2012 IBC Means of Egress

Based on the 2012 International Building Code® (IBC®)

Introductions

- Instructor introduction
- Exits
- Cell phones & pagers
- Schedule & breaks
- Student introductions

Goal

- Participants will receive an overview of the fundamental requirements for means of egress as indicated in the 2012 International Building Code® (IBC®). They will be presented with specific problems related to means of egress and will be asked to solve each problem using a set of plans for a four story commercial building.

Objectives

- List and describe each of the three parts of a means of egress.
- Identify the seven fundamental means of egress design issues.
- Calculate the occupant load and determine the required means of egress capacity.
- Determine the required number of exits.
Objectives

- Determine the requirements for arrangement of the means of egress facilities including:
  - The remote location of doors and exits.
  - The exit access travel distance.
  - The common paths of egress travel.
  - The egress through adjoining spaces.
- Determine the requirements for fire-resistance-rated construction for egress elements.
- Determine the requirements for design of egress elements.

Objectives

- Determine requirements for door hardware.
- Determine requirements for locations and amounts of means of egress lighting and signage.
- Evaluate the adequacy of a horizontal exit as part of a means of egress plan.
- Evaluate the means of egress in assembly spaces.
- Evaluate the adequacy of accessible means of egress.

Explanation of Icons

- This icon directs you to material in the I-Codes.
- This icon indicates when an example is used to reinforce concepts in the handout.
- The activities included in the handout, indicated by this icon, provide an opportunity for you to practice applying the code.
- Look for this icon to indicate a process or procedure that is important for you to know and to be able to use on the job.

In addition to examples and question and answer sections, your workbook may include a case study based on real-world situations.

The Question and Answer sections provide questions addressing critical areas.

This icon introduces the Final Reflection exercise.
Module 1: Means of Egress Basics

Fundamental Means of Egress Design Issues
1. Number of occupants and total width of egress elements
2. Number of exits required
3. Location of means of egress elements
4. Fire-resistance-rated construction
5. Component design
6. Hardware
7. Lighting and signs

Additional Design Considerations
1. Use of horizontal exits
2. 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
Means of Egress Basics in the IFC

New Construction
- Provisions duplicated from IBC
  - (1002-1025)

Existing Construction
- IFC provisions only
  - (1026-1027)

Three Parts of a Means of Egress

- Exit access
- Exit
- Exit discharge

Exit

Exit Access
**Exit Discharge**

Shaded area = exit discharge

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**Definition**  
Section 1002

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

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**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 feet (3048 mm).
Module 2: Occupant Load and Means of Egress Capacity

The number of occupants is determined in accordance with IBC Section 1004.1:

1. Where occupants pass through intervening rooms—OL is cumulative for spaces along egress path.
2. Where occupants on a mezzanine or story egress through an adjacent floor level—OL is cumulative for that story or other levels exiting through that story.
3. In areas without fixed seating—OL computed at the rate of one occupant per unit of area.
4. In areas with fixed seating—OL is based on seating capacity.

### Table 1004.1.2 (partial)

<table>
<thead>
<tr>
<th>Function of Space</th>
<th>Occupant Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory storage areas, mechanical equipment room</td>
<td>300 gross</td>
</tr>
<tr>
<td>Agricultural building</td>
<td>300 gross</td>
</tr>
<tr>
<td>Aircraft hangars</td>
<td>300 gross</td>
</tr>
<tr>
<td>Airport terminal</td>
<td></td>
</tr>
<tr>
<td>Baggage claim</td>
<td>20 gross</td>
</tr>
<tr>
<td>Baggage handling</td>
<td>300 gross</td>
</tr>
<tr>
<td>Concourse</td>
<td>100 gross</td>
</tr>
<tr>
<td>Waiting areas</td>
<td>15 gross</td>
</tr>
<tr>
<td>Assembly</td>
<td></td>
</tr>
<tr>
<td>Gaming floors (keno, slots, etc.)</td>
<td>11 gross</td>
</tr>
<tr>
<td>Theater and cinema</td>
<td>30 net</td>
</tr>
<tr>
<td>Assembly with fixed seats</td>
<td>See Section 1004.4</td>
</tr>
<tr>
<td>Assembly without fixed seats</td>
<td></td>
</tr>
<tr>
<td>Concentrated (chairs only-not fixed)</td>
<td>7 net</td>
</tr>
<tr>
<td>Standing space</td>
<td>5 net</td>
</tr>
<tr>
<td>Unconcentrated (tables and chairs)</td>
<td>15 net</td>
</tr>
<tr>
<td>Reading rooms, allow 3 persons for each lane including 15 feet of runway, and for additional areas</td>
<td>7 net</td>
</tr>
<tr>
<td>Business area</td>
<td>100 gross</td>
</tr>
<tr>
<td>Commercial areas other than fixed seating areas</td>
<td>40 net</td>
</tr>
<tr>
<td>Day care</td>
<td>10 net</td>
</tr>
<tr>
<td>Dormitories</td>
<td>50 gross</td>
</tr>
<tr>
<td>Educational</td>
<td></td>
</tr>
<tr>
<td>Classroom area</td>
<td>20 net</td>
</tr>
<tr>
<td>Shops and other vocational room areas</td>
<td>50 net</td>
</tr>
<tr>
<td>Essential rooms</td>
<td>80 gross</td>
</tr>
<tr>
<td>Group I-5 fabrication and manufacturing areas</td>
<td>200 gross</td>
</tr>
<tr>
<td>Industrial area</td>
<td>100 gross</td>
</tr>
<tr>
<td>Institutional areas</td>
<td></td>
</tr>
<tr>
<td>Inpatient treatment areas</td>
<td>240 gross</td>
</tr>
<tr>
<td>Outpatient areas</td>
<td>100 gross</td>
</tr>
<tr>
<td>Sleeping areas</td>
<td>120 gross</td>
</tr>
<tr>
<td>Emergency rooms</td>
<td>200 gross</td>
</tr>
</tbody>
</table>

Number by combination will determine the occupant load of main space.

