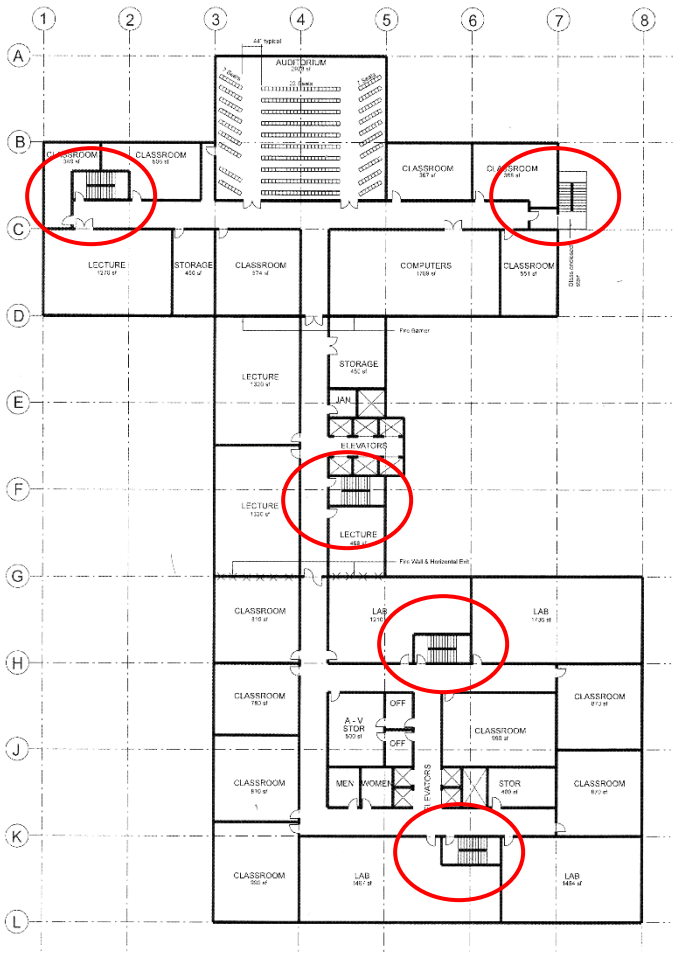
OCCUPANT LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM STORY
1-500	2
501-1,000	3
More than 1,000	4

Number of Exits
Section 1006.3.1

- Each story or occupied roof must have the minimum number of exits, or access to exits, as set forth in **Table 1006.3.1**

Number of Exits Section 1006.3.1

- The required number of exits, or exit access stairways where permitted, from any story shall be **maintained** until arrival at grade or a public way
- It is important that the exits be **adequately separated** per Section 1007 in order to maintain their **independence**



Second Floor Plan

Single Exits from Stories Section 1006.3.2

- A single exit or access to a single exit is permitted from any story or an **occupied roof** where in conformance with Section 1006.3.2
- **Five conditions** are set forth where a single exit or access to a single exit is permitted

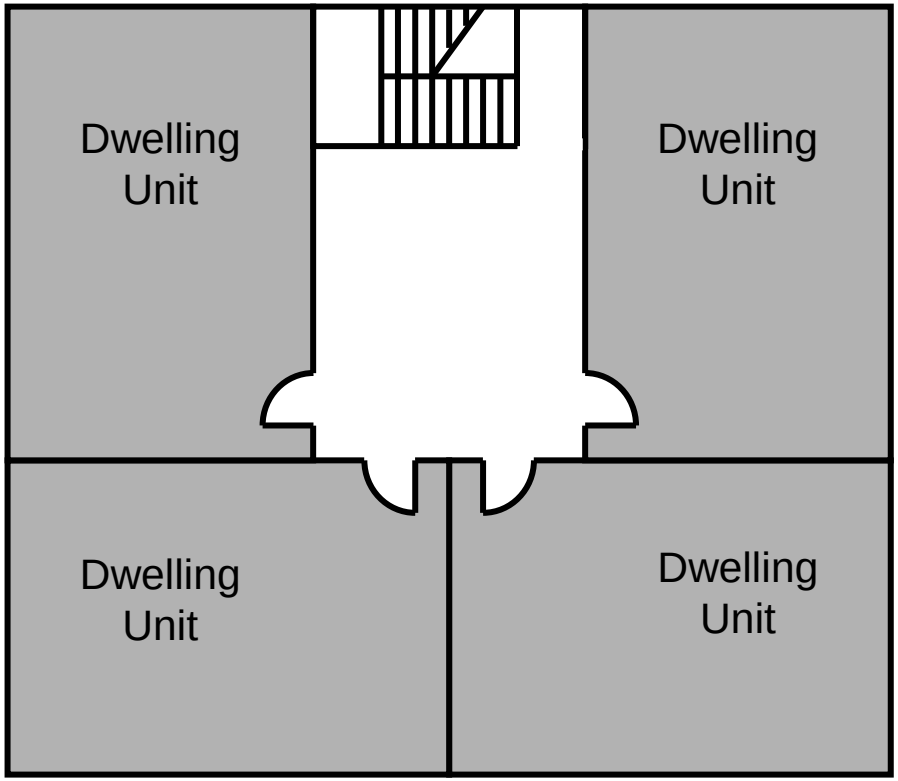
Single Exits
Section 1006.3.2, Condition 1

- A single exit or access to a single exit is permitted from any story or an occupied roof where the occupant load, number of dwelling units and exit access travel distance **do not exceed** the values in **Table 1006.3.2(1)** or **1006.3.2(2)**

Single Exits
Section 1006.3.2, Condition 1

R-2 with one exit:

- **4** dwelling units
- **≤3** stories
- **125’** max. travel distance
- Fire **sprinkler system** installed



Number of Exits
Table 1006.3.2(1)

TABLE 1006.3.2(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 1006.3.2(2).

Number of Exits
Table 1006.3.2(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.

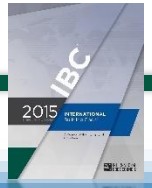
b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall have a maximum *exit access* travel distance of 100 feet.

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.

Number of Exits
Section 1006.3.2, Conditions 2–5

- In addition to the allowances for single-exit stories in Tables 1006.3.2(1) and 1006.3.2(2), there are a number of other conditions under which a single exit is **permitted**:
  - Rooms, areas and spaces complying with Section 1006.2.1, provided the exits discharge **directly** to the exterior at the level of exit discharge
  - Group R-3 and R-4 occupancy buildings
  - Individual dwelling units (subject to occupant load and travel distance limitations)



Number of Exits
Section 1006.3.2, Conditions 2–5

- In addition to the allowances for single-exit stories in Tables 1006.3.2(1) and 1006.3.2(2), there are a number of other conditions under which a single exit is **permitted**:
  - Parking garages where vehicles are parked mechanically

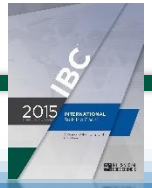
Dwelling Units
Section 1006.3.2, Condition 5

- Single exits are permitted within and from dwelling units in single-story and multistory buildings where the:
  - Dwelling unit complies as a space with one means of egress
  - Exit from the dwelling unit discharges **directly** to the exterior at the level of exit discharge, or the exit access outside of the unit's entrance door provides access to at least two exits

Mixed Occupancies Section 1006.3.2.1

- In a mixed occupancy condition where single exits are permitted for the occupancies involved, the maximum number of occupants served by the single exit shall be based on:

$$\frac{\text{Calculated number of occupants}}{\text{Allowable number of occupants}} \leq 1.0$$



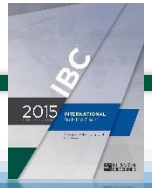
Basements
Section 1006.3.2.2

- A basement provided with one exit shall **not** be located **more than** one story below grade
- This specific limitation clarifies the scope of **Tables 1006.3.2(1) & (2)** where basements are addressed

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

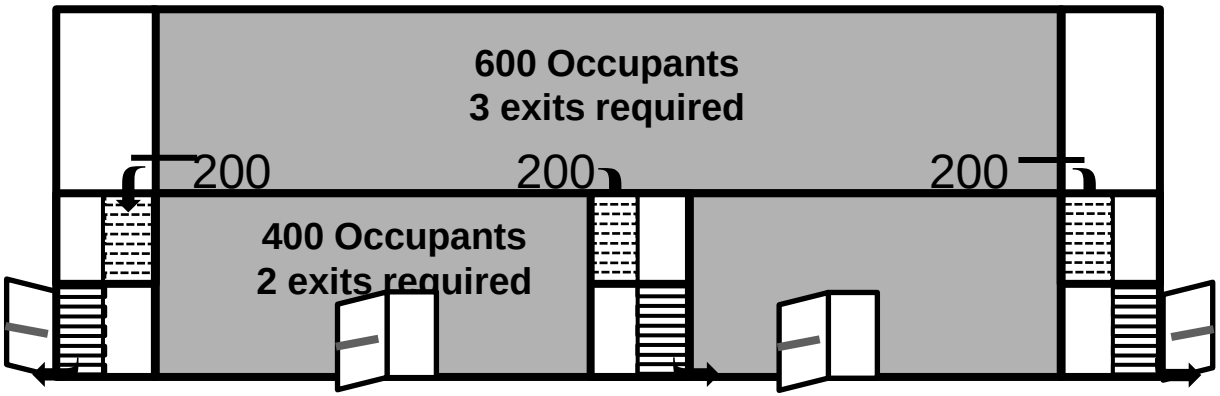
STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)
First story above or below grade plane	A, B[b], E F[b], M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2[a, c], R-4	10	75
	S[b, d]	29	75
Second story above grade plane	B, F, M, S[d]	29	75
Third story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

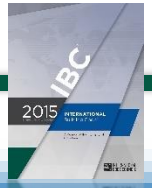
NP = Not Permitted.
NA = Not Applicable.
a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.
b. Group B, F and S occupancies 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.



Exit Configuration Section 1007.1

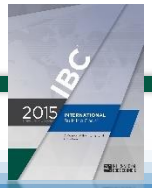
- Where multiple exits are required, they shall be adequately separated from each other such that if one exit is blocked, the others are available
- Exits, exit access doorways, and exit access stairways and ramps serving spaces and individual stories shall be separated in conformance with Section 1007



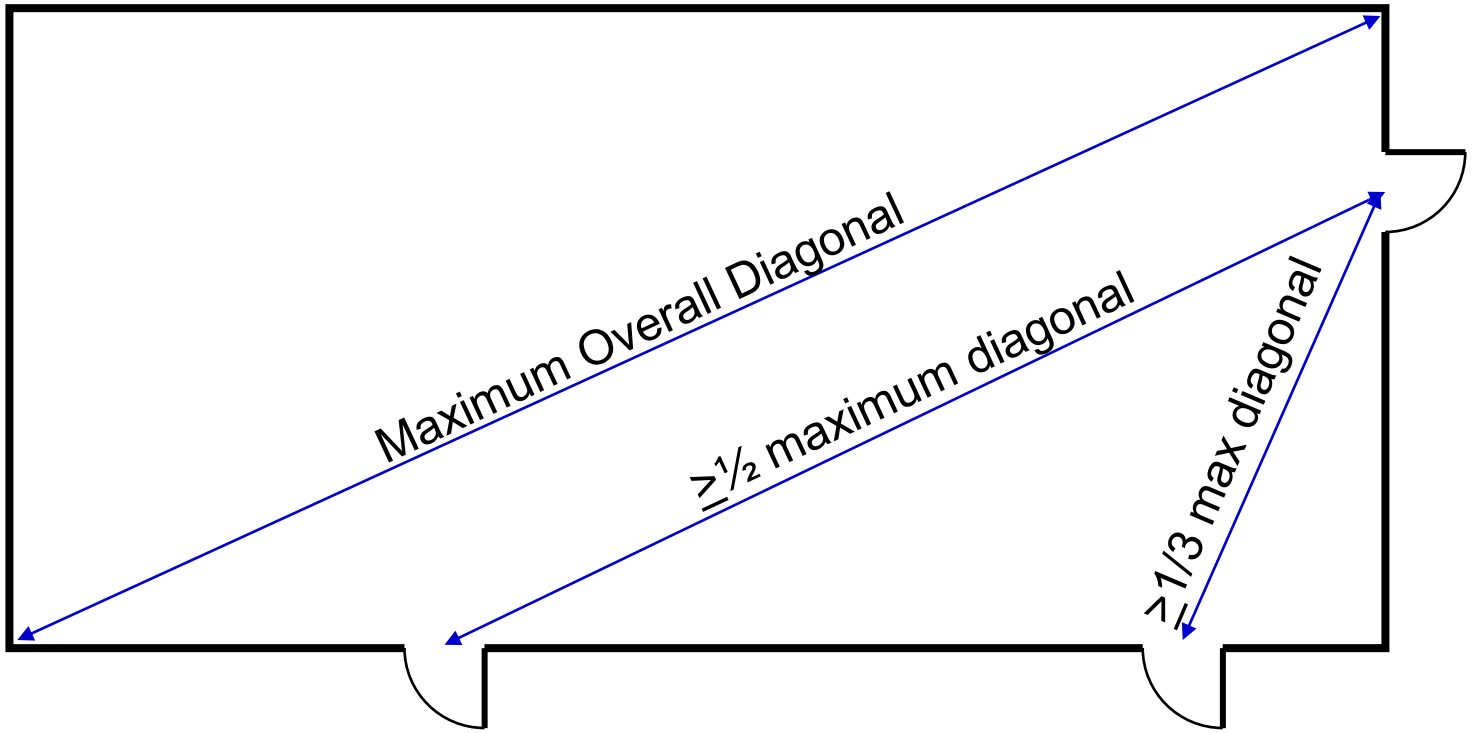


Separation of Two Exits Section 1007.1.1

- Where two exits, exit access doorways, exit access stairways or ramps, or any combination thereof, are required within the exit access, they shall be separated a minimum of ½ of the overall diagonal of the building or area served
  - Where the building is fully sprinklered, the required separation is reduced to **1/3** of the overall diagonal.

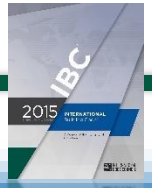


Separation of Two Exits Section 1007.1.1

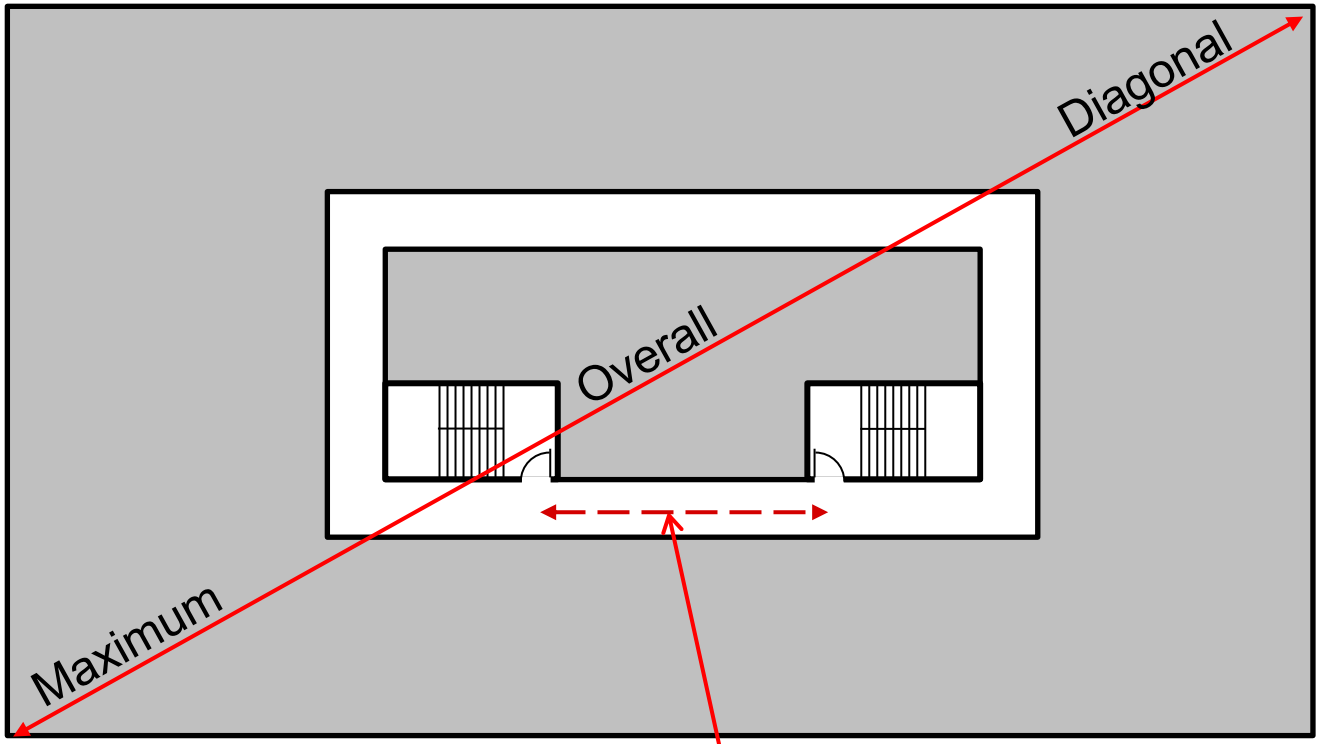


Separation of Two Exits Section 1007.1.1.1

- The separation distance required in Section 1007.1.1 shall be measured to:
  - **Any point** along the width of the doorway (exits and exit access doorways)
  - The **closest riser** (exit access stairways)
  - The **start of the ramp** run (exit access ramps)



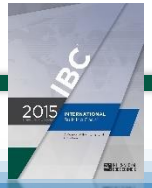
Separation of Two Exits Section 1007.1.1.1



Exit separation measured along "shortest direct" line of travel

Separation of Three or More Exits Section 1007.1.2

- Where access to three or more exits is required, at least **two** must be separated in conformance with Section 1007.1.1:
  - **≥1/2** diagonal distance of building or area
  - **≥1/3** diagonal distance if building **sprinkled**
  - Scissor stairs may be counted as one exit stairway
- The additional required exit(s) must be located a reasonable distance from the others so that if one becomes blocked, the others will be available