30 + (10 + 10 + 5) = 55

55 is used for determining egress requirements.
### Design Occupant Load

**Section 1004.1.1**

Floor area of building = 7000 ft²
7 compressors @ 420 ft² = 2940 ft²

Occupant Load = 100 ft²/person
Using 7000 ft² = 70 occupants
Reduced to 41 occupants using 4060 ft²

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### Retail Sales/Mercantile

Occupant load = 1800 ÷ 30 = 60

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### Occupant Load Activity

**Determine the following occupant loads**

1. Occupant load for the 2,700 ft² accounting suite between column lines D and G on the 3rd floor.

   \[
   2,700 ÷ 100 = 27
   \]

2. Occupant load for the Auditorium on the 2nd floor.

   \[
   63 + 220 + 70 = 353
   \]

   Any consideration for:
   - stage/platform
   - wheelchair allocation

3. Occupant load for the cafeteria on the 1st floor.

   \[
   2,928 ÷ 15 = 196
   \]


   Conference Rm: \[
   450 ÷ 15 = 30
   \]

   Offices: \[
   1,350 ÷ 100 = 14
   \]

   Total: \[
   44
   \]
Occupant Load Activity
Determine the following occupant loads

5. Occupant load for Lab 3 in the basement.
   \[ \frac{2,960}{50} = 60 \]

6. Occupant load for the 3rd floor North Wing.
   \[ \frac{18,000}{100} = 180 \]

Increased Occupant Load
Section 1004.2

Minimum Required Egress Width
Stairways

- Minimum width 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 0.15" \( IF \)
    - Building is equipped with an emergency voice/alarm communication system \( and \)
    - Building is equipped with a fire sprinkler system (NFPA 13 or 13R)
Minimum Required Egress Width

**Stairways**
- Minimum width for egress stairways shall be determined based solely on the occupant load of the story served by the stairway.

**Other than stairways**
- Minimum width of all other egress components
  - Occupant load served multiplied by 0.2”
  - For other than Group H and I-2, the minimum width 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
Exiting From Multiple Levels – Egress Convergence

Mezzanine Levels
Section 1004.1.1.2

GIVEN:
- A nonsprinklered four-story office building with basement
- Occupant load exiting into stair enclosure at each level as indicated
- First-floor occupants exit to exterior without entering the stair enclosure

Outdoor Areas
Section 1004.8

Application Example
Section 1005.5
- Multiple means of egress shall be sized such that the loss of any one means of egress will not reduce the available capacity to less than 50% of the required capacity.
**Application Example**

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

Still have 64” available

**Application Example**

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

**Application Example**

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

**Assembly Exits**

At least 50% = >46”

At least 50% combined

Occupant load: 442 seats plus 18 employees = 460
Required exit width: 460 x 0.2 = 92 inches
**Required Egress Width Activity**

Calculate the required egress width

1. North wing of the 3rd floor: 180 \times 0.2 = 36"
   
   Is the required width provided? YES

2. North wing of the 2nd floor based on an occupant load of 1264: 1264 \times 0.2 = 252"
   
   Is the required width provided? NO

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**Minimum Number of Exits**

Section 1015.1

**TABLE 1015.1**

Spaces with One Exit or Exit Access Doorway

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>MAXIMUM OCCUPANT LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, E, F, M, U</td>
<td>49</td>
</tr>
<tr>
<td>H-1, H-2, H-3</td>
<td>3</td>
</tr>
<tr>
<td>H-4, H-5, I-1, I-2, I-3, 1-4, R</td>
<td>10</td>
</tr>
<tr>
<td>S</td>
<td>29</td>
</tr>
</tbody>
</table>
Minimum Number of Exits
Section 1015.1.1

- Every space shall have access to at least 1 exit
- 2 exits when occupant load is above the threshold in Table 1015.1
- 2 exits when the common path of travel is exceeded

Table 1015.1: only 1 exit <49

Allowable Common Path of Travel = 75'

Minimum Number of Exits
Section 1015.1.1

- Access to at least 3 exits when occupant load served is 501 to 1,000

Minimum Number of Exits
Section 1015.1.1

- Access to at least 4 exits when occupant load >1,000

Minimum Number of Exits
Section 1021

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

Occupant Load 501 to 1,000

Occupant Load >1,000

2 exits required

3 exits required

4 exits required

O.L. = 400

O.L. = 600

O.L. = 200

O.L. = 1100

O.L. = 350

O.L. = 400

O.L. = 600
Minimum Number of Exits
Section 1021

- No cumulative or contributing occupant load from adjacent levels needs to be considered

Table 1021.2(1)
Stories with One Exit or Access to One Exit for R-2 Occupancies

<table>
<thead>
<tr>
<th>Story</th>
<th>Occupancy</th>
<th>Maximum Number of Dwelling Units</th>
<th>Maximum Exit Access Travel Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement, 1st, 2nd or 3rd story</td>
<td>R-2,b</td>
<td>4 dwelling units</td>
<td>125 feet</td>
</tr>
<tr>
<td>4th story and above</td>
<td>NP</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

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 1029.

b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1021.2(2).

R-2 with One Exit

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

Table 1021.2(2)
Stories with One Exit or Access to One Exit for Other Occupancies

<table>
<thead>
<tr>
<th>Story</th>
<th>Occupancy</th>
<th>Maximum Occupants per Story</th>
<th>Maximum Exit Access Travel Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st story or basement</td>
<td>A, B, E, F, P, U, M, S</td>
<td>49 occupants</td>
<td>75 feet</td>
</tr>
<tr>
<td></td>
<td>H-2, H-3</td>
<td>3 occupants</td>
<td>25 feet</td>
</tr>
<tr>
<td></td>
<td>H-4, H-5, I, R-1, R-2, R-4, R-5</td>
<td>10 occupants</td>
<td>75 feet</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>29 occupants</td>
<td>100 feet</td>
</tr>
<tr>
<td>2nd story</td>
<td>B, F, M, S</td>
<td>29 occupants</td>
<td>75 feet</td>
</tr>
<tr>
<td>3rd story and above</td>
<td>NP</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

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 1029.

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 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 1021.2(1).
COMMON PATH OF EGRESS TRAVEL. That portion of exit access which the occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available. Paths that merge are common paths of travel. Common paths of egress travel shall be included within the permitted travel distance.

### Table 1014.3

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Without Sprinkler System (feet)</th>
<th>With Sprinkler System (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, S&lt;sup&gt;a&lt;/sup&gt;</td>
<td>100</td>
<td>100&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>U</td>
<td>75</td>
<td>75&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>F</td>
<td>75</td>
<td>75&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>H-1, H-2, H-3</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>R-2</td>
<td>75</td>
<td>125&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>R-3&lt;sup&gt;e&lt;/sup&gt;</td>
<td>75</td>
<td>125&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>I-3&lt;sup&gt;f&lt;/sup&gt;</td>
<td>100</td>
<td>100&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>All others&lt;sup&gt;c&lt;/sup&gt;</td>
<td>75</td>
<td>75&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

- **a.** Buildings equipped throughout with sprinkler system in accordance with Section 903.3.1.1.
- **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.** For a room or space used for assembly purposes having fixed seating, see Section 1028.8.
- **d.** The length of a common path of egress travel in a Group B-2 open parking garage shall not be more than 150 feet (45 720 mm).
- **e.** The length of a common path of egress travel in a Group R-3 occupancy located in a mixed occupancy building.
- **f.** For the distance limitations in Group I-2, see Section 407.4.

Building egress was evaluated based on Occupant Load:
- O.L. <49
- Nonsprinklered Group B
- Table 1015.1 requires 1 exit

2 exits required when the common path of travel is exceeded.
**Common Path of Travel**

Section 1014.3

- Solutions
  - Add 2nd exit
  - Install fire sprinklers
  - Revise egress path

**Number of Exits and Exit Access Doors Activity**

Calculate the number of exit access doorways or exits required in the following locations:

1. Conference room on 3rd Floor (OL = 68) between Column lines 3 and 4:
   - Are the required number provided? YES, but only if door to clerical office complies with means of egress provisions

2. Accounting office area (OL = 27) on the 3rd Floor:
   - Are the required number provided? YES

3. 2nd Floor lecture halls (OL = 189 each) across from elevator lobby:
   - Are the required number provided? NO

4. Cafeteria on 1st Floor (OL = 196):
   - Are the required number provided? YES

5. Evaluate the common path of travel for the Teaching Assistants’ office area on the 3rd Floor.

   - Measured from point 5A along most direct egress path to corridor intersection at point B/C and 3.4

   - Does it comply? YES. Actual travel is approximately 95'; 100' is permitted.
6. Evaluate the common path of travel for the Purchasing Suite on the 3rd Floor.

Measured from point D/E and 4.3 along most direct egress path to corridor intersection at point C6.2.

Does it comply?

NO. Actual travel is approximately 110'; 100' is permitted.

Exit or Exit Access Doorways Required

- 1015.2.1 – Two exit or exit access doors
- 1014.2 – Egress through intervening spaces
- 1016 – Exit access travel distance
- 1018.4 – Dead-end corridors
Exit or Exit Access Doorway Arrangement
Section 1015.2.1

1-HR fire-rated corridor

Exit separation measured along line of travel

Exit or Exit Access Doorway Arrangement
Section 1015.2.1, Exception 1

Exit or Exit Access Doorway Arrangement
Section 1015.2.1

Room A exits
Room B exits
Building exits

Exit separation measured along “shortest direct” line of travel
Exit or Exit Access Doorway Arrangement
Section 1015.2.1, Exc 2

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

Exit or Exit Access Doorway Arrangement
Section 1015.2.2

- When >3 means of egress are required, at least 2 of the exit doors or exit access doorways must meet the separation requirement

Egress Through Intervening Spaces
Section 1014.2

- Intervening rooms must be related to the area or room served
- Intervening room cannot be Group H
  
  Common Path of Egress Travel becomes limiting factor

Egress Through Intervening Spaces
Section 1014.2

- Third Floor office area
- Intervening rooms
**Egress Through Intervening Spaces**

**Section 1014.2**

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

The same hazard or lesser hazard occupancy group

- 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 from dwelling units or sleeping areas shall not lead through other sleeping areas or toilet rooms.