Module 3

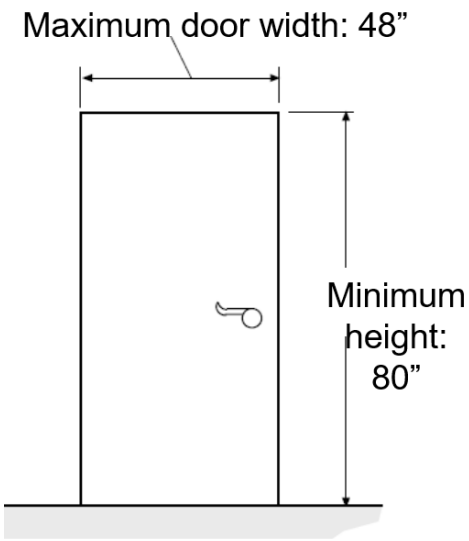
Specifics of Exit Components

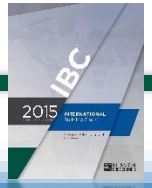
Exterior Doors at the Level of Exit Discharge Section 1022.2

- For most buildings, the typical exit components are exterior doors at or near grade
- This component is considered as a protected element as it leads directly to exterior travel at ground level, providing direct access to a public way with limited, if any, concern for fire and smoke risk

Exterior Doors at the Level of Exit Discharge Section 1022.2

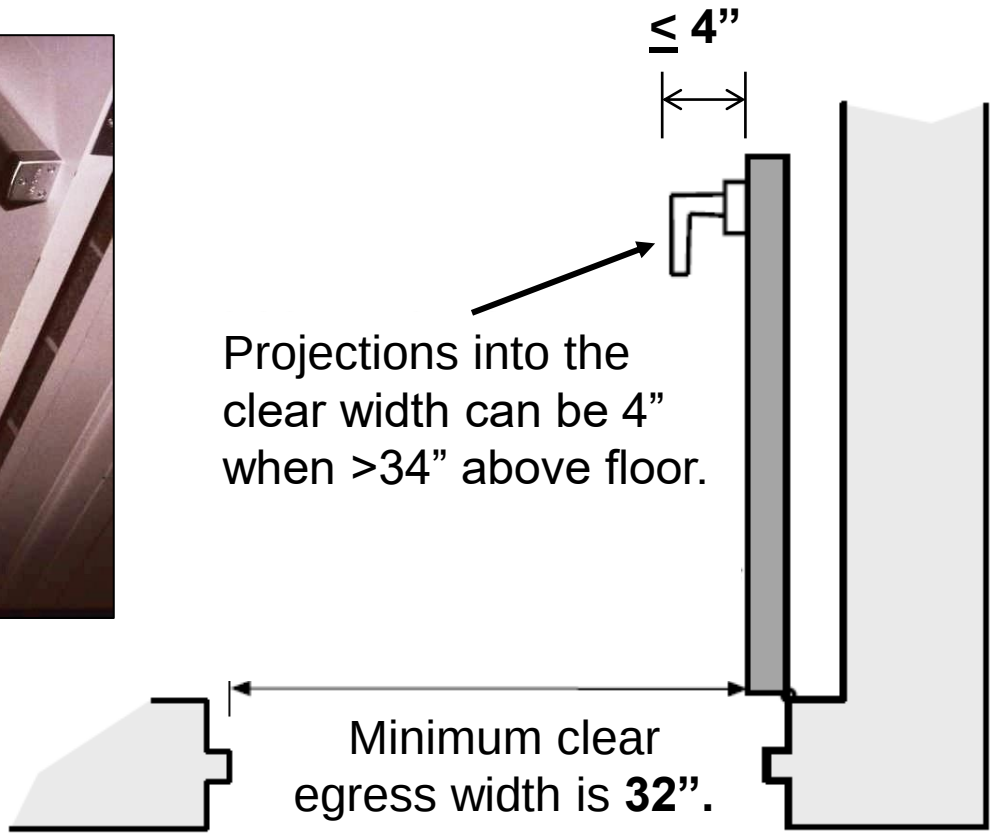
- Complying doors, including exterior doors, are regulated by Section 1010
- In addition, Section 1022.2 mandates that all buildings used for human occupancy be provided with at least **one exterior door** that meets the requirements of Section 1010.1.1 (size of doors)





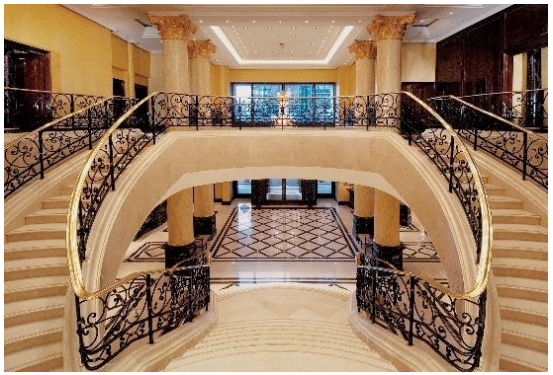
Doorway Obstructions

Exterior Doors at the Level of Exit Discharge Section 1022.2



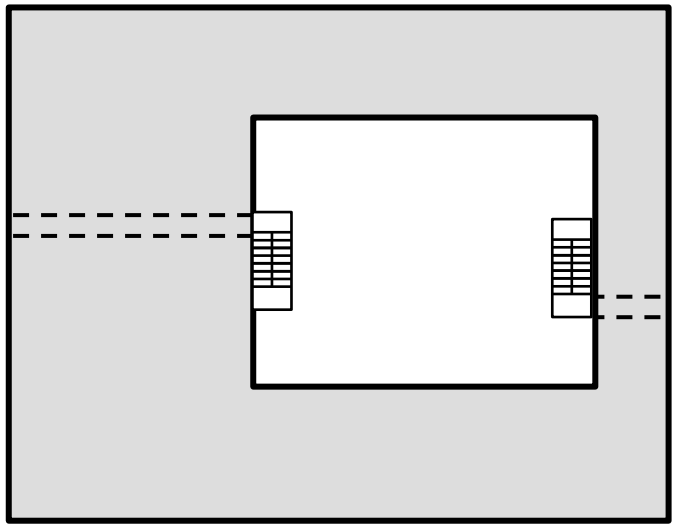
Interior Exit Stairways and Ramps Section 1023.1

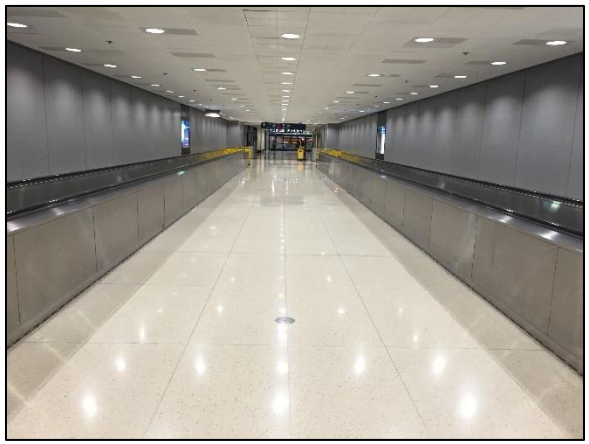
- Interior exit stairways and ramps shall be enclosed and lead directly to the exterior of the building or extended to the exterior through the use of a complying exit passageway
- As an alternative, extended travel is **permitted** through an interior exit discharge area as limited by Section 1028.1
  - Specifics are addressed under the Exit Discharge module of this program



Interior Exit Stairways and Ramps Section 1023.1

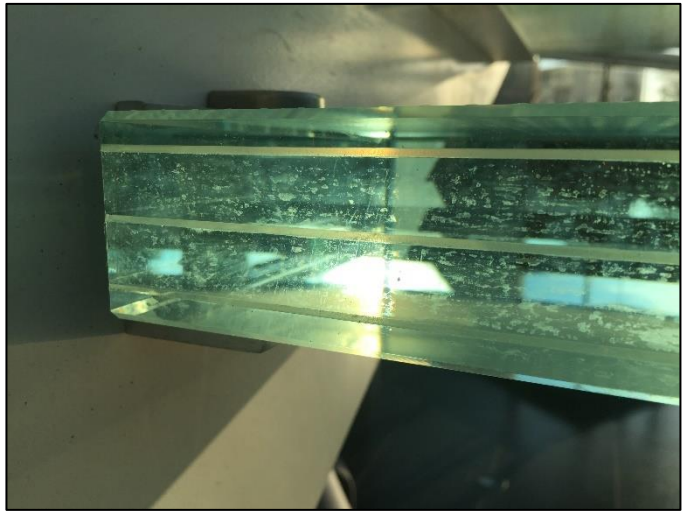
- Interior exit stairways shall lead directly to the exterior or shall be extended to the exterior of the building with an exit passageway

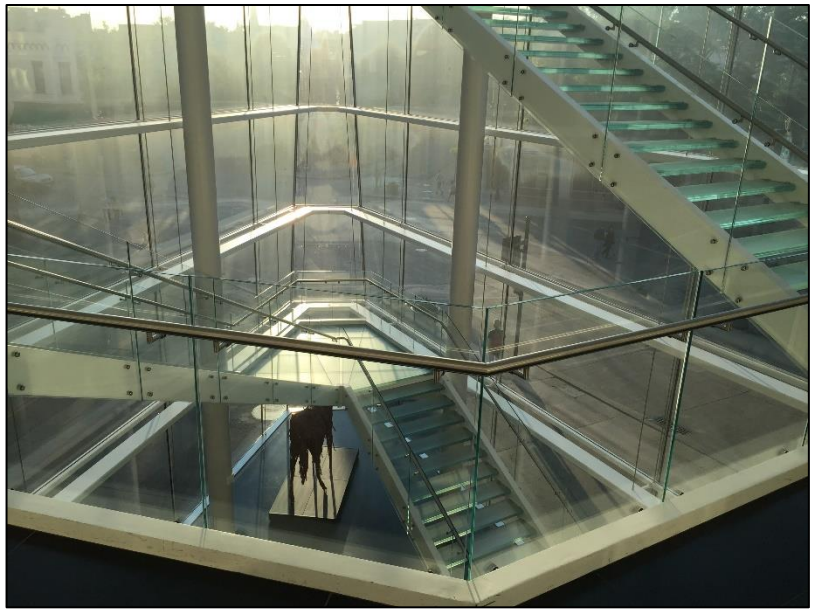




Interior Exit Stairways and Ramps Section 1023.1

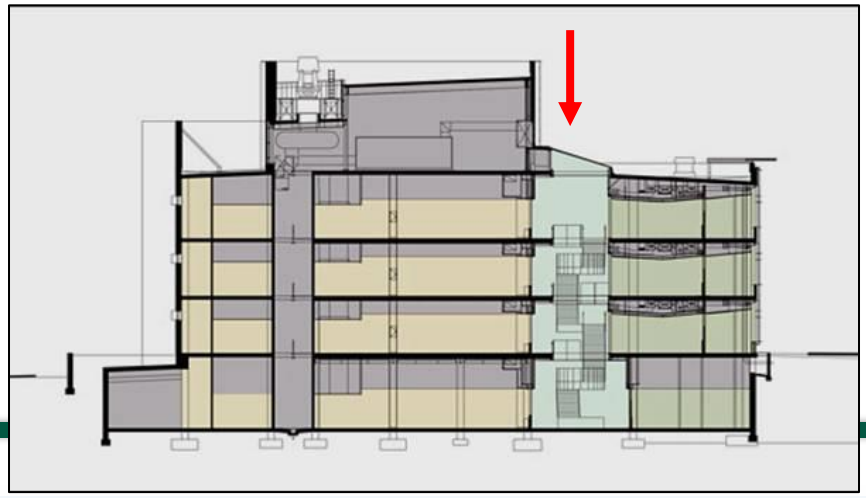
- An interior stairway or ramp shall **not be used** for any purpose other than:
  - A means of egress
  - A circulation path





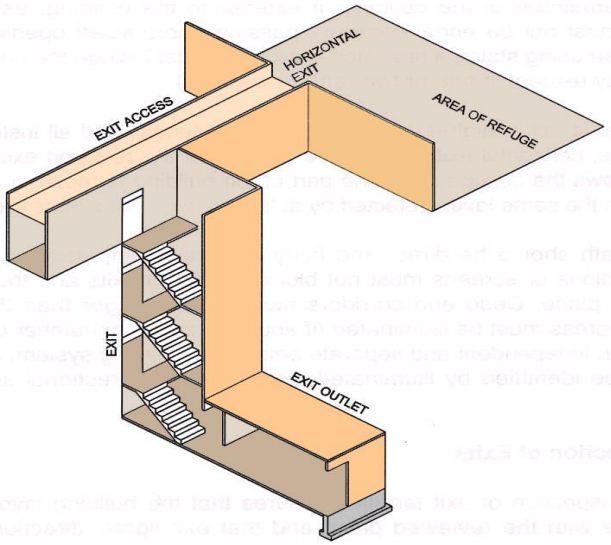
Interior Exit Stairway Construction Section 1023.2

- Enclosures for interior exit stairways and ramps are to be constructed as **fire barriers** or horizontal **assemblies**, or both
  - Minimum **2-hour** where connecting **four or more** stories
    - Otherwise, minimum of **1-hour**
  - Not less than the rating of the floor assembly penetrated



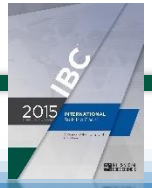
Interior Exit Stairway Termination Section 1023.3

- Interior exit stairways and ramps are to be continuous and terminate at an exit discharge or the public way, except where extended by an exit passageway
  - Such interior exit stairways and ramps **may** open into an interior exit discharge condition as established in Exceptions 1 and 2 of Section 1028.1

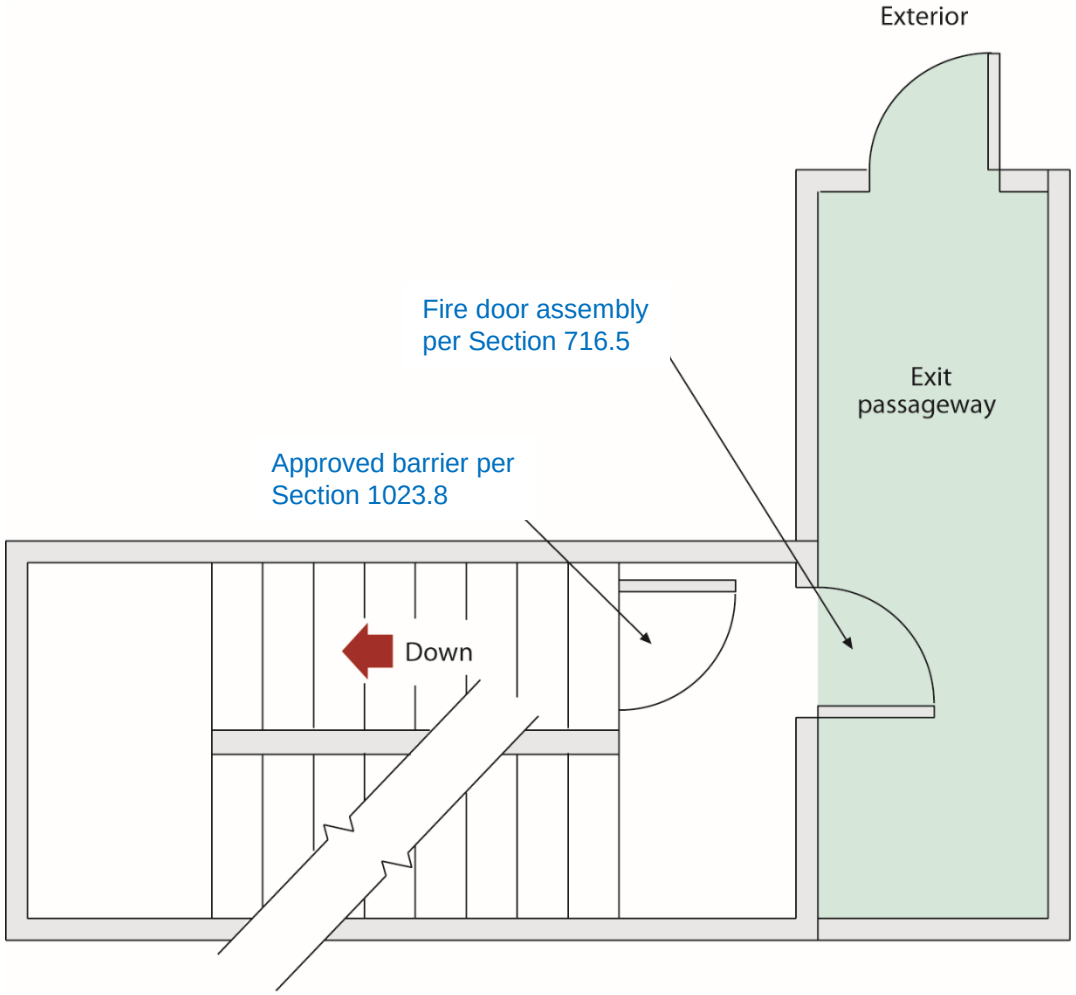


Interior Exit Stairway Extension Section 1023.3.1

- Where interior exit stairways and ramps are extended by an exit passageway, the stairway/ramp shall be **separated** from the exit passageway by a **fire barrier** or **horizontal assembly**, or both
  - The minimum rating of the fire barrier shall be **not less than** the required rating for the interior exit stairway/ramp
- The only opening permitted in the separation between the stairway and exit passageway is the **required fire door assembly**