Dwelling unit or Sleeping area

- Cannot pass through storage areas.

**Exception:** Group M

- Only allowed in Group M if:
  - not locked
  - demarcation of egress path
  - maximum 50% of exits
**Exit Access Travel Distance**

Section 1016

- Measured from furthest point in room
- Measured to nearest exit
- Travel around temporary or movable fixtures should be considered

**Travel Distance Measurement**

- Measurement is to "closest" exit
- Choice of 2 directions of travel

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

Common path of travel = 70'
Travel Distance = 145'

**TABLE 1016.2**

**EXIT ACCESS TRAVEL DISTANCE**

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Without Sprinkler System (feet)</th>
<th>With Sprinkler System (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, E, F-1, M, R, S-1</td>
<td>200</td>
<td>250²</td>
</tr>
<tr>
<td>I-1</td>
<td>Not Permitted</td>
<td>250²</td>
</tr>
<tr>
<td>B</td>
<td>200</td>
<td>300²</td>
</tr>
<tr>
<td>F-2, S-2, U</td>
<td>300</td>
<td>400²</td>
</tr>
<tr>
<td>H-1</td>
<td>Not Permitted</td>
<td>75²</td>
</tr>
<tr>
<td>H-2</td>
<td>Not Permitted</td>
<td>100²</td>
</tr>
<tr>
<td>H-3</td>
<td>Not Permitted</td>
<td>150²</td>
</tr>
<tr>
<td>H-4</td>
<td>Not Permitted</td>
<td>175²</td>
</tr>
<tr>
<td>H-5</td>
<td>Not Permitted</td>
<td>200²</td>
</tr>
<tr>
<td>I-2, I-3, I-4</td>
<td>Not Permitted</td>
<td>200²</td>
</tr>
</tbody>
</table>
### Table 1016.2 Footnotes

- **a.** See the following for modifications to exit access travel distance requirements:
  - §402.8: For the distance limitation in malls.
  - §404.9: For the distance limitation through an atrium space.
  - §407.4: For the distance limitation in Group I-2.
  - §408.6.1 and §408.8.1: For the distance limitations in Group I-3.
  - §411.4: For the distance limitation in special amusement buildings.
  - §1015.4: For the distance limitation in refrigeration machinery rooms.
  - §1015.5: For the distance limitation in refrigerated rooms and spaces.
  - §1021.2: For buildings with one exit.
  - §1028.7: For increased limitation in assembly seating.
  - §1028.8: For increased limitation for assembly open-air seating.
  - §3103.4: For temporary structures.
  - §3104.9: For pedestrian walkways.

- **b.** Buildings equipped throughout with an automatic sprinkler system in accordance with §903.3.1.1 or §903.3.1.2. See §903 for occupancies where automatic sprinkler systems are permitted in accordance with §903.3.1.2.

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

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

- **Sprinklered building**
  - Maximum travel distance = 250 feet

- **Nonsprinklered building**
  - Maximum travel distance = 200 feet

### Travel Distance for: F-2, S-2 or U

- **Sprinklered building**
  - Maximum travel distance = 300 feet

- **Nonsprinklered building**
  - Maximum travel distance = 300 feet
Travel Distance for:
F-2, S-2 or U

Sprinklered building

Maximum travel distance = 400 feet

Exterior Egress Balcony Increase
Section 1016.2.1

Increased travel distance on exterior egress balcony – maximum 100'

Balcony open ≥50% on the exterior side

Travel distance allowed by IBC §1016.2

Interior wall and opening protection may be required

Travel Distance
Section 1016.3

Exception for Open Parking Garages

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

Dead-end Corridors
Section 1018.4

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
Dead-end Corridors
Section 1018.4, 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-end Corridors
Section 1018.4, Exception 3

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

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

Arrangement of Exits and Exit Access Doors Activity

1. Evaluate the egress through adjoining spaces for compliance. Identify locations where egress through adjoining spaces does not comply.

   - Lab 3 in Basement – egress path through the operable partition
   - 1020 ft² conference room on 3rd Floor – door into adjoining clerical office
   - Office at Column line B/1 on 3rd Floor is permitted to travel through the other rooms, but the common path of egress travel of 110’ exceeds the maximum of 100’
Arrangement of Exits and Exit Access Doors Activity

2. Evaluate the separation of exits or exit access doors:
   a. **2nd Floor** Auditorium – the longest diagonal is 77'
      YES. 50’ separation is provided
   b. **1st Floor** Cafeteria – the longest diagonal is 77'
      YES. 57’ separation is provided
   c. **1st Floor** Personnel Office – the longest diagonal is 68’
      Not Applicable
      2 means of egress are not required

3. Evaluate the exit access travel distance. What is the allowed exit access travel distance for:
   a. **Basement** Classroom at Column Line G/3
      COMPLIES
      300’ is allowed
   b. **2nd Floor** Auditorium
      COMPLIES
      200’ is allowed

4. Examine the Maintenance Office at Column Lines B/6 on the first-floor.
   Is there a noncomplying dead-end corridor?
   NO
   Only one means of egress is required.

5. Evaluate the corridors on the **3rd Floor**.
   Identify any dead-end corridors and determine if they comply.
   A dead-end condition occurs at column line C/3 at the entrance to corridor at Teaching Assistants area.
   It is >50’. It does not comply.

   A dead-end condition occurs at the north and south ends of the Accounting area.
   Only one means of egress is required, so dead-end limitations do not apply. It does comply.
Module 6: Doors and Door Hardware

Doors
Section 1008.1

- Egress doors must be really 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 ??
Doors  
Section 1008.1

- Doors installed for egress purposes in numbers greater than those required by the code must conform to all provisions of the IBC 1008.1.

Size of Doors  
Section 1008.1.1

- Exceptions to 32” clear width:
  - 41½” in Group I-2 occupancy areas for movement of beds
  - Non-egress doors in Groups R-2, R-3 or R-4
  - 28” in Group I-3 resident sleeping areas
  - Doors to storage closets less than 10 ft²
  - 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 accessible doors in Type B dwelling units
Doorway Obstructions
Section 1008.1.1.1

- Projections into the clear width can be 4" (102 mm) when >34" above floor

Minimum clear egress width is 32" (813 mm)

Door Swing
Section 1008.1.2

- Egress doors shall be side-hinged type
- Exceptions:
  - Private garages, office, factory and storage with an occupant load ≤10
  - Group I-3 occupancies
  - Within individual units of Groups R-2 and R-3
  - Complying revolving doors
  - Complying horizontal sliding doors
  - Power-operated doors
  - Critical or intensive care patient rooms in suites of health care facilities
  - Bathroom doors in a sleeping unit in Group R-1
  - Manually operated sliding doors permitted where an occupant load is ≤10

Door Swing
Section 1008.1.2

- Egress doors must swing in the direction of travel when serving
  - 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
**Door Opening Force**

Section 1008.1.3

- 15 lbs. maximum opening force to fully open position
- 30 lbs. maximum to set door in motion

**Floor Elevation**

Section 1008.1.5

- Interior floor or landing to be level
- Exterior landing maximum slope of 2%

**Section 1008.1.5**

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

**Landings at Doors**

Section 1008.1.6

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

- 36” min.
- 44” min.
Thresholds
Section 1008.1.7

1/4" maximum; 
3/4" maximum at sliding doors in dwelling units

Beveled when level change exceeds 1/4"

Door Arrangement
Section 1008.1.8

48" minimum
1220 mm

Key Locking Device
Section 1008.1.8.4

Key-locking device permitted (deadbolt)

NOTE: Sign letters ≥1" high on contrasting background

THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED
### Door Operations
**Section 1008.1.9.3**

- Key-locking hardware on the egress side only allowed on the main entrance.

### Locks and Latches
**Section 1008.1.9.3**

- Night latch
- Deadbolt
- Security Chain
- 48” maximum
- 34” minimum
- No height limit

### Bolt Locks
**Section 1008.1.9.4**

- Manual edge-mounted bolts, surface-mounted bolts, and 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 1008.1.10**

- 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 overcurrent devices, switching devices or control devices

---

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Panic and Fire Exit Hardware
Section 1008.1.10

Extend at least ½ of door width from latch side

Unlatching force 10 lb. max. (applied in direction of exit travel)

34” min.
44” max.

Panic and Fire Exit Hardware
Section 1008.1.10.2

Half door width maximum measured from latch side

Push-pad-type panic hardware

Delayed Egress Locks
Section 1008.1.9.7

Access-controlled Egress Doors
Section 1008.1.9.8

Access-controlled egress doors shall have the following components:

1. A sensor on the egress side
2. 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.”
3. Entrance doors in buildings with an occupancy in Group A, B, E or M shall not be secured from the egress side during periods that the building is open to the general public.
**Access-controlled Egress Doors**  
Section 1008.1.9.8

Access-controlled egress doors must UNLOCK when the following occurs:
1. A signal from the motion sensor
2. Loss of power to the motion sensor
3. Loss of power to the locking mechanism
4. Use of the manual unlocking device; doors shall remain unlocked for a minimum of 30 seconds
5. Activation of the building fire alarm system, if provided
6. Activation of the building automatic sprinkler or fire detection system, if provided

---

**Electromagnetic Locks**  
Section 1008.1.9.9

- Electromagnetically locked egress doors allowed in Groups A, B, E, 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
  - Not allowed on doors requiring panic hardware

---

**Special Locking in Group I-2**  
Section 1008.1.9.6

- 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

---

**Revolving Doors**  
Section 1008.1.4.1

- Door collapses to provide an aggregate 36° for egress paths
- RPM speed limited based on size
Table 1008.1.4.1
Revolving Door Speeds

<table>
<thead>
<tr>
<th>INSIDE DIAMETER (feet-inches)</th>
<th>POWER-DRIVEN-TYPE SPEED CONTROL (rpm)</th>
<th>MANUAL-TYPE SPEED CONTROL (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-6</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>7-0</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>7-6</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>8-0</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>8-6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9-0</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9-6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>10-0</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Power-operated Doors
Section 1008.1.4.2

- 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 doors—BHMA A156.19

Revolving Doors
Section 1008.1.4.1

Gates at Stadiums
Section 1008.2.1
Doors and Door Swing Activity

1. Identify any direction of door swing problems on the 2nd Floor.
   Lecture Rooms

2. Identify any direction of door swing problems on the 1st Floor.
   Lecture rooms
   Stair door @ grid line H/6
   Corridor door @ D/4
   OL north of column line D = 376
   376 requires minimum of 2 exits
   376 requires an egress width of 75.2"
   With loss of 1 exit must still provide ½ of the required egress width = 37.6"
   Revise cross corridor doors at column line D to provide additional needed width

3. Identify any direction of door swing problems in the Basement.
   Classroom/lab @ column line F4
   Janitor room @ column line C2
   Corridor exit @ column line C7

4. Evaluate the doors in the vestibule in on the Basement. There are two doors in series with each other when exiting from the corridor. Is there adequate clearance provided?
   Yes.
   However, there is a potential conflict at the interior exit stairway door.