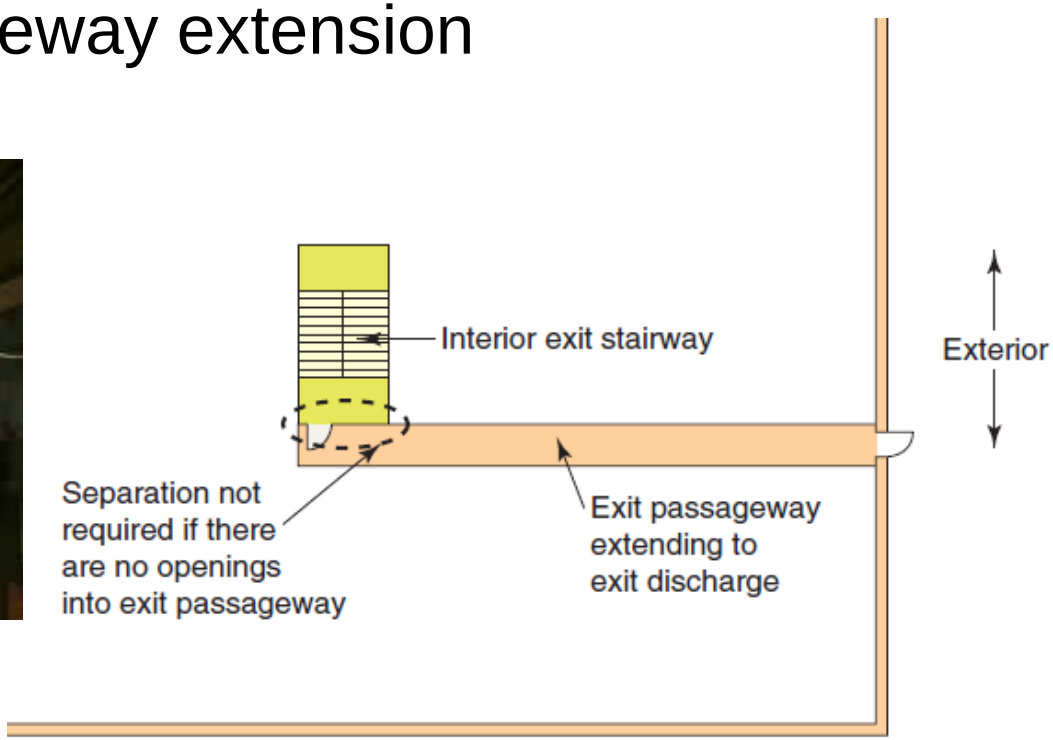


Interior Exit Stairway Extension Section 1023.3.1



Interior Exit Stairway Extension Section 1023.3.1, Exception 2

- The fire barrier and fire door assemblies are not required where there are no openings in the exit passageway extension

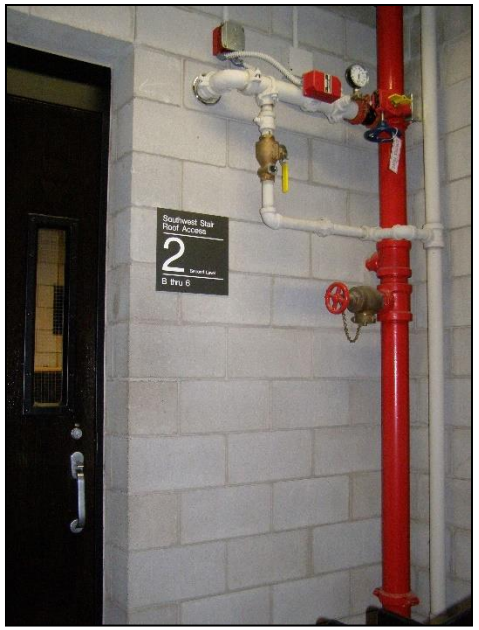


Interior Exit Stairway Openings Section 1023.4

- Interior exit stairway and ramp opening protectives shall comply with Section 716
- Openings other than unprotected exterior openings are **limited** to those necessary for:
  - Exit access to the enclosure from normally occupied spaces, **and**
  - Egress from the enclosure
- Elevators are not permitted to open into interior exit stairways and ramps

Interior Exit Stairway Penetrations Section 1023.5

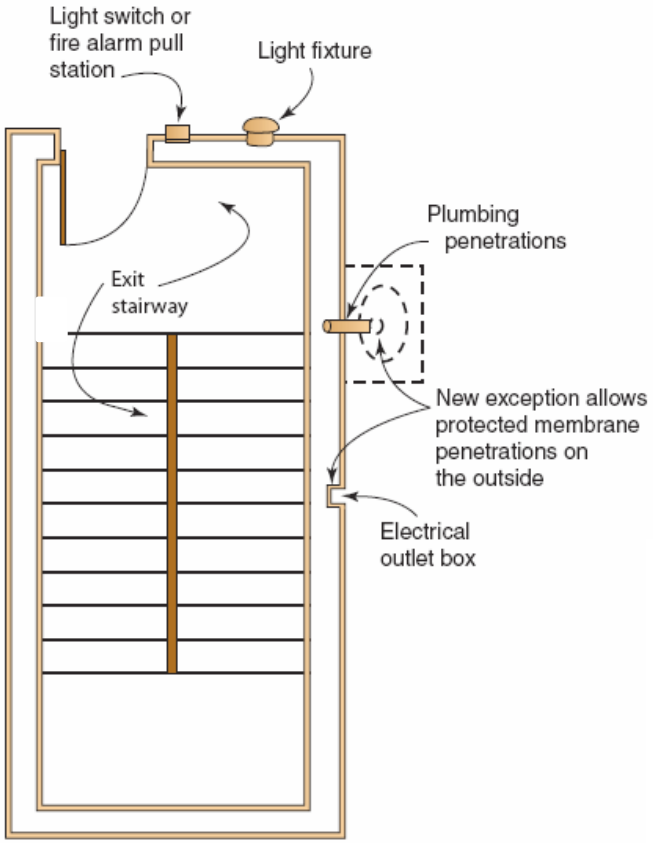
- Penetrations into and openings through interior exit stairways and ramps are generally prohibited
- Allowances include:
  - Required exit doors
  - Independent equipment and ductwork necessary for ventilation or pressurization
  - Sprinkler piping and standpipes
  - Electrical raceways serving the enclosure



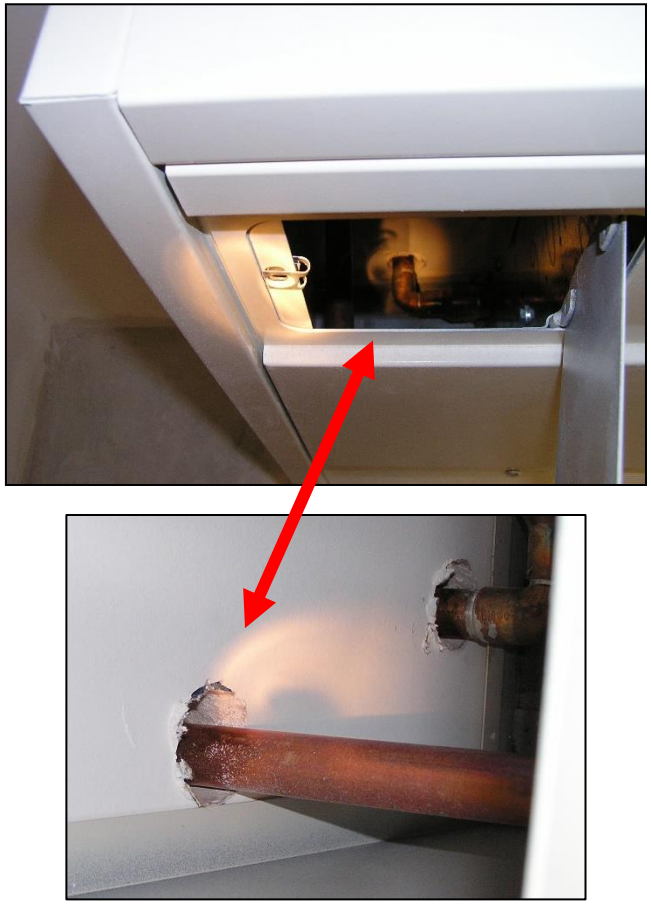
Interior Exit Stairway Penetrations Section 1023.5, Exception

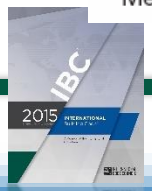
Penetrations generally prohibited into stairway

- See 1023.5 for
- specific permitted items



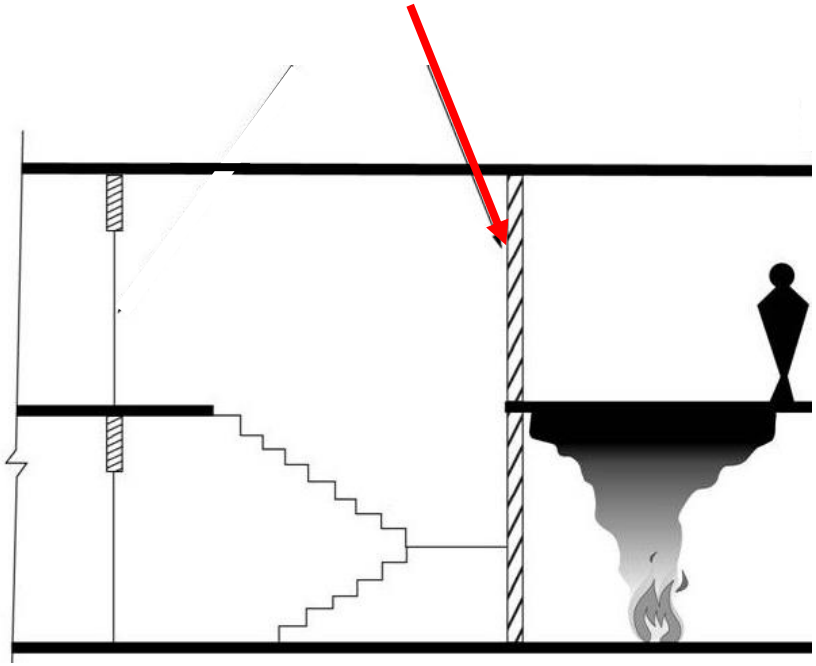
Membrane penetrations of interior exit stairways

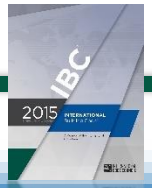




Interior Exit Stairway Penetrations Section 1023.5

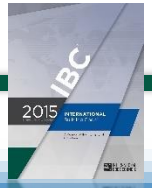
- There shall be no penetrations or communicating openings, whether protected or not, between adjacent interior exit stairways and ramps





Interior Exit Stairway Ventilation Section 1023.6

- Equipment and ductwork for interior exit stairway and ramp ventilation must:
  - Be located at the building's exterior and directly connect to the enclosure by ductwork in complying shafts, **or**
  - When located within the enclosure, receive intake air taken directly from the outdoors and exhaust air directly to the outside, or utilize ducts within complying shafts, **or**
  - When located within the building, be separated from the remainder of the building, including other mechanical equipment, through the use of complying shafts

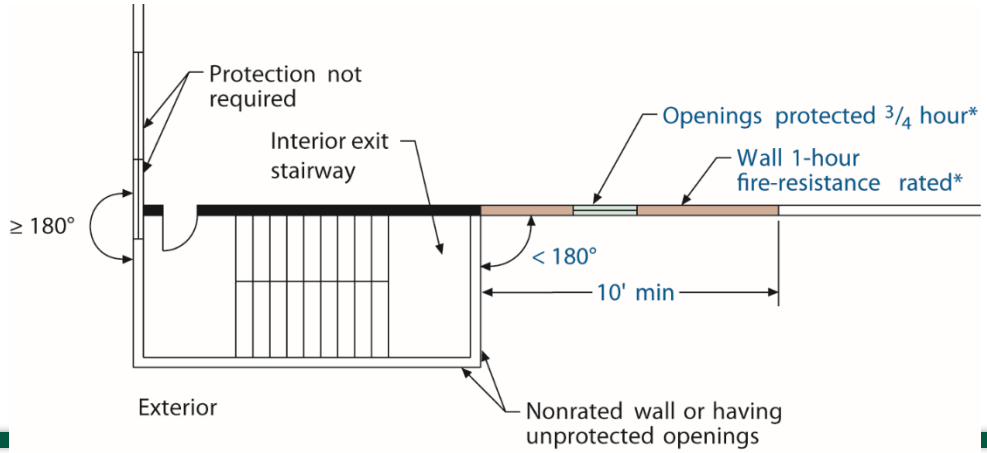


Interior Exit Stairway Ventilation Section 1023.6

- Under each of the three ventilation conditions, openings into the fire-resistance-rated construction shall be **protected** and **limited** to those needed for maintenance and operation
- Interior exit stairway and ramp ventilation systems shall be independent of other building ventilation systems

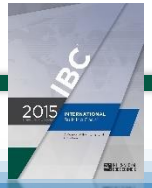
Interior Exit Stairway Exterior Walls Section 1023.7

- In addition to the general requirements addressing exterior wall protection, special provisions apply where non-rated walls or unprotected openings enclose the exterior of the stairway and the walls/openings are exposed by other parts of the building at less than **180°**

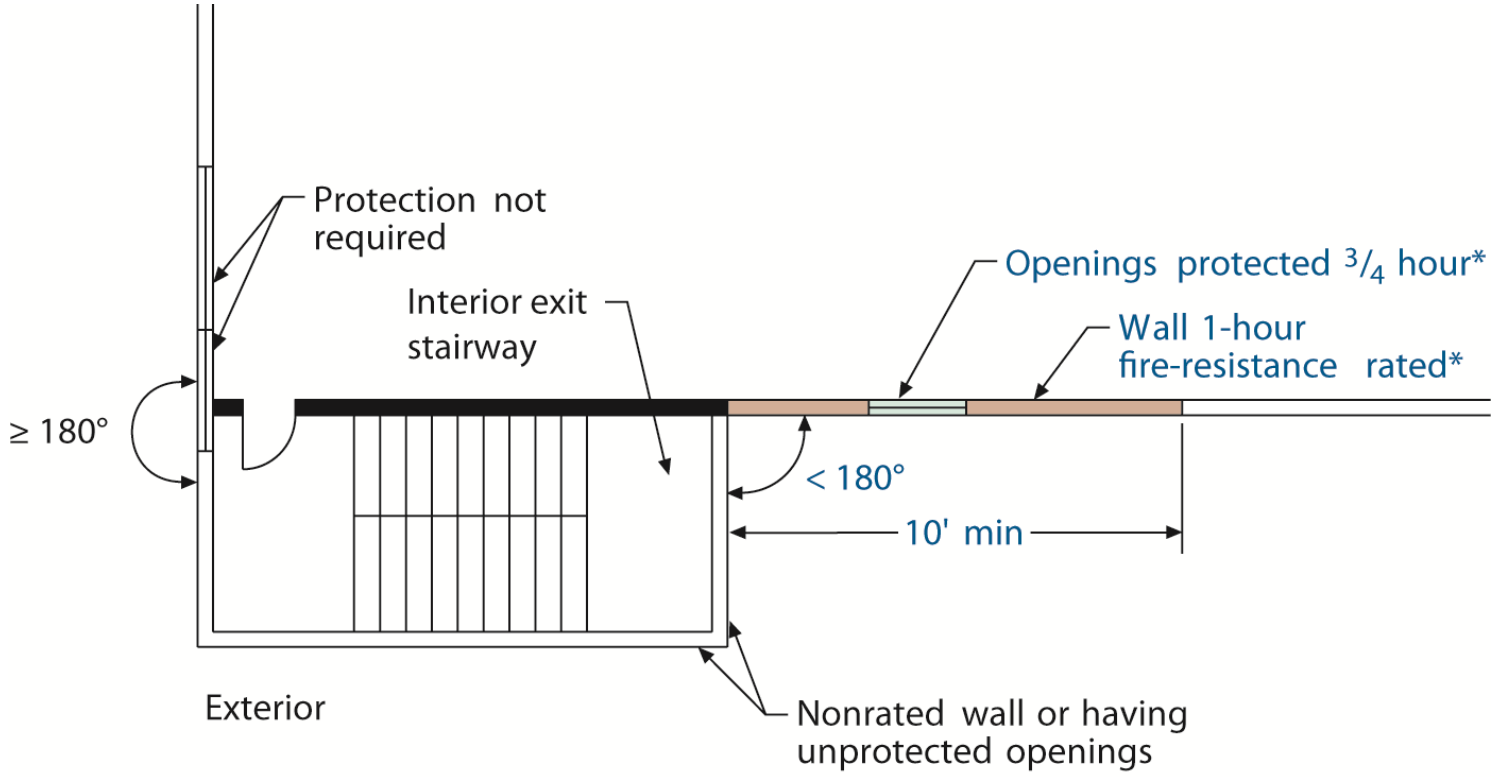


Interior Exit Stairway Exterior Walls Section 1023.7

- Under such conditions, the building exterior walls within **10’** horizontally of a nonrated wall or opening shall be rated for at least 1 hour
  - Openings within such walls shall be protected by minimum **¾-hour** protectives
- The fire protection shall **extend** from the ground at least **10’** vertically above the topmost landing, or to the roof, whichever is lower



Interior Exit Stairway Exterior Walls Section 1023.7

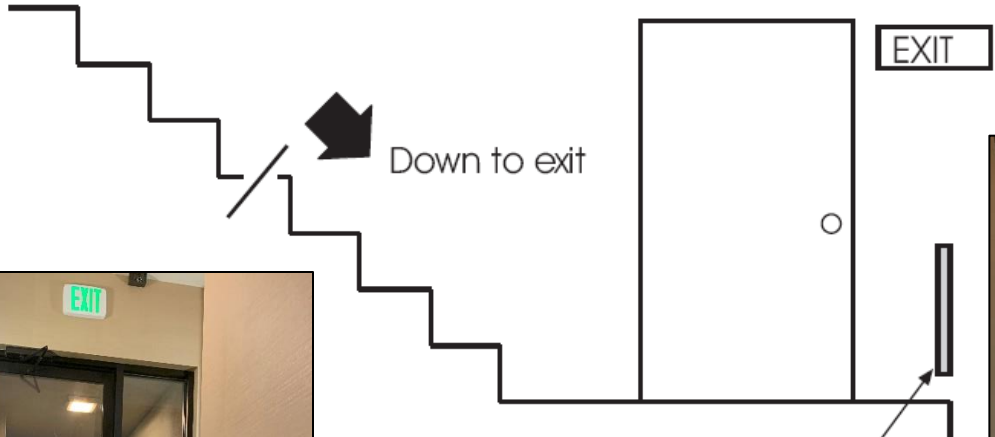


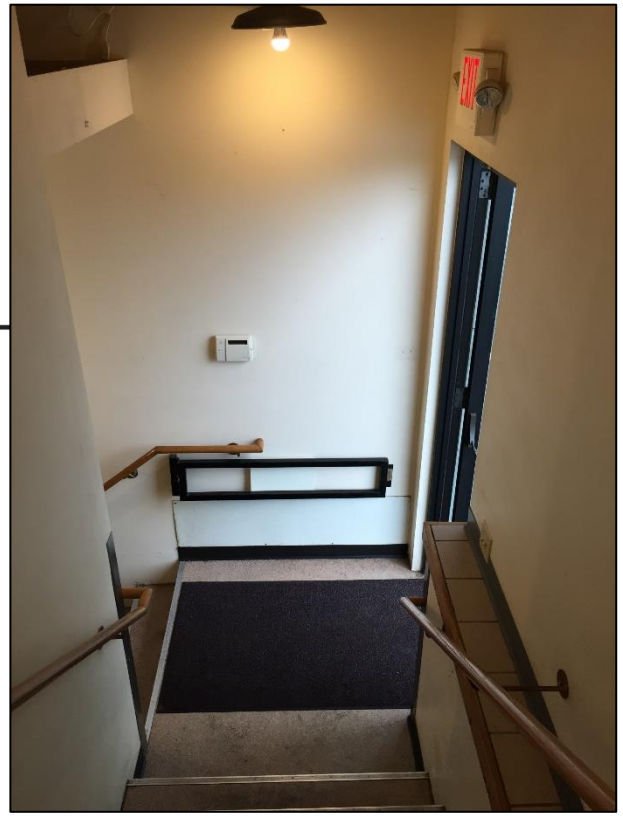
* Protected to a height of 10 feet above topmost landing or roof, whichever is less.