Module 7: Corridors and Exit Passageways
Corridors vs Exit Passageways

<table>
<thead>
<tr>
<th>Feature</th>
<th>Corridor</th>
<th>Exit Passageway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component of egress</td>
<td>Exit access</td>
<td>Exit</td>
</tr>
<tr>
<td>One direction of travel</td>
<td>Possibly (limitations based on length and number of persons served)</td>
<td>Yes (single directional travel typically permitted)</td>
</tr>
<tr>
<td>Fire-resistance rated construction</td>
<td>Possibly (constructed as fire partition)</td>
<td>Yes (constructed as fire barrier)</td>
</tr>
<tr>
<td>Provides access to storage areas, mechanical rooms, etc.</td>
<td>Yes</td>
<td>No (except in covered mall buildings)</td>
</tr>
</tbody>
</table>

Table 1018.2
Minimum Corridor Width

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>WIDTH (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any facilities not listed below</td>
<td>44”</td>
</tr>
<tr>
<td>Access to and utilization of mechanical, plumbing or electrical systems or equipment</td>
<td>24”</td>
</tr>
<tr>
<td>With a required occupancy capacity less than 50</td>
<td>36”</td>
</tr>
<tr>
<td>In Group E with a corridor having a required capacity of 100 or more</td>
<td>72”</td>
</tr>
<tr>
<td>In corridors and areas serving gurney traffic in occupancies where patients receive outpatient medical care, which causes the patient to be incapable of self-preservation</td>
<td>72”</td>
</tr>
<tr>
<td>Group I-2 in areas where required for bed movement</td>
<td>96”</td>
</tr>
</tbody>
</table>

Corridor and Exit Passageway Widths
Section 1018.2

- 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 Group R-2 and dwelling units of Group R-3.
Obstructions in Egress Width
Section 1005.7

Does not apply to dwelling units and sleeping units

Obstructions in Egress Width
Section 1005.7

Does not apply to dwelling units and sleeping units

Corridor Widths Activity

Corridor A = \left(\frac{(6 \times 45) + (12 \times 45)/2 \times 2}{2}\right) = \frac{126}{2} = 63''

Corridor B = \left(\frac{12 \times 45 \times 0.2}{2}\right) = \frac{108}{2} = 54''

Table 1018.1
CORRIDOR FIRE-RESISTANCE RATING

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>OCCUPANT LOAD SERVED BY CORRIDOR</th>
<th>REQUIRED FIRE-RESISTANCE RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without sprinkler system</td>
<td>With sprinkler systems</td>
</tr>
<tr>
<td>H-1, H-2, H-3</td>
<td>All</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>H-4, H-5</td>
<td>&gt;30</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>A, B, E, F, M, S, U</td>
<td>&gt;30</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>&gt;10</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>I-2a, I-4</td>
<td>All</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>I-1, I-3</td>
<td>All</td>
<td>Not Permitted</td>
</tr>
</tbody>
</table>
Corridor Continuity
Section 1018.6

1-HR fire-resistance-rated corridor

Walls must be 1-HR fire-resistance-rated

Doors must be 20-minute fire-resistance-rated

Exit Passageways
Section 1023.1

No door openings other than doorways from normally occupied spaces

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

Group I-2 Corridors
Section 407.2, 407.3

Corridor walls constructed as smoke partitions

Smoke barrier per 407.3

Specific requirements are open to corridor

"Door closers not required"
Corridors and Exit Passageways Activity

1. Determine the required fire-resistance rating for the following walls:
   A. Corridor wall A on the 3rd Floor
      0-HR; Section 1018.1, Exc 4
   B. Corridor wall B on the 3rd Floor
      0-HR; Section 1018.1, Exc 4
   C. Exit Passageway wall E on the 1st Floor
      2-HR, Sections 1022.2, 1023.3

2. Assume the building is not sprinklered.
   Determine the required fire-resistance rating for the following walls:
   A. Corridor wall D on the 1st Floor
      1 hour, Table 1018.1
   B. North and south walls in the Lobby on the 1st Floor
      1 hour, Section 1018.6, Exception and Table 1018.1

3. Determine the minimum required width for the following corridors:
   A. Corridor in the teaching assistants’ area on the 3rd Floor
      36”; OL <50
   B. Corridor in the Basement at Column Line C
      44”; OL >50

4. Regarding the west exit from the Auditorium on the 2nd Floor:
   A. Does the exit access door open into a corridor or an exit passageway? Corridor; exit passageway is not required
   B. Minimum required width?
      44"
      \[ \text{OL} = \frac{373}{3} = 128 \]
      \[ 128 \times 0.2 = 19.8" \]
      \[ 44" \text{ minimum} \]
   C. What is the maximum allowable length?
      20’
Module 8: 
**Stairways, Ramps and Elevators**

**Ceiling Height**
Section 1003.2

**Horizontal Projections**
Section 1003.3.3

- No projections >4" over any walking surface between the heights of 27" and 80"
- Handrails can project 4½"

**Elevation Change**
Section 1003.5

Change required to be made by a 'sloped surface'. Ramp complying with Section 1010 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, Exc 1

- Exterior door which is not required to be accessible
- Single step with max. 7” riser

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

Stairways
Section 1009

- **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.