Discharge Identification Section 1023.8

- Where an interior exit stairway or ramp continues below its level of exit discharge, an approved **barrier** must be provided to prevent persons from unintentionally traveling to the level(s) below
  - Directional exit signage must be provided in addition to the required barrier

Discharge Identification Sec.1022.8



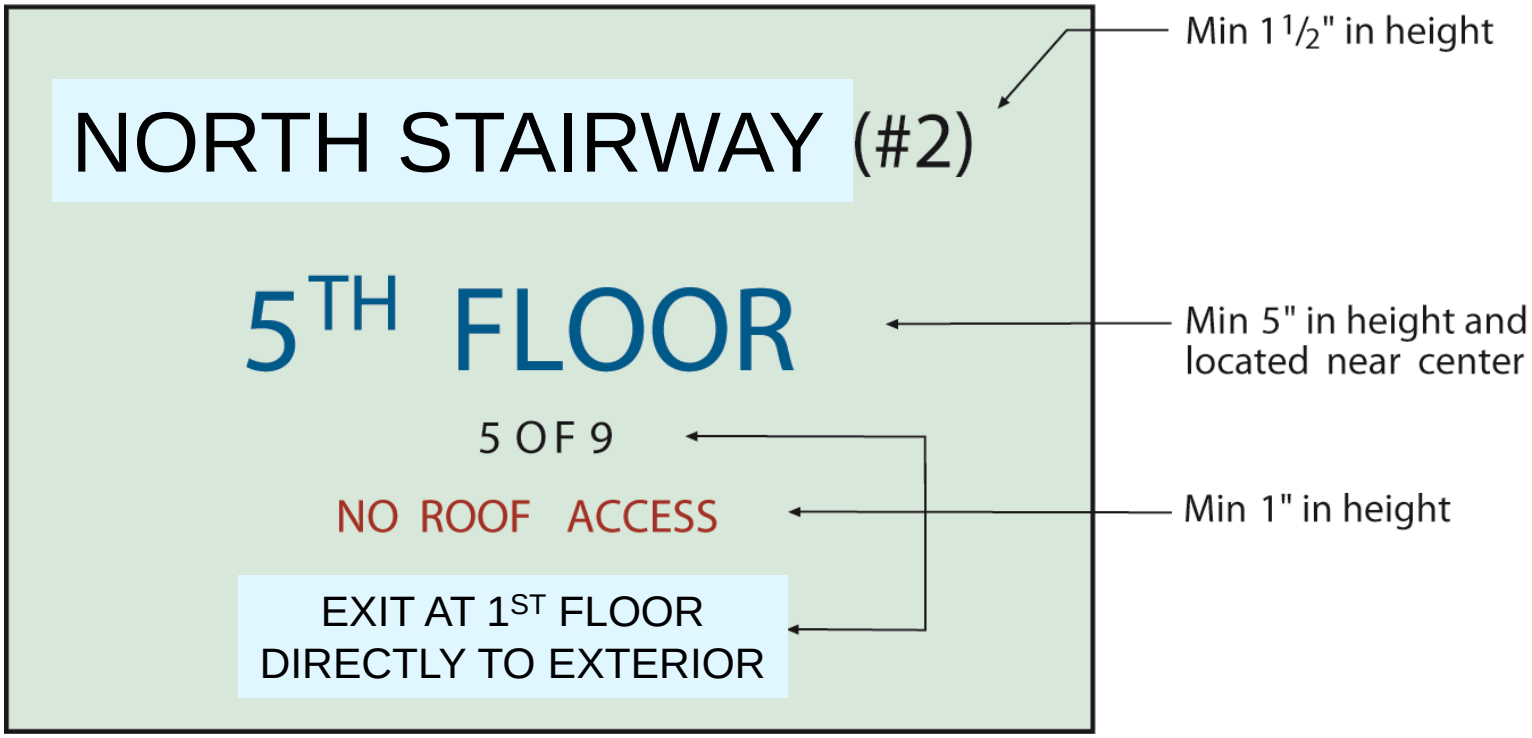


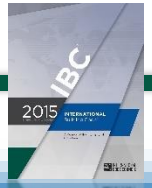
Stairway Identification Signs Section 1023.9

- An informational sign is required at each floor level landing of an interior exit stairway or ramp connecting **four or more** stories
- In addition to the stairway identification sign, a floor-level sign in visual characters, raised characters and Braille complying with **ICC A117.1** shall be located **adjacent** to the door leading from the interior stairway or ramp onto the story to **identify the floor level**

Stairway Identification Signs Section 1023.9

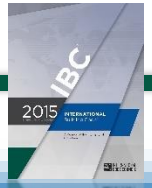
Min sign size of 18″ by 12″





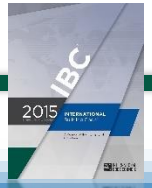
Elevator Lobby Identification Signs Section 1023.10

- Where the landing of an interior stairway has **two or more** doors that lead to the floor level, any door with direct access to an enclosed elevator lobby shall be **identified**
- A sign shall be located **on** the door **or adjacent** to the door that states "Elevator Lobby"
  - Letters shall be at least **1"** in height and in contrast to their background

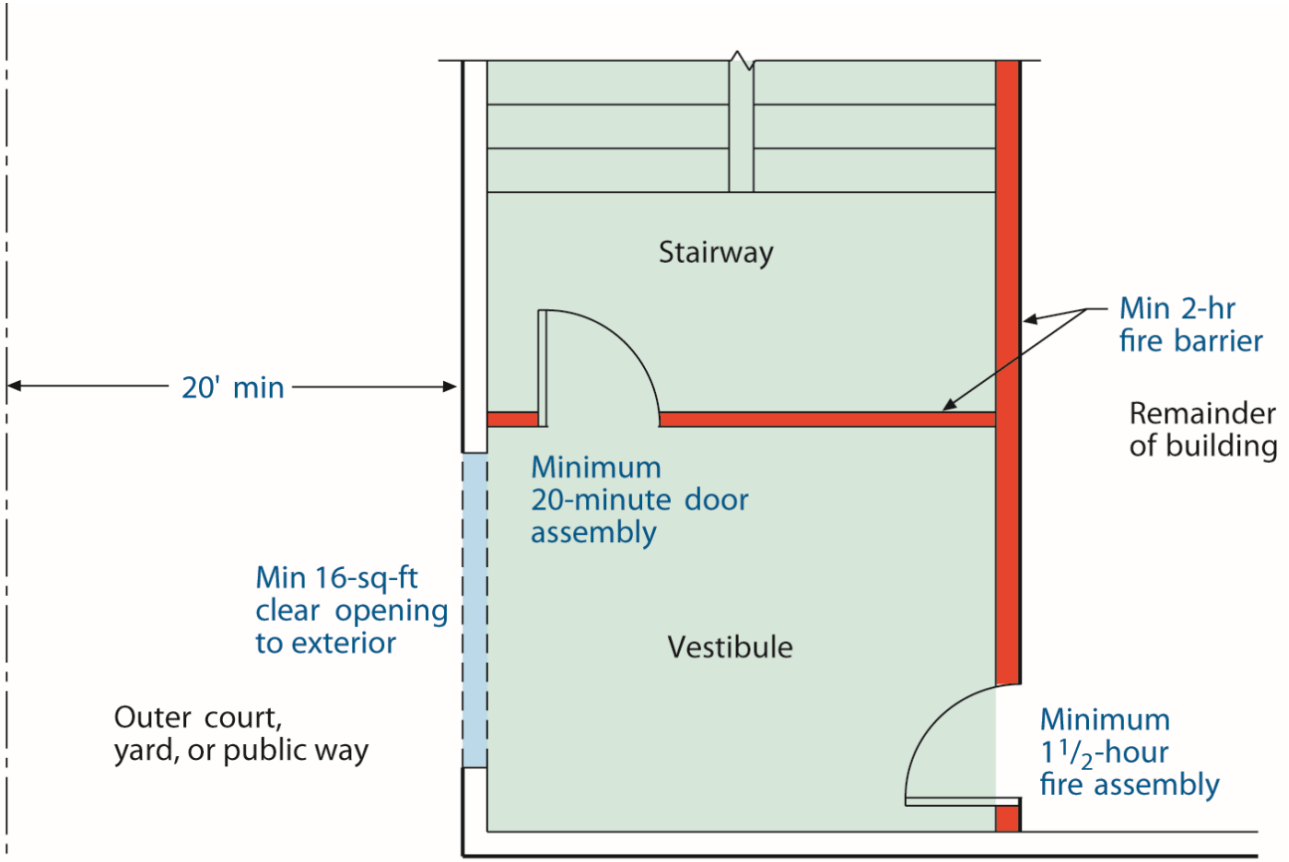


Smokeproof Enclosures and Pressurized Stairways and Ramps Section 1023.11 (MI)

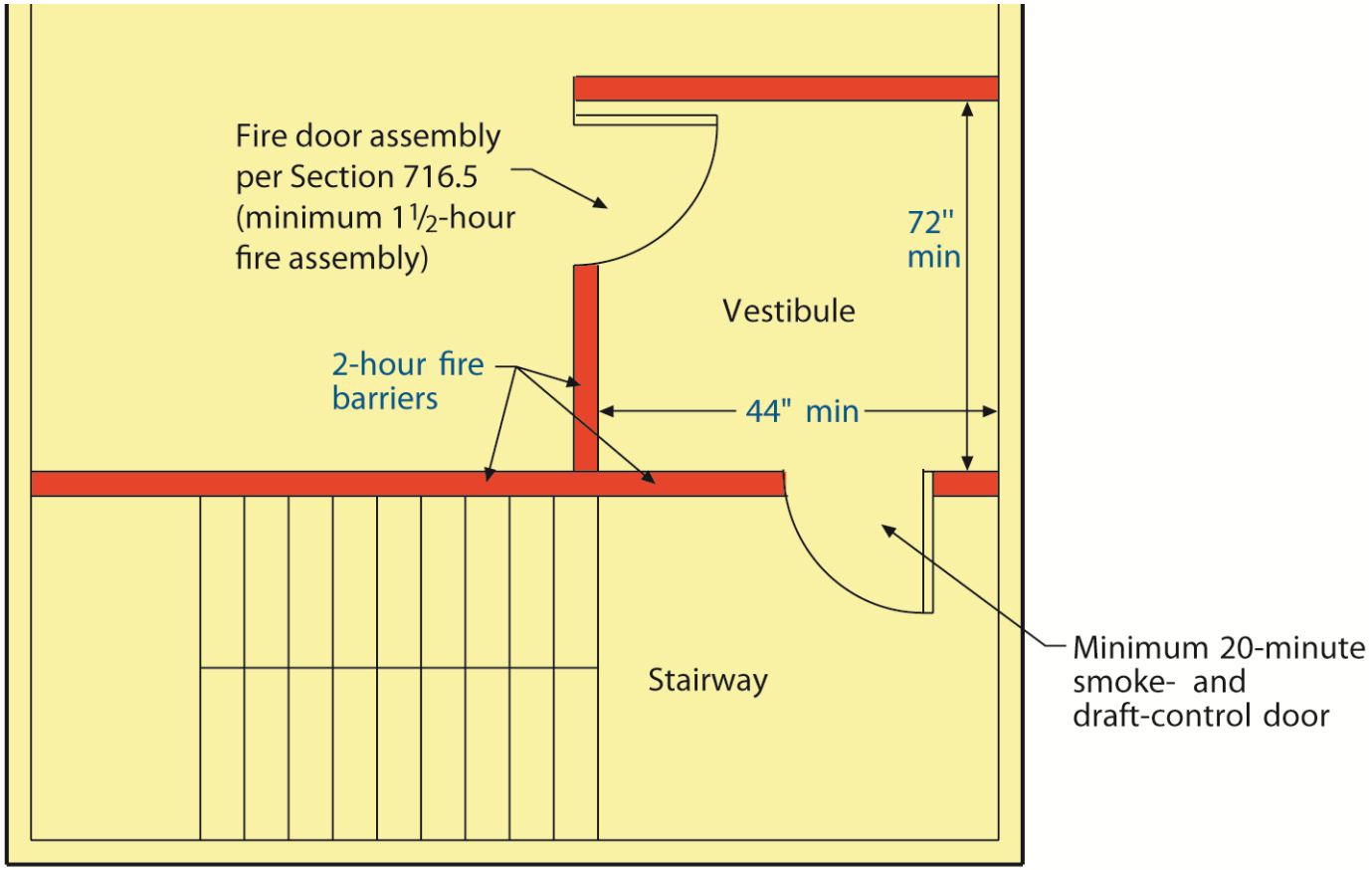
- As required for **high-rise** buildings (floor surface >55' above LLFDVA) and **underground** buildings (>30' below level of exit discharge), interior exit stairways and ramps shall be smokeproof enclosures
  - The requirements for construction and operation are established in Section 909.20:
    - Access via vestibule or open exterior balcony
    - Separated by **min. 2-hr.** fire barrier
    - No openings except required MOE doors
    - Self- or automatic-closing
    - Natural or mechanical ventilation alternatives
    - Standby power for ventilation & fire detection systems req.



Natural Ventilation Alternative Section 909.20.3

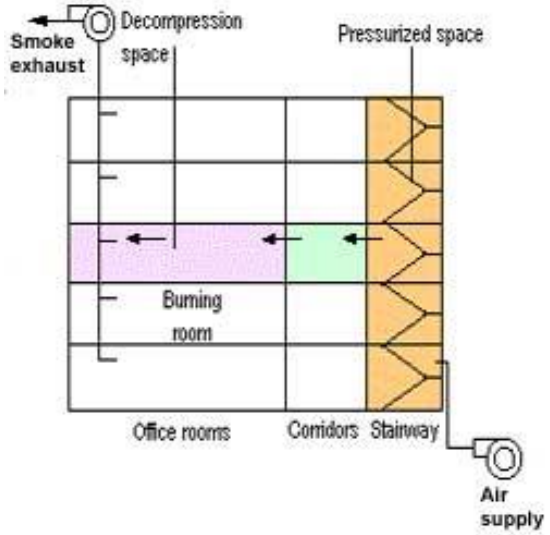


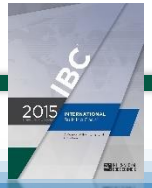
Mechanical Ventilation Alternative Section 909.20.4



Stairway Pressurization Alternative Section 909.20.5

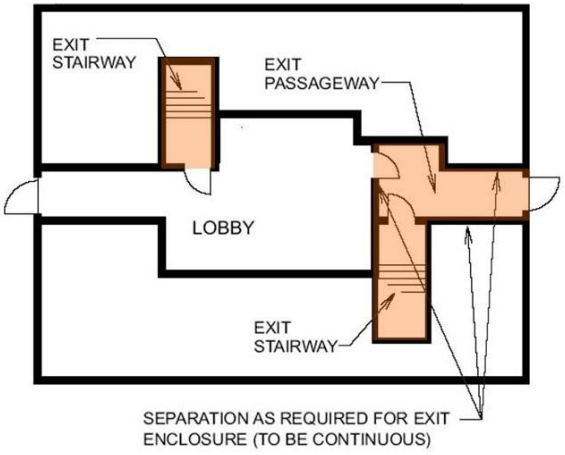
- Where the building is fully sprinklered, the vestibule is not required, provided each interior exit stairway is pressurized
- The pressurization level, in the shaft relative to the building, shall be:
  - Not less than **0.10”** of water
  - Not more than **0.35”** of water

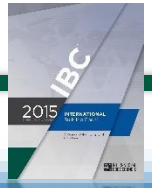




Termination and Extension Section 1023.11.1

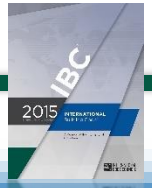
- Termination of a smokeproof enclosure shall occur at an exit discharge or the public way
  - A smokeproof enclosure is permitted to egress through areas on the level of exit discharge as permitted by Section 1028.1 for interior exit discharge:
    - **≤50%** of interior exit stairways **may** egress through areas on level of exit discharge
    - Entire area separated by fire-resistance equal to stair enclosure.
    - Protected by **sprinkler system**
    - Min. **30' or ¼ length** of overall diagonal dimension of building