Elevation Change
Section 1003.5

- Handrail within 30” of centerline of egress path
- 13” min.

Stairways
Section 1009

- All stairways that serve occupied portions of a building must comply with stairway provisions in Section 1009
- This applies to stairs that are required for egress and to interior exit access stairways, or “convenience” stairways
### Stairway Width
**Section 1009.1**
- Objects can project in stairway width
- Projections are regulated by Section 1003.3

### Headroom
**Section 1009.2**
- Headroom regulated until line intercepts leading (one tread depth beyond before line)
- Measured vertically
- timber or other construction

### Stair Treads and Risers
**Section 1009.7**
- Maximum construction
- 3/8" for tread run
- 3/8" for riser height
- One tread depth extension
- 4" min. rise
- 7" max. rise
- 34"-38"

### Stair Treads and Risers
**Section 1009.7.2**
- Handrails – Section 1012
- 4" minimum run
- 7% maximum rise
- 4" minimum over
- 7% maximum rise
- Section 1009.7.2, Exception 5
- R-3: and Group U accessory to R-3: Within dwelling units R-2
- For SI: 1 inch = 2.54 mm
**Nosing Profile**
Section 1009.7.5

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

**Stair Treads and Risers**
Section 1009.7.4

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

**Stairway Landings**
Section 1009.8

X = the required clear width of the exit stairs

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

**Section 1009.8**

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

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

---

**Stairway Landings**

**Section 1009.8**

- X = the required width of the stairway

7" max.

---

**Stairway Landings**

**Section 1009.8**

- Section 1008.1.6 – when the door serves ≥50, the door cannot obstruct the landing more than ½ the required width of the landing.

---

**Stairway Walking Surface**

**Section 1009.9.1**

- Treads and landings slope no more than 2% in any direction

12

1/4

---

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Stairway Construction
Section 1009.9.3

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

Vertical Rise
Section 1009.10

Maximum rise of 12' between floor levels or landings.
Exceptions:
1. Aisle stairs
2. Maximum rise of 20 in alternating tread devices
3. Spiral stairways for technical production areas

Curved Stairways
Section 1009.11

Walking Line = 12" from inside curve

Width requirement per Section 1005.1

Winder Treads
Section 1009.7.3

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

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

For SI: 1 inch = 25.4 mm.
Spiral Stairway
Section 1009.12

- Spiral stairways can be used as a part of the means of egress if:
  - Located within a dwelling unit
  - Used from a space ≤250 ft² with ≤5 occupants
  - Used for egress from technical production areas

Alternating Tread Device
Section 1009.13

- Allowed for in egress in:
  - Groups F, H and S
    - Mezzanine ≤250 ft² with ≤5 occupants
  - Group I-3
    - Observation towers and control rooms in ≤ 250 ft²
    - Unoccupied roofs

Ship Ladder
Section 1009.14

- Allowed for in egress in:
  - Group I-3
    - Observation towers and control rooms in ≤250 ft² with ≤3 occupants
  - Unoccupied roofs

Handrails
Section 1009.15
**Handrail Height**
Section 1012.2

- Top of handrail extension
- Landing
- Measured to top of handrail
- Handrails are to be continuous the full length of the stair

**Intermediate Handrails**
Section 1012.9

- Stair width beyond 30 inches from handrail does not count handrail required capacity.

**Handrail Graspability – Type I**
Section 1012.3

- Proportions beyond sides not required
- Hands placed on centerline
- Handrail with circular cross-section, 1-1/2" min., 2" max.

**Handrail Graspability – Type II**
Section 1012.3

- Perimeter greater than 5/8"
- Tallest portion
- Finger recess area both sides
- Edges minimum radial 0.07"
Handrail Extensions
Section 1012.6

Handrail

'x''

34'' to 39''

12'' Min.

34'' to 38''

* Extension "x" continues to slope for the depth of one tread beyond bottom riser

Handrails Extensions
Section 1012.6

Return to wall or guard

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

Floor Identification Signs
Section 1022.9

Exit Discharge at 1st Floor
North Stair
No Roof Access

5
Access to Floors 1 through 10

Exit discharge
Direction of stair identification
Roof access?
Floor level
Upper terminus
Lower terminus

Floor Landing

5 feet above floor

Acceptable
Not permitted

Extend handrail in direction of stair run
High-rise Buildings
Section 403.5.2

- Additional exit stairway for high-rise buildings >420', other than Group R-2
- Required egress width must be provided with 1 stairway removed
- Not required in buildings provided with occupant evacuation elevators

Ramp Slope
Section 1010.3

- Ramp slope: 1:12 max. (8.3% slope)
- Ramp used as part of a means of egress

Width of Ramps
Section 1010.5.1

- Minimum ramp width:
  - Generally not less than required for corridors
  - 6" if occupant load ≤ 50
  - 12" if occupant load > 50

Ceiling Height on Ramps
Section 1010.6.2

- 12" min. height
- 68" min. headroom
Landings
Section 1010.7

Handrails
Section 1010.9

Landings at Doorways
Section 1010.7.5

Edge Protection
Section 1010.10 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.
  - In assembly spaces with fixed seating where ramps provide access to adjacent seating.
**Edge Protection Not Required**  
*Section 1010.10, Exception 1*

1:10 Max. slope  
Ramp  
Flared sides

**Curb on Ramp**  
*Section 1010.10.1*

*Minimum 4” high*

**Barrier or Rail on Ramp**  
*Section 1010.10.1*

*Barrier*  
<4”
**Extended Floor or Ground**  
*Section 1010.10.2*

No barrier required when 12" minimum.