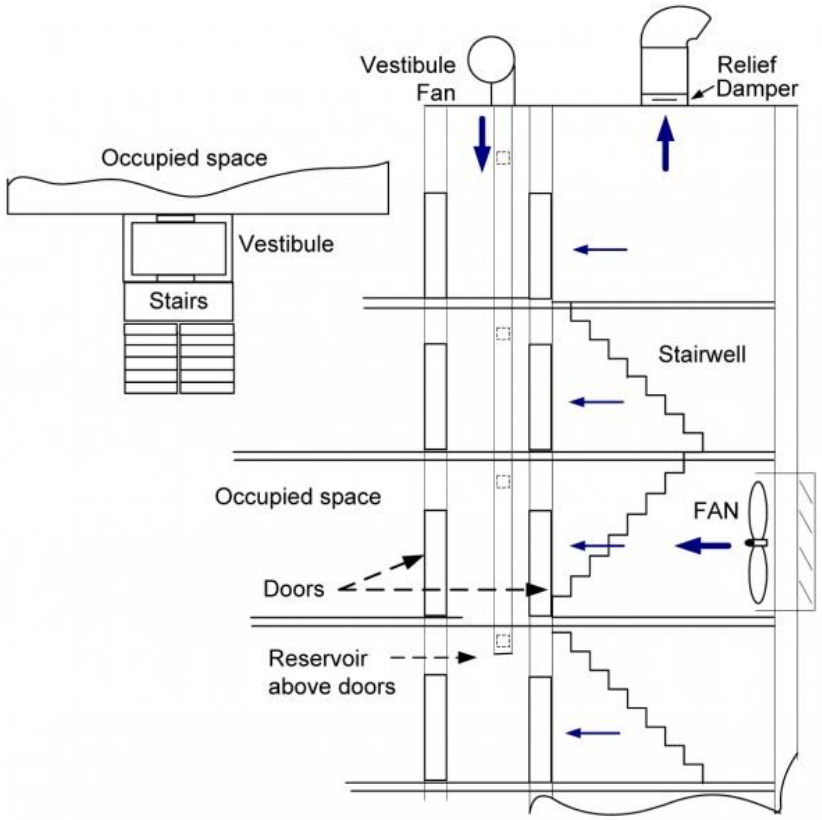
Termination and Extension Section 1023.11.1

- The extension of a smokeproof enclosure by an exit passageway is permitted where:
  - The exit passageway is without openings other than the fire door assembly required by Section 1023.3.1, **and**
  - Doors necessary for egress from the exit passageway.
- Openings are permitted within the exit passageway and the fire barrier separating the exit passageway from the smokeproof enclosure is not required provided:
  - The exit passageway is protected and pressurized in the same manner as the smokeproof enclosure



Enclosure Access Section 1023.11.2

- Unless the pressurization alternative is used, access to the stairway within a smokeproof enclosure shall be by way of a **vestibule** or an **open exterior balcony**

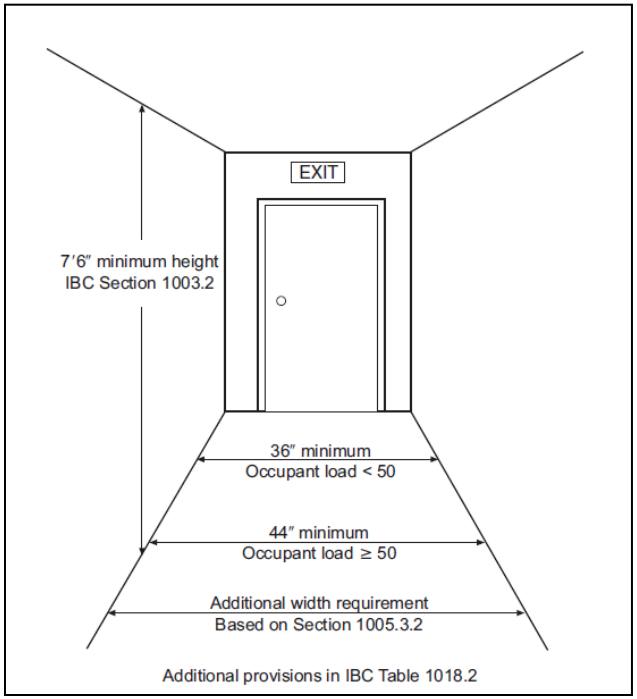


Exit Passageways
Section 1024.1

- An exit passageway, provides **exit travel** along a horizontal path, typically as selectively determined by the **designer**
- Exit passageways are also mandated by various provisions of the code where highly protected egress travel is necessary
- An exit passageway shall not be used for any purpose other than as a means of egress and a circulation path

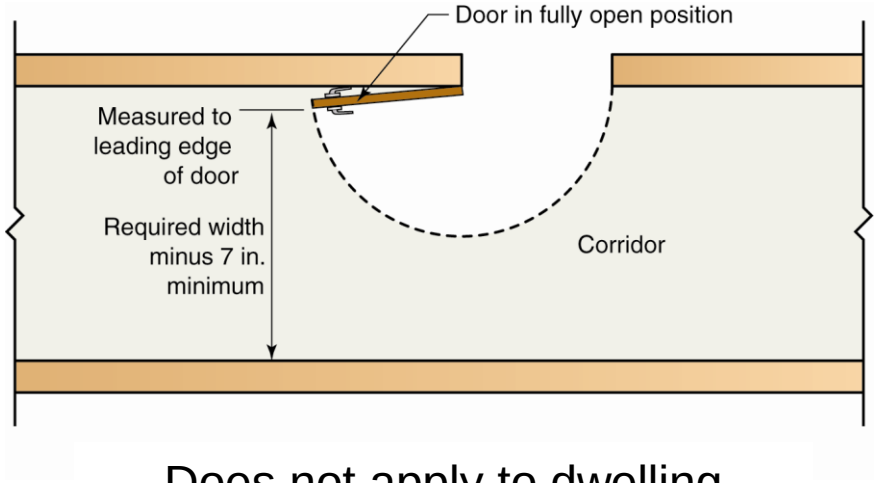
Exit Passageway Width Section 1024.2

- Exit passageway minimum width and required capacity are regulated in much the same manner as required for corridors
- The minimum required width is **44”**, with a reduction to **36”** permitted where the occupant load served is **less than 50**

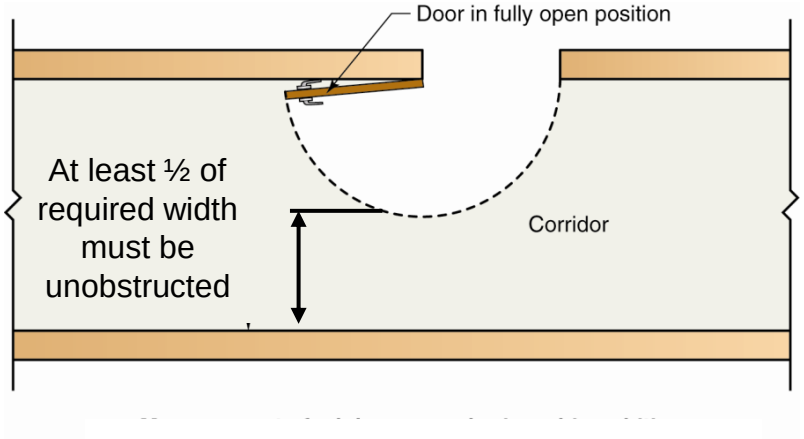


Exit Passageway Width Section 1024.2

- Other than permissible encroachments, the minimum width or required capacity must be **unobstructed**



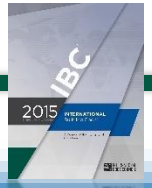
Does not apply to dwelling and sleeping units.



Does not apply to dwelling and sleeping units

Exit Passageway Construction Section 1024.3

- Exit passageway enclosures shall have walls, floors and ceilings with a minimum **1-hour** fire-resistance rating
  - Fire barriers or horizontal assemblies, or both, must be provided in order to achieve the required fire resistance
- Where connecting interior exit stairways, the rating **cannot be less** than that of the stairway enclosure

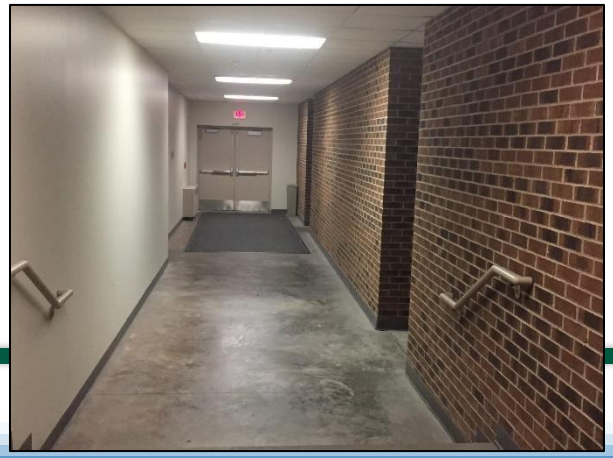


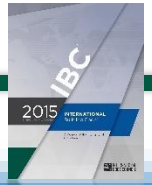
Exit Passageway Termination Section 1024.4

- Exit passageways located on the level of exit discharge shall be **continuous** until reaching the exit discharge or public way
- Where located on other levels of the building, exit passageways shall terminate at an exit, such as an interior exit stairway

Exit Passageway Openings Section 1024.5

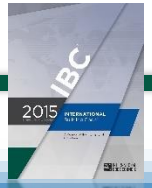
- Openings are **limited** in exit passageways in much the same manner as for interior exit stairways
- Other than those in the exterior wall, **openings** are **limited** to those necessary for exit access to the exit passageway from normally occupied spaces, and for egress from the exit passageway
  - **Exception** for mall buildings





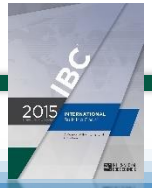
Exit Passageway Penetrations Section 1024.6

- Penetrations are also **limited** in exit passageways in much the same manner as for interior exit stairways
- Generally prohibited, allowances include:
  - Required exit doors
  - Independent equipment and ductwork necessary for ventilation or pressurization
  - Sprinkler piping and standpipes
  - Electrical raceways serving the enclosure
  - Protected membrane penetrations on the outside of the exit passageway



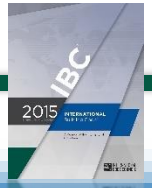
Exit Passageway Ventilation Section 1024.7

- Equipment and ductwork necessary for independent pressurization is permitted where compliant with one of **three** established **methods**
  - Although not specifically addressed, exit passageway ventilation must also comply with one of the three methods
- Exit passageway ventilation systems shall be independent of other building ventilation systems



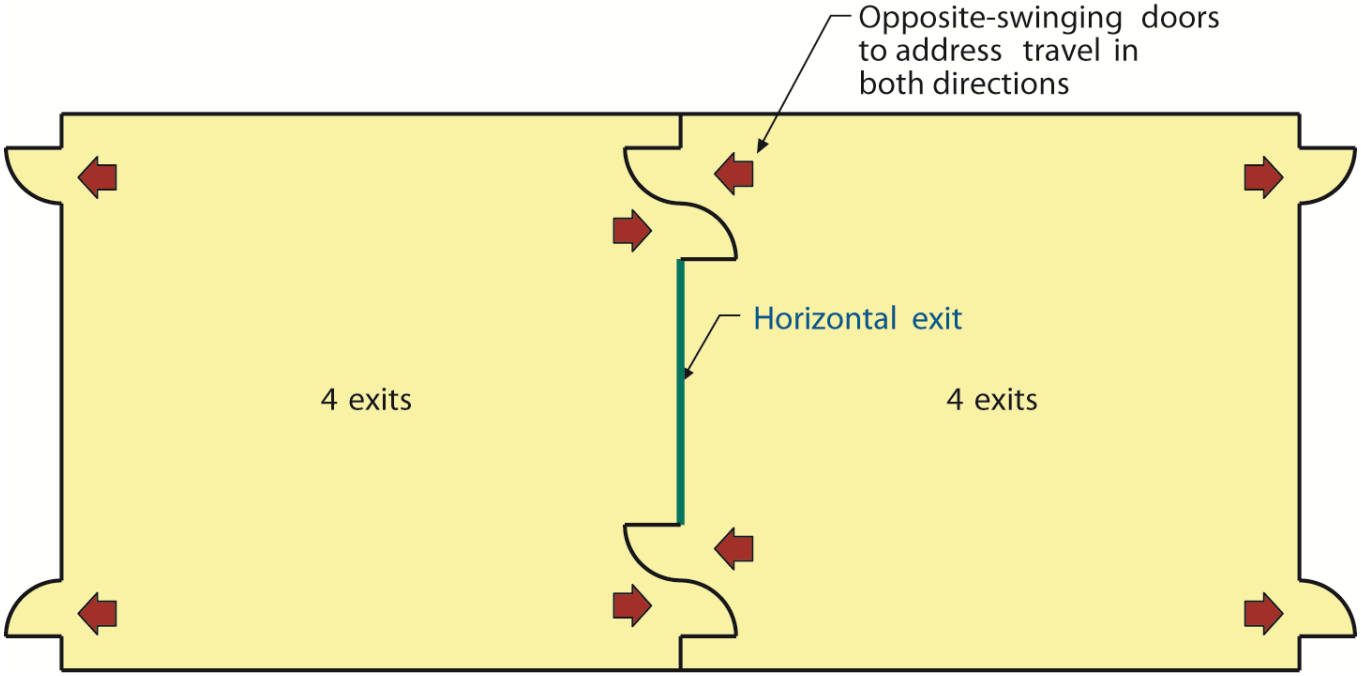
Horizontal Exits
Section 1026.1

- Horizontal exits, while permitted as exit elements, address egress differently than the other exit components
- One or more refuge areas are created to allow occupants protection from the area of fire incidence
- Occupants then utilize the exit system provided for the other building occupants if continued egress is necessary



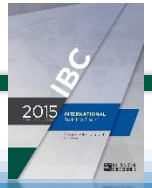
Horizontal Exits
Section 1026.1

- A refuge area can be created on one or both sides of the horizontal exit

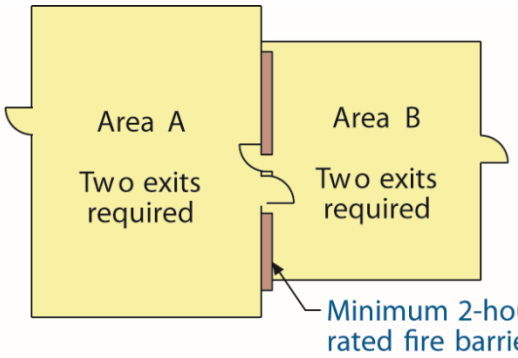


Horizontal Exits
Section 1026.1

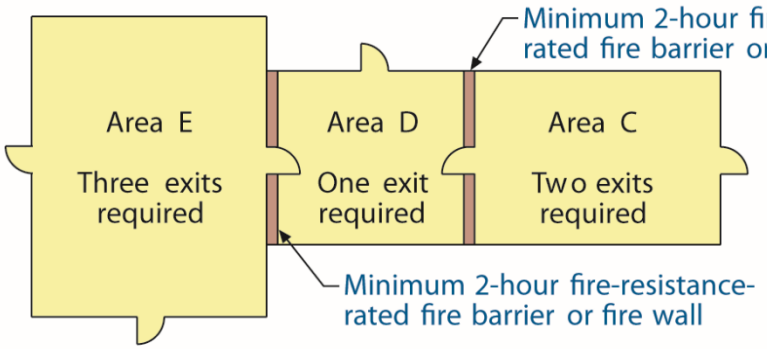
- Due to the concept of relocation rather than evacuation, all exits from a space or story cannot be horizontal exits
- A horizontal exit **cannot be the only exit** from a portion of the building
- If two or more means of egress are required, a limit of **50%** of the total number, capacity and width are permitted to be horizontal exits



Horizontal Exits
Section 1026.1

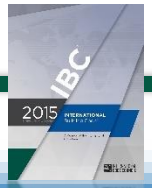


Complying fire wall or fire barrier may be utilized as horizontal exit from both sides, provided door size and swing are adequately addressed.



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

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

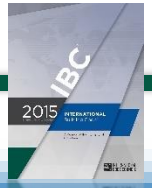


Horizontal Exits
Section 1026.1, Exceptions

- The **limit** on the number and width of horizontal exits is **modified** for:
  - **Group I-2** occupancies, where up to **2/3** of the required exits can be horizontal exits
  - **Group I-3** occupancies where **all** of the exits are permitted to be horizontal exits

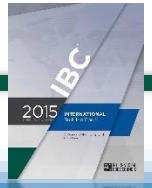
Horizontal Exit Separation Section 1026.2

- A horizontal exit separation can be provided through **two** different **methods**:
  - Minimum **2-hour fire wall**, **or**
  - Minimum **2-hour fire barriers**
- The fire wall will completely **divide** the structure into **two separate buildings**, with egress permitted from one to another



Horizontal Exit Fire Barriers Section 1026.2

- Where fire barriers are used, they shall **extend vertically through all levels** of the building
  - Continuous vertical separation is not required where **minimum 2-hour** floor assemblies are provided with no unprotected openings
- Horizontal exits constructed by fire barriers shall be **continuous from exterior wall to exterior wall** to **completely divide** the floor served by the horizontal exit

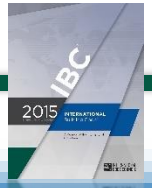


Horizontal Exit Opening Protectives Section 1026.3

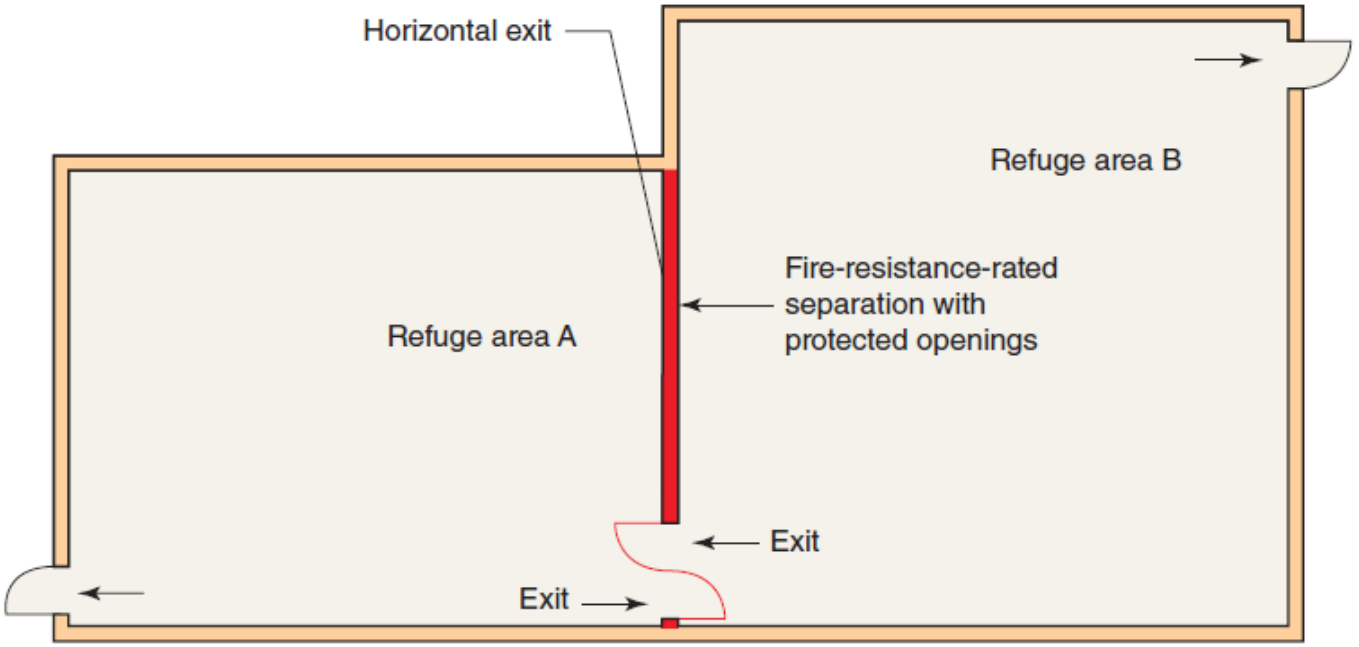
- Fire doors in a horizontal exit shall be self-closing or automatic-closing when activated by a **smoke detector**
- Where located in a cross-corridor condition, the doors must be automatic-closing by activation of a smoke detector

Refuge Area
Section 1026.4

- In addition to enclosure by a fire-resistive separation, the **size** of the refuge area must be **adequate** for the occupant load served
- It shall be a space occupied by the same tenant or a public area open to all occupants
- The available floor area shall be such that it can accommodate the **original** occupant load of the refuge area **plus** the occupant load **anticipated** from the adjoining compartment

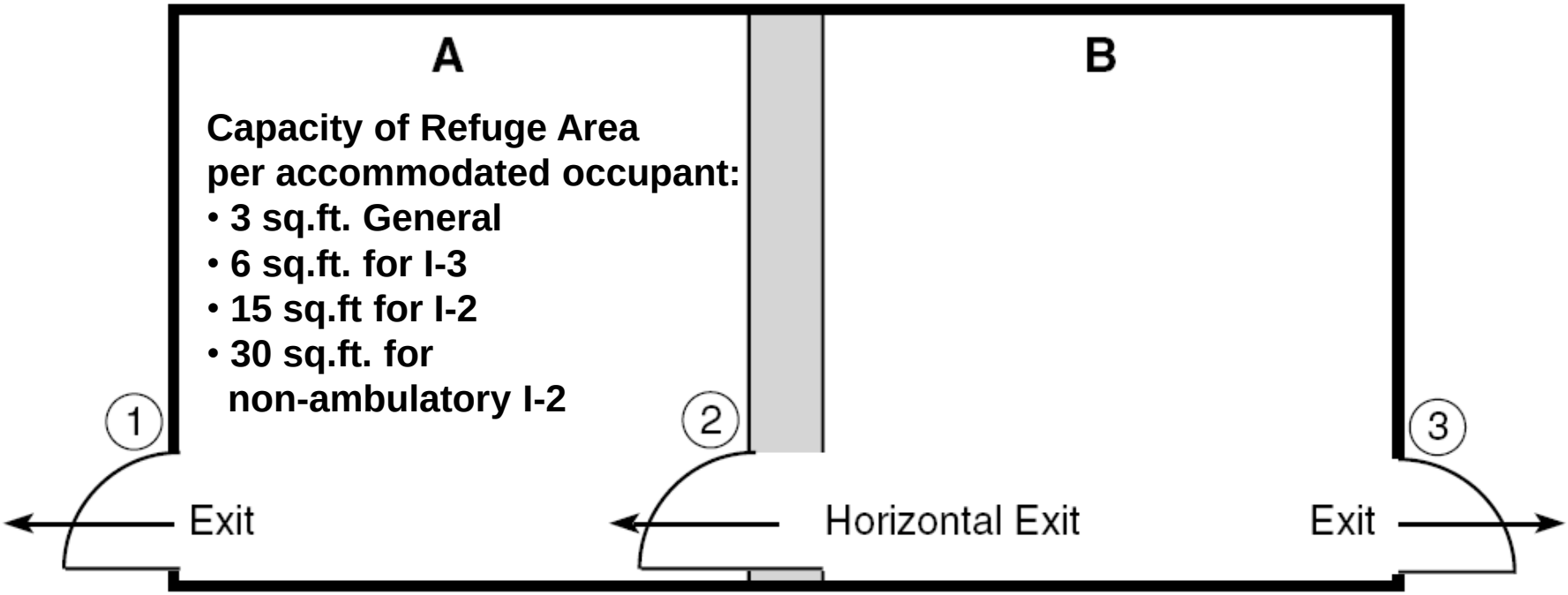


Refuge Area Section 1026.4

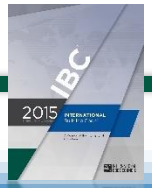


- The "**anticipated**" occupant load shall be based on the capacity of the horizontal exit doors entering the refuge area

Capacity of Refuge Area Section 1026.4.1

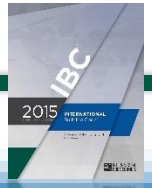


NOTE: Exit for "A" adequate to meet the provisions of Chapter 10 but need not include added capacity imposed by occupants entering through horizontal exit from "B".

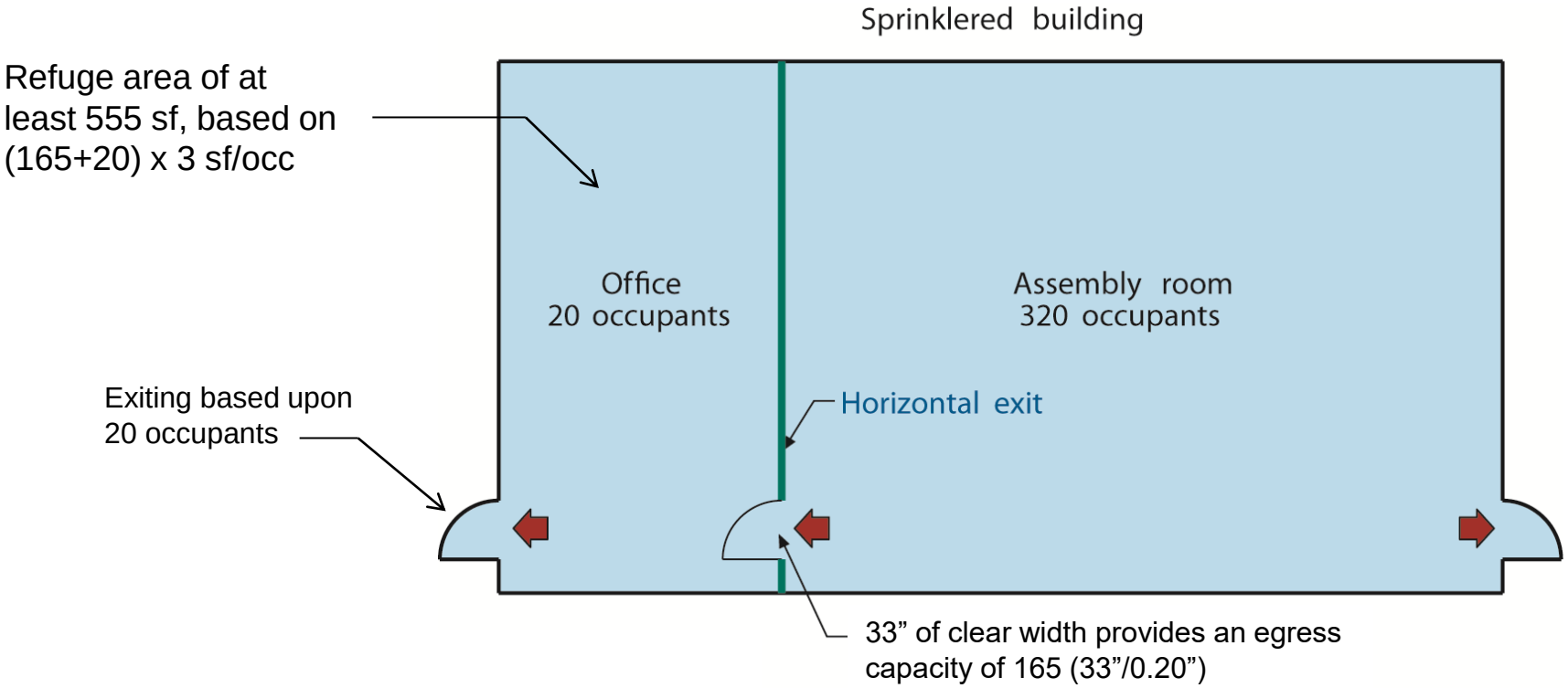


Number of Exits
Section 1026.4.2

- The refuge area shall be provided with exits based on its original occupant load without adding the occupant load imposed by persons entering it through horizontal exits from other areas
- At least **one exit** shall lead **directly** to the exterior or to an interior exit stairway or ramp
  - **Exception** where refuge area has direct egress and **no travel back** through original compartment



Number of Exits
Section 1026.4.2



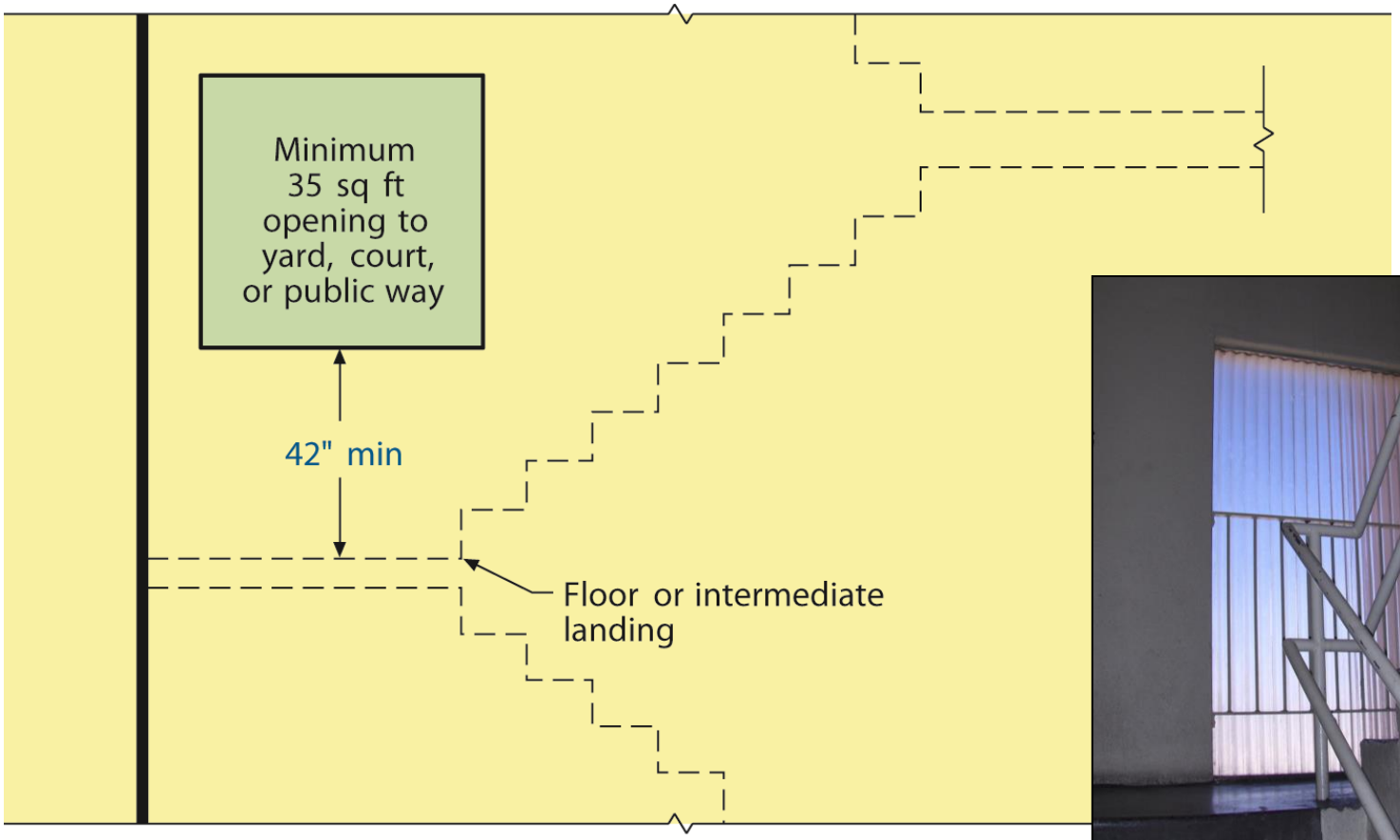
Exterior Exit Stairways and Ramps Section 1027.2

- Exterior exit stairways and ramps are considered as exit components and are permitted as an element of the means of egress, **except** for:
  - Group I-2 occupancies
  - Buildings **>6 stories** above grade plane
  - High-rise buildings

Exterior Exit Stairway Open Side Section 1027.3

- Where exterior exit stairways and ramps are part of the means of egress, they shall be **open** on at least **one side**
- The open side shall have an adjacent aggregate open area of **35 sq.ft.** at each floor level and intermediate landing level
- The open area must be at least **42” above** the adjacent floor or landing level

Exterior Exit Stairway Open Side Section 1027.3



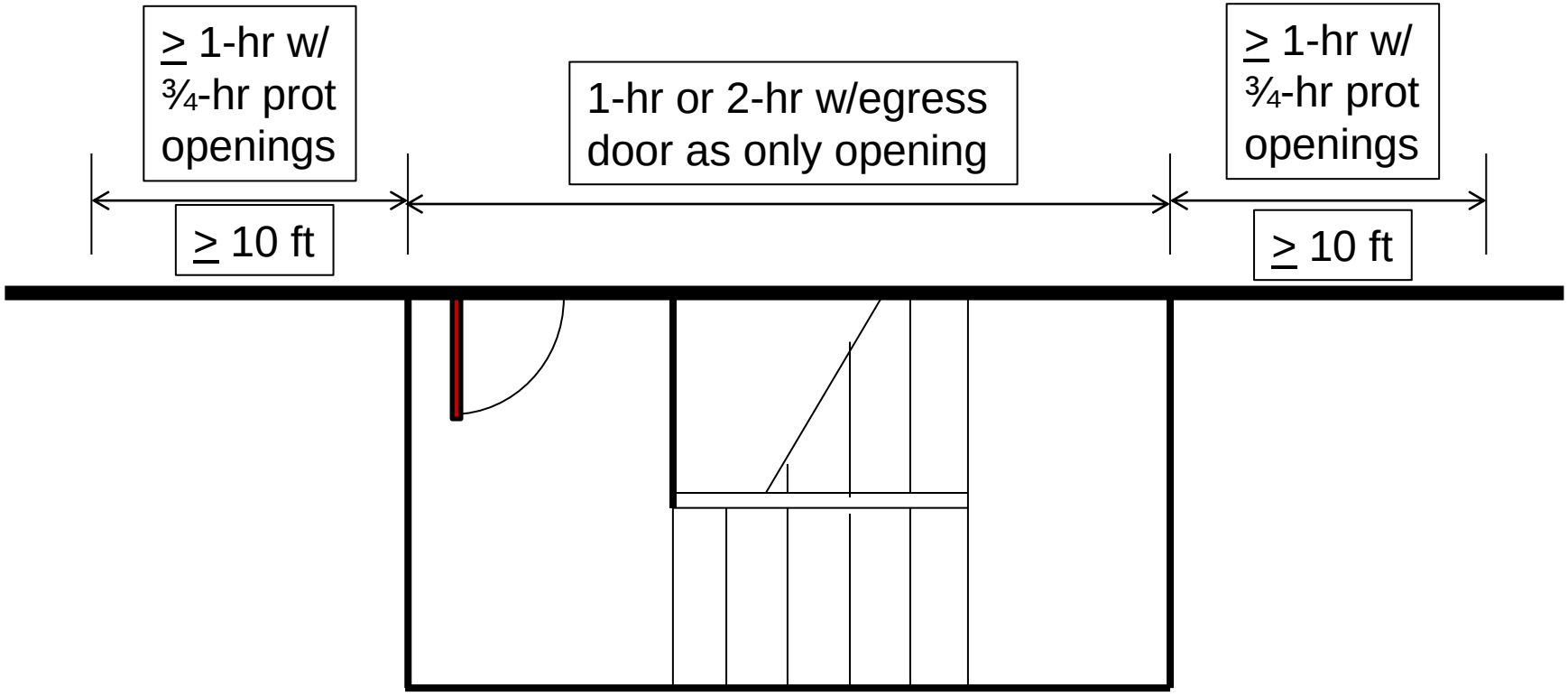
Exterior Exit Stairway Location Section 1027.5

- At least **10’** of **horizontal separation** shall be provided between an exterior exit stairway/ramp and:
  - Adjacent lot lines
  - Other portions of the same building
  - Other buildings on the same lot
- The **10'** minimum separation is not required where exterior walls and openings of the adjacent building are protected per Section 705 based on **Fire Separation Distance** (FSD)

Exterior Exit Stairway Protection Section 1027.6

- In a general sense, exterior exit stairways and ramps must be separated from the interior of the building in the same manner as for interior exit stairways and ramps.
- Openings within the separation walls are to those **doors** egress occupied