**Stairway Enclosures Required**  
*Section 1009.2.2*

- All interior exit stairways shall be enclosed.

**NOTE:** this applies to "interior exit stairways", not "interior exit access stairways”.

**Stairway Enclosure Construction**  
*Section 1022.2*

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

Doors:
- Self-closing or automatic closing
  - 1-HR rating in 1-HR construction
  - 1½-HR rating in 2-HR construction
Exit Access Stairways
Section 1009.3

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

Exceptions to Stair Enclosures
Section 1009.3, Exception 3

- 18” deep draft curtain or soffit
- Fire sprinklers spaced maximum 6’ apart
- In Group B or M: unlimited number of floors

Exceptions to Stair Enclosures
Section 1009.3, Exception 4

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

Interior Exit Stairway Continuity
Section 1009.2

- 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 Continuity  
Section 1009.2

- ½ of the number and capacity of interior exit stairways can egress through the level of exit discharge, if
  - Free and unobstructed path of travel
  - Readily visible and identifiable exit
  - Level of exit discharge is separated from areas below by construction conforming to the fire-resistance rating for the enclosure
  - Level of exit discharge is sprinklered
  - Other portions of the level of exit discharge with access to the egress path shall either be sprinklered, or separated by fire barriers equivalent to the exit stairway enclosure

Vertical Enclosure Exterior Walls  
Section 1022.7

- If enclosure wall is not protected, protection of opening portion required
- Min. 1 hour construction for 9 ft.
- 3/4 hour opening protection
- No additional protection if wall 180° from enclosure wall

Discharge Identification  
Section 1022.8

- Directional sign per IBC 1011
- Exterior stairway
- Yard, court or public way

Exterior Exit Stairways  
Section 1026

- Maximum 6 stories in height
- Not allowed in high-rise
- Not allowed in Group I-2
Exterior Exit Stairways and Ramps
Section 1026.3

- Min. 38 sq. ft. opening
- No credit for area < 42 in height
- 42 min. guard
- Floor or landing

Exterior Stairway Opening
Section 1026.3

- >35 ft² open to exterior
- At each floor level and each landing
- Can be blocked by guards, handrails

Exterior Exit Stairways and Ramps
Section 1026

- Property line or adjacent building
- 10 ft. min.
- Open on one side min. 35 sq. ft.
- Exterior stairway
- Building interior

Exterior Ramp and Stairway Protection
Section 1026.6

- 10' minimum
- 1-hour construction with ¾-hour opening protectives
**Exterior Ramp and Stairway Protection**  
Section 1026.6, Exc 1, 2 and 3

- Protect to roof height or 10' min.
- 2nd story
- 1st story
- Story above grade
- Basement

**Open-ended Corridors**  
Section 1026.6 Exc 4

- Clear opening. Min. 35 sq. ft. or exterior stairway required
- Exterior exit stairway
- Sprinklered throughout
- Separation not required

**Open-ended Corridor**  
Section 1026.6 Exception 4

**Stairways Activity**

1. What is the required fire-resistance-rating for the wall G on the 1st Floor at Column Line 7?
   - 1-HR minimum for portion of wall within 10’ of stairway enclosure

2. What is the required fire-resistance-rating for the wall I on the 1st Floor near the Kitchen?
   - 2-HR  
   - Section 1022.2
Stairways Activity

3. With regard to the vestibule on the **Basement** Level at Column Line C:
   A. What is the fire-resistance-rating for the west wall?
      A wall constructed equivalent or better than wired glass in steel frames.
      Section 1027.1, Exc 2.3
   B. What is the fire-resistance-rating for doors in the east wall?
      No rating is required

4. Are there any concerns with the stairway on the **1st Floor** at Column Line H?
   • The enclosure does not extend to an exit or exit discharge
   • Door swing at the 1st floor should be from the stairway into the corridor
   • Since this stairway continues to the basement, a barrier must be provided to direct egress flow out at the 1st floor

Occupant Evacuation Elevators

Section 3008

- Smoke barrier & Fire barrier = 1-HR
- Class I Standpipe
- Elevator monitored at Fire Command Center
- Standby power
  - Elevator
  - Machine room & HVAC
- Wiring for normal and standby power provided with 1-HR protection
- 3 sq.ft./person of
  - 25% of floor occupant load plus
  - 1 wheelchair space/50 occupants
  - 1 wheelchair space/50 occupants
- Fire doors = ¾-HR

Elevators can be utilized for occupant evacuation from this floor.
Elevators Activity

1. What is the required fire-resistance-rating for the elevator shafts?
   - 2-HR
   - Section 713.4

2. Can the elevators be utilized as a component of the required means of egress?
   - NO, except as an accessible means of egress
   - Section 1003.7

Lighting and Signs

- Exit Signs
- Internally Illuminated Exit Signs
- Power Source
- Stairway Floor Number Signs
- Egress Illumination
- Illumination Emergency Power

Is an exit sign required here?

100' or the listed viewing distance for the exit sign. Exit signs also required within exits.
Exit Signs
Section 1011.1, Exceptions

Exit signs not required in:
1. Rooms or areas with 1 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
Section 1011.2

Tactile Exit Signs