Exterior Exit Stairway Protection Section 1027.6



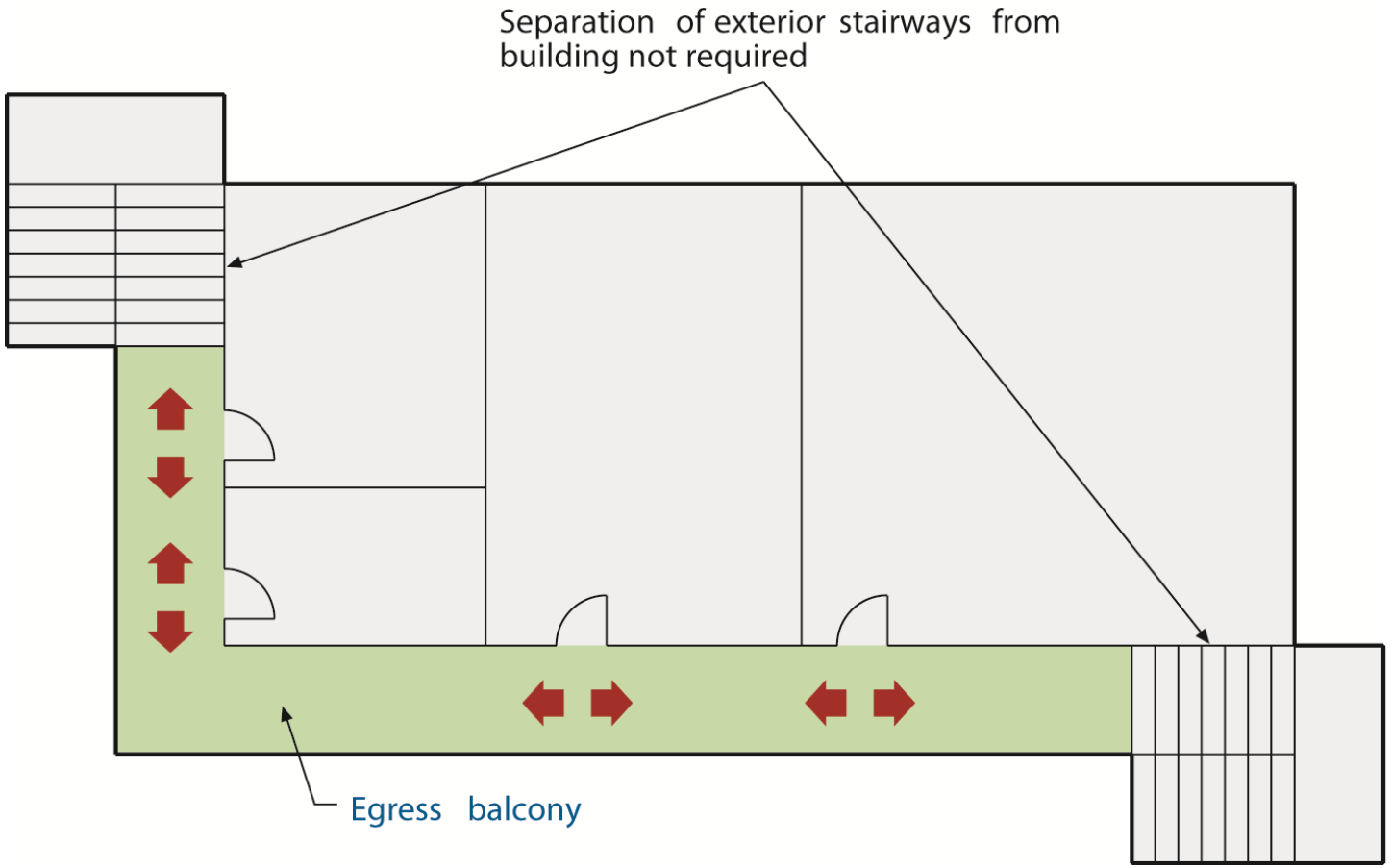
Exterior Exit Stairway Protection Section 1027.6, Exception 1

- An exterior exit stairway does not need to be separated from the interior of the building in buildings no more than **two stories** above grade plane
  - This allowance is not applicable to Group R-1 and R-2 occupancies

Exterior Exit Stairway Protection Section 1027.6, Exception 2

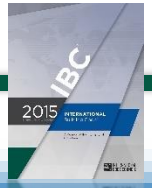
- An exterior exit stairway does not need to be separated from the interior of the building where **two remote exterior stairways** or other approved **open-to-the-air** exits are provided:
  - **50%** openness is required.
  - Top of openings to be not less than **7' above** the top of the balcony

Exterior Exit Stairway Protection Section 1027.6, Exception 2

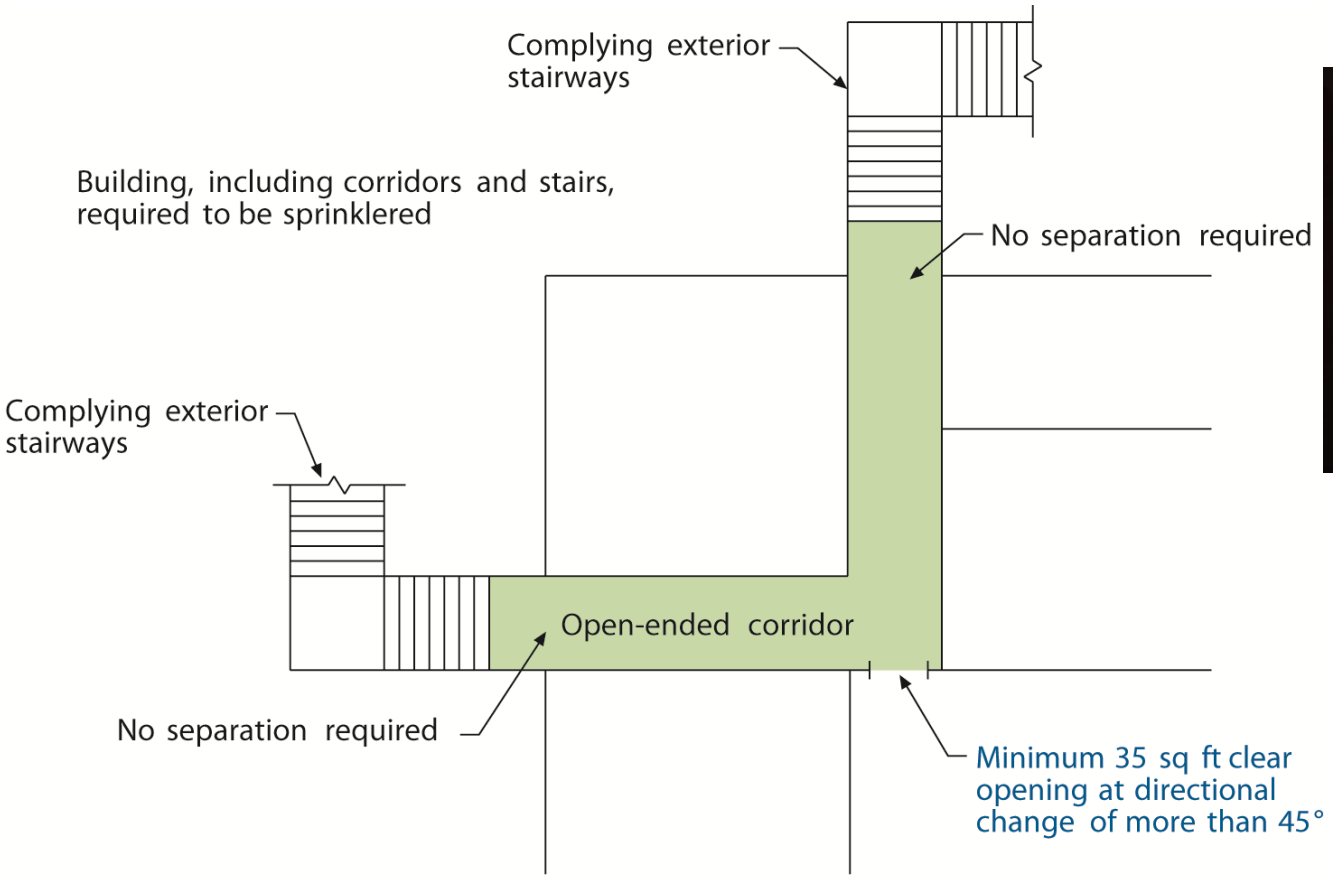


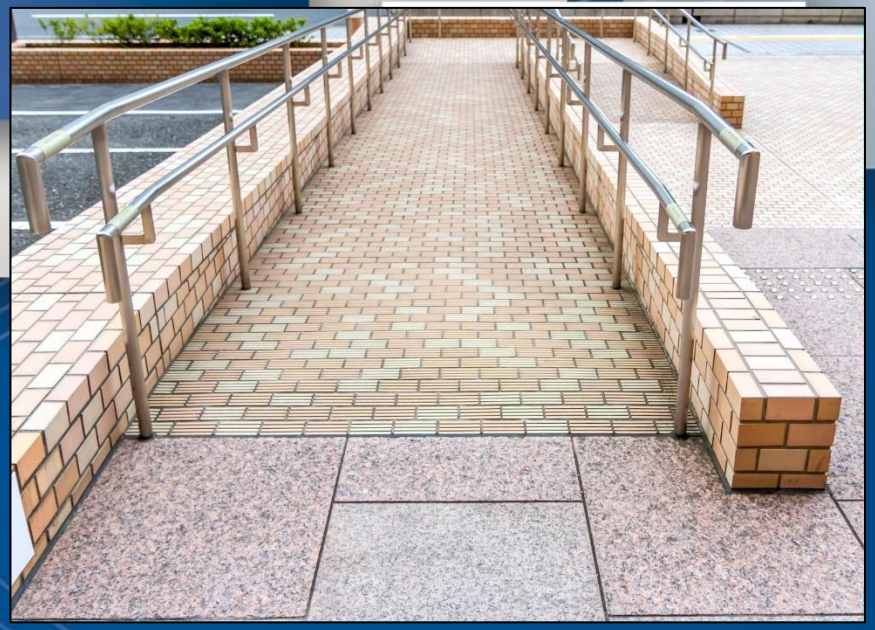
Exterior Exit Stairway Protection Section 1027.6, Exception 3

- An exterior exit stairway **does not need to be separated** from the interior of the building where it connects to open-ended corridors under the conditions of **Section 1027.6, Exception 3**
- This building configuration is typically found where breezeways and similar building elements are used to serve each story



Exterior Exit Stairway Protection Section 1027.6, Exception 3



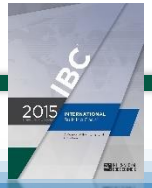


Module 4

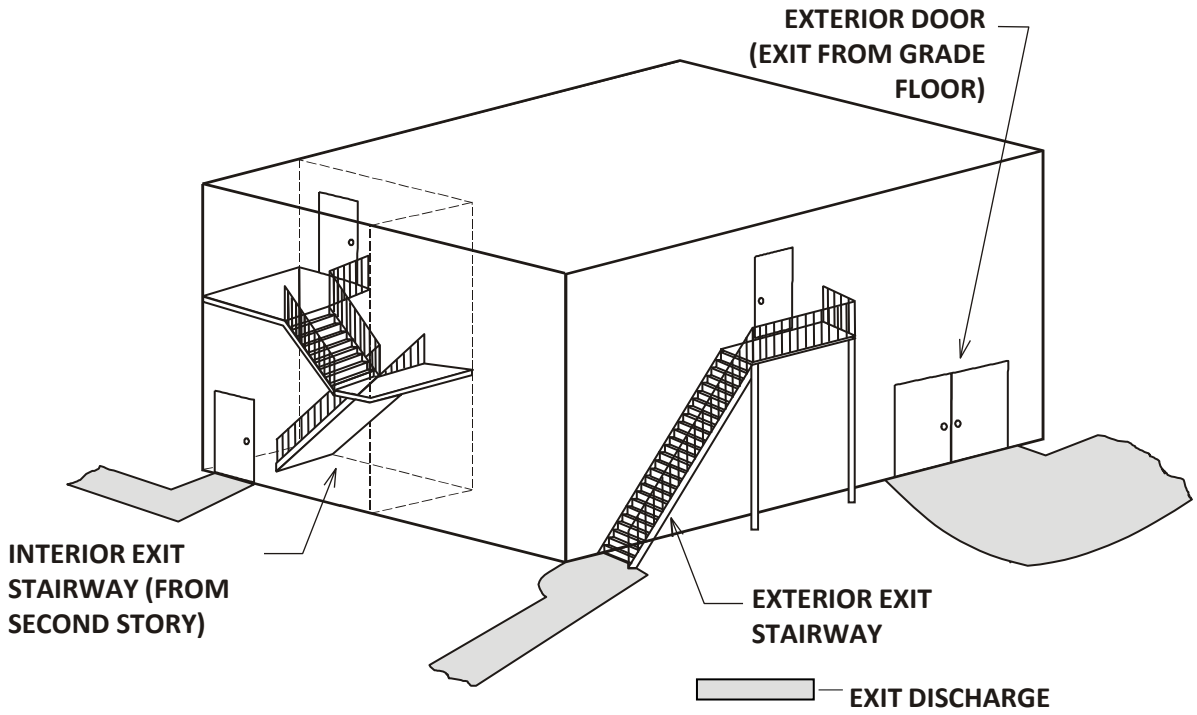
Exit Discharge

Exit Discharge
Section 1028

- The “exit discharge” is the third and final part of the means of egress system
- With limited exception, exit discharge is **exterior egress travel at grade** between the building and the public way
- Although it is the least hazardous portion of the means of egress process, the exit discharge is regulated to a limited degree

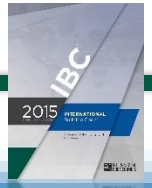


Exit Discharge Section 1028

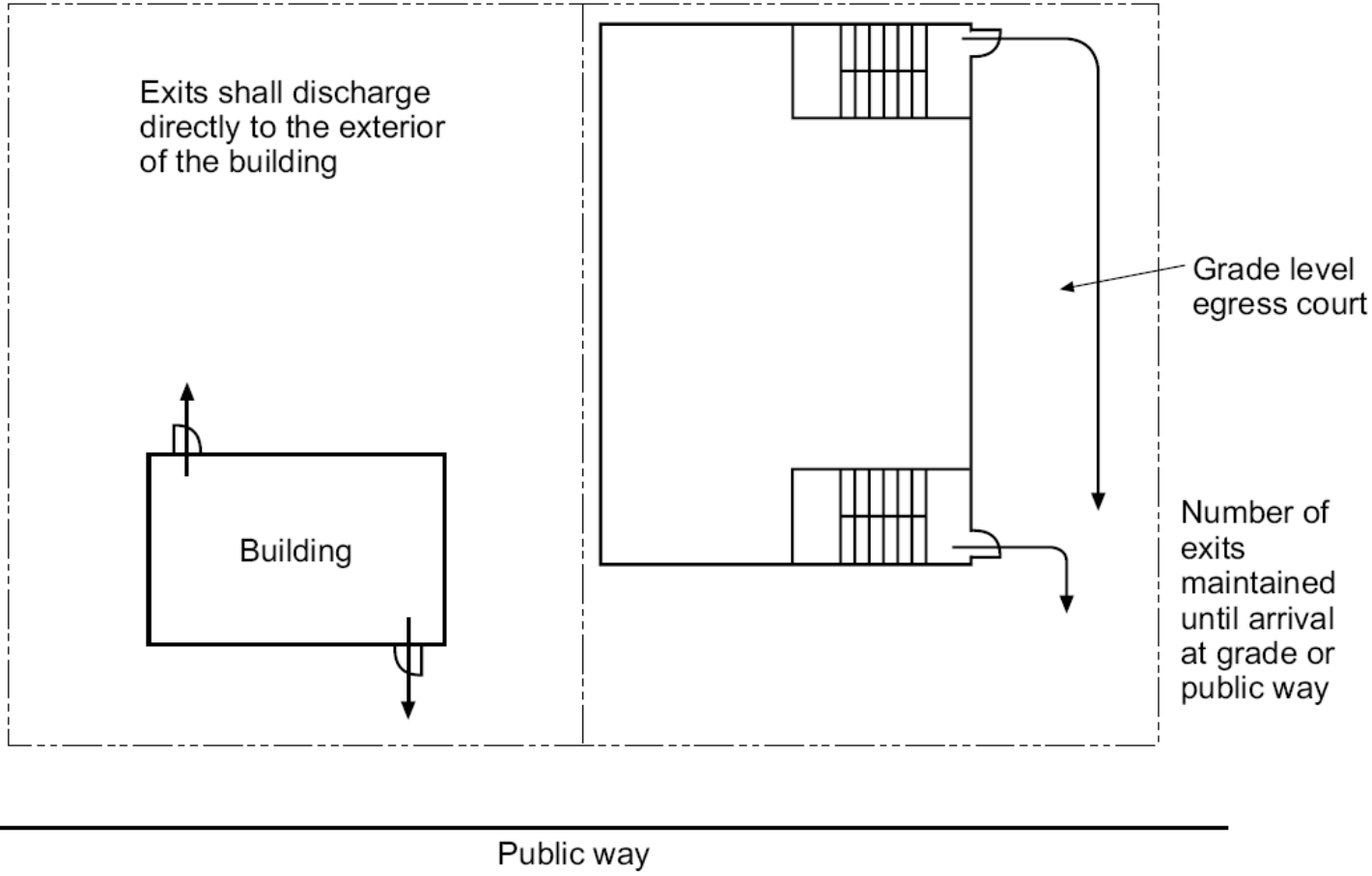


Exit Discharge
Section 1028.1

- Exits shall discharge directly to the exterior of the building
- The exit discharge shall be at grade or provide a **direct path** of egress travel to grade
- The exit discharge shall **not re-enter** a building
- The required number of exits shall be maintained until arrival at the exit discharge
  - Once reaching the exit discharge, multiple exits are no longer mandated

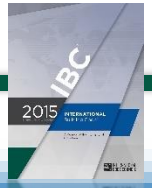


Exit Discharge
Section 1028.1

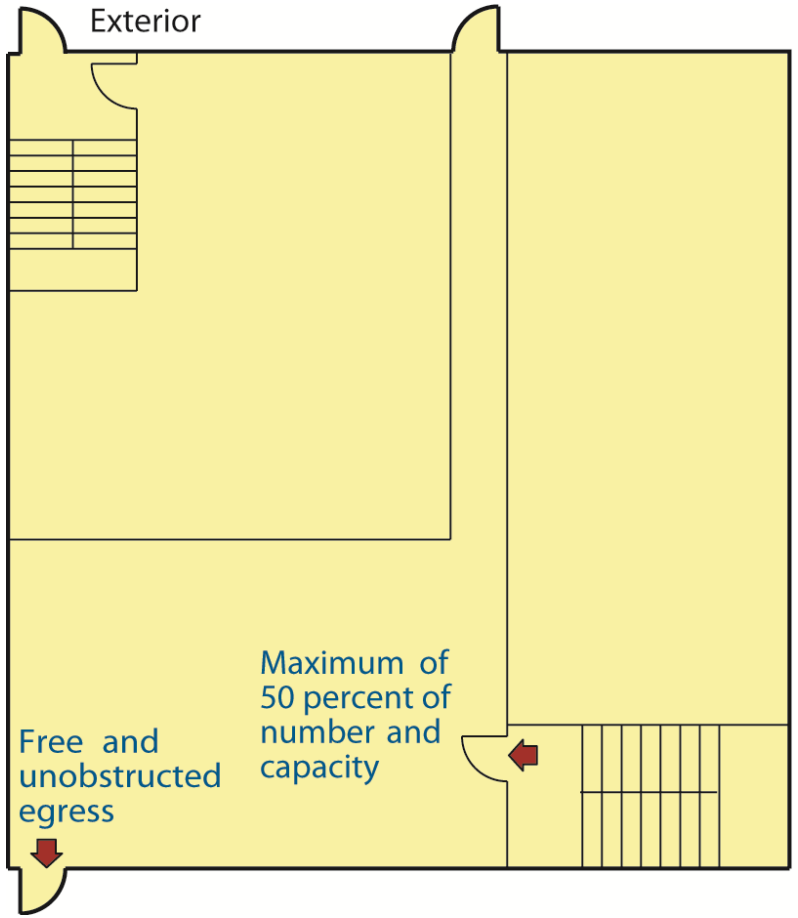


Interior Exit Discharge Section 1028.1

- While exit discharge typically occurs at the exterior of the building, there are two exceptions that permit interior exit discharge
- The combined use of the two exceptions **cannot exceed 50%** of the number and capacity of the required exits



Interior Exit Discharge
Section 1028.1, Exception 1

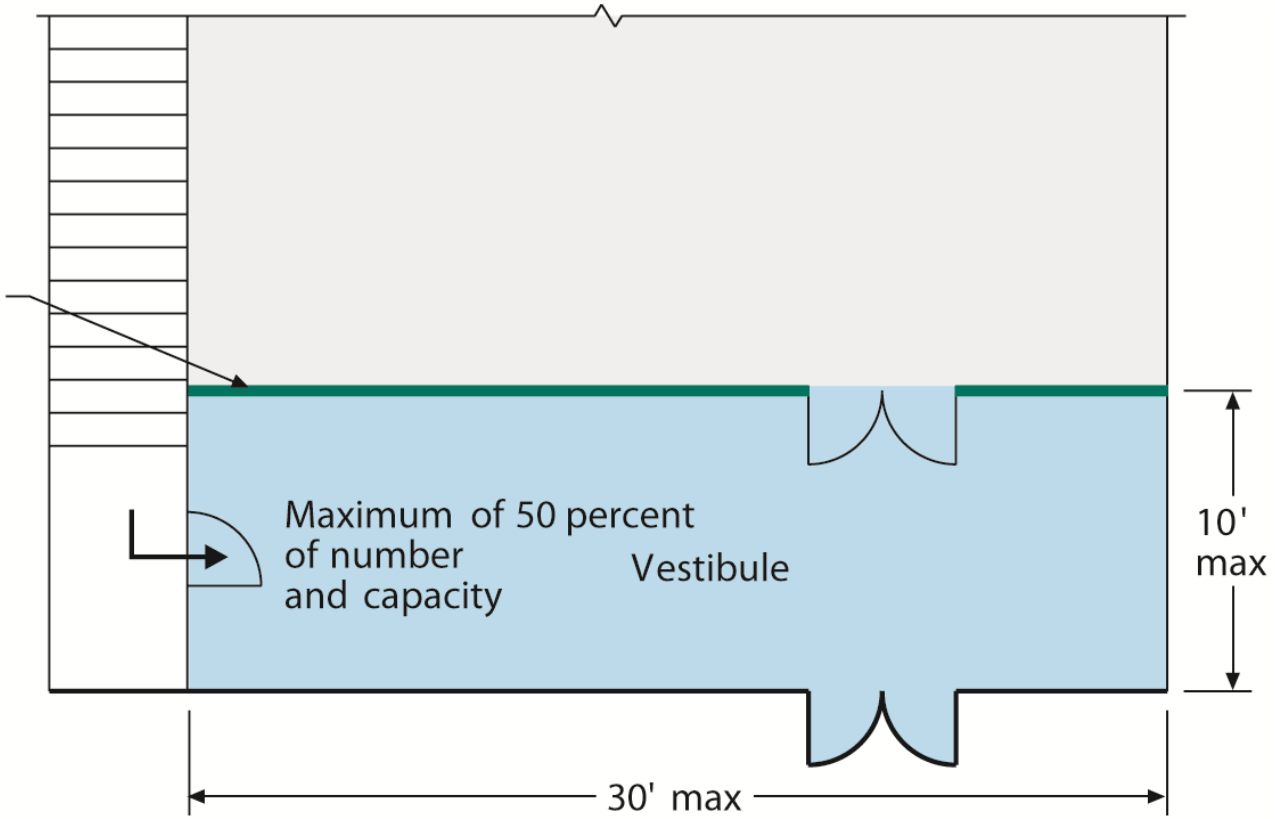


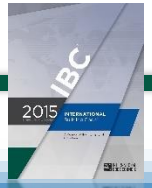
Entire floor level is sprinklered and protected from areas below by construction equivalent to rating of interior exit stairway enclosure

Exit to be readily visible and identifiable from the point of termination of the enclosure.

Interior Exit Discharge Section 1028.1, Exception 2

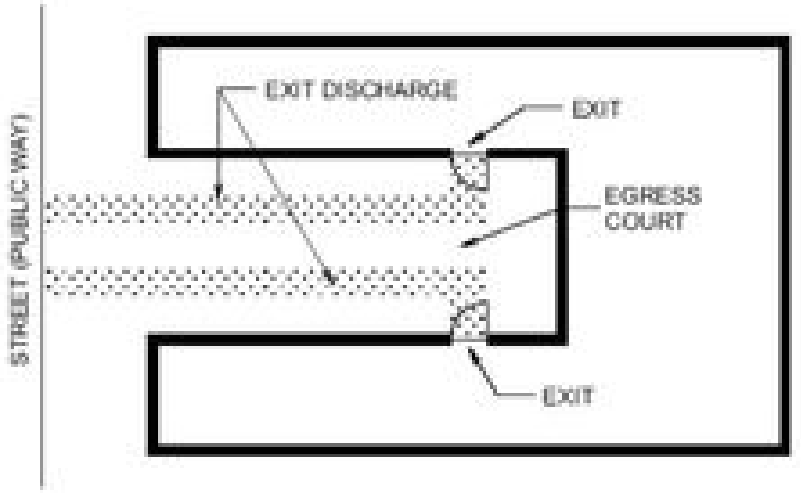
Separation from remainder of level of exit discharge to be by **fire partition**.

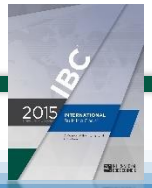




Exit Discharge Section 1028

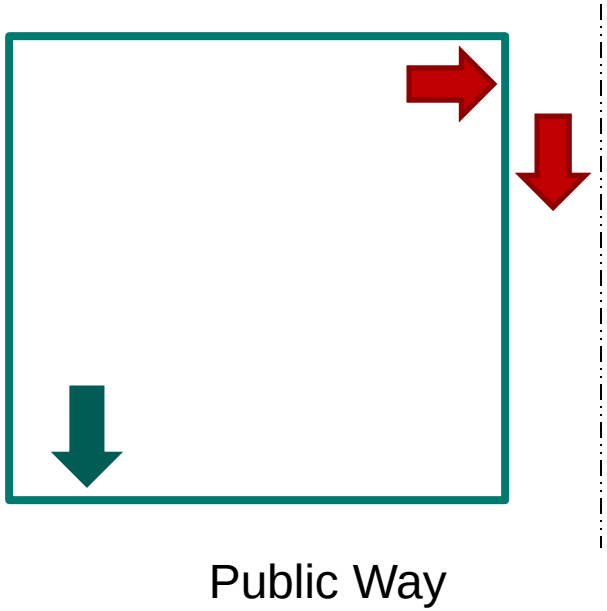
- There are four key issues regarding the regulation of the exit discharge:
  - Capacity/width
  - Openness
  - Construction
  - Access to public way





Exit Discharge Capacity Section 1028.2

- Of primary importance, the capacity of the exit discharge **cannot be less** than the required discharge capacity of the exits being served

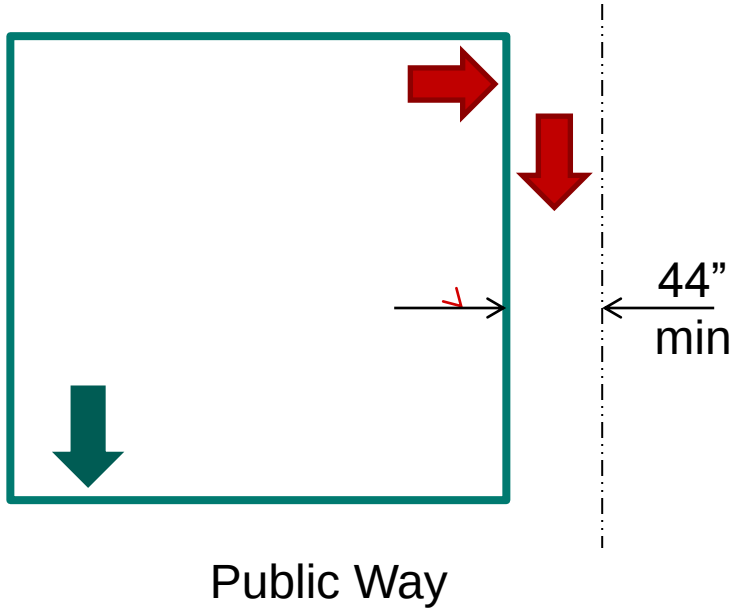


Exit Discharge Openness Section 1028.3

- Exit discharge components must be **open** to the exterior
- Performance-wise, the exitway must be sufficiently open so that the accumulation of smoke and toxic gases is minimized
- Throughout the code, the life-safety hazard level is greatly reduced where smoke and toxic gases are controlled or removed

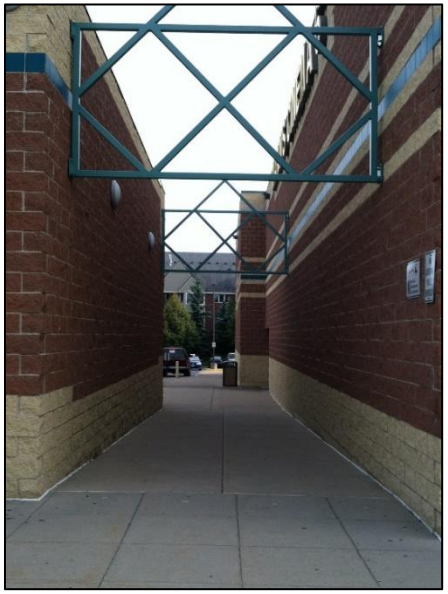
Exit Discharge Width Section 1028.4.1

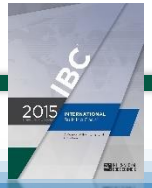
- The minimum capacity of egress courts shall be based upon the capacity, but not less than **44”** (**36”** for Group R-3)
- The minimum height shall be **7’**



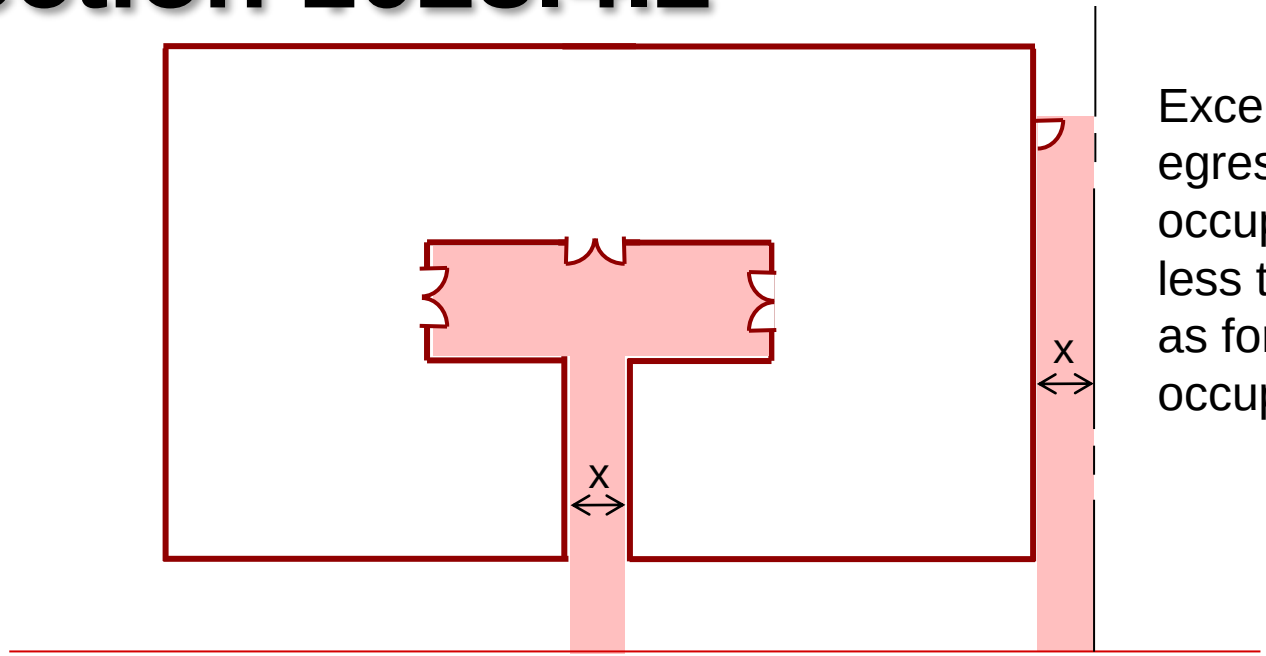
Exit Discharge Construction Section 1028.4.2

- Where the exit discharge is located such that egress travel must occur in close proximity to the building, the building's exterior wall and openings are regulated for **fire resistance** and **fire protectives**
- Egress courts adjacent to the building must allow for an efficient and protected path of travel to the public way



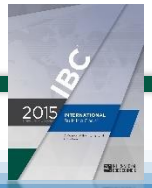


Exit Discharge Construction Section 1028.4.2



Exceptions for egress courts serving occupant loads of less than **10**, as well as for Group R-3 occupancies.

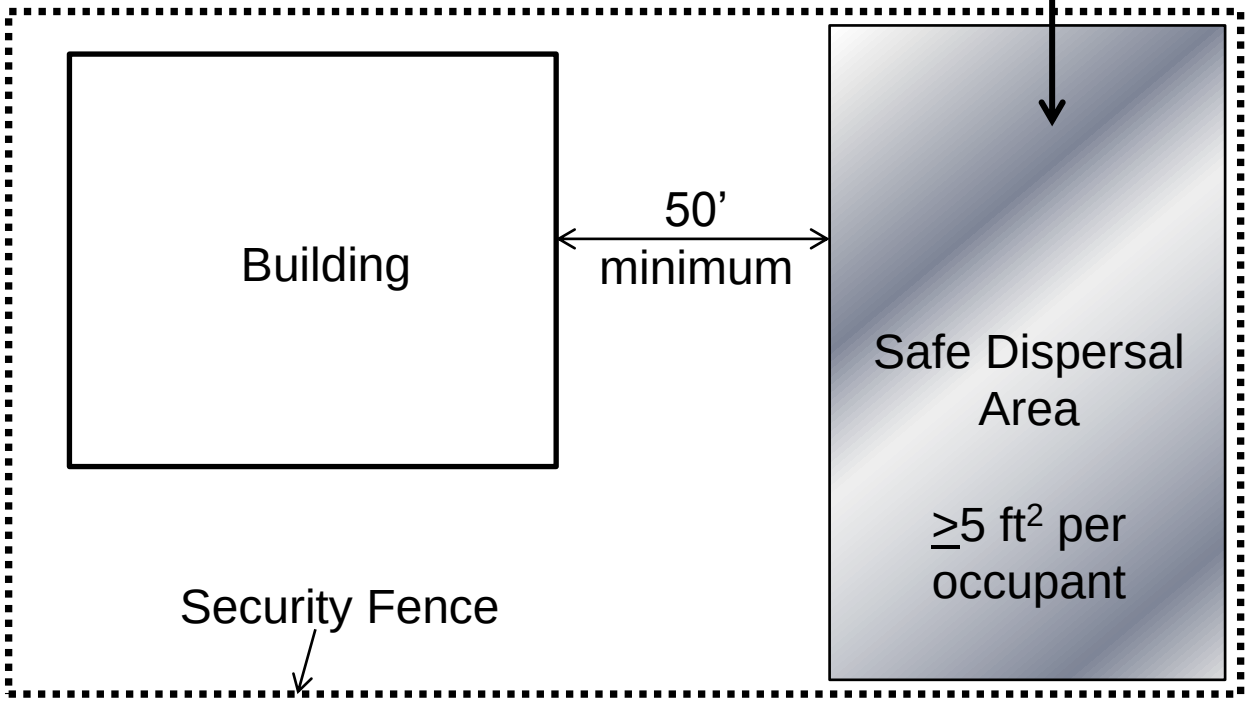
Where X is less than **10’** in width, exterior wall to be minimum **1-hour** with minimum **45-minute** openings to height of **10’** or roof height, whichever is less.



Access to a Public Way Section 1028.5

- The exit discharge shall provide a **direct and unobstructed path of travel** to the public way
- Where access to a public way cannot be provided, a **safe dispersal area** can be provided

Safe Dispersal Area
Section 1028.5



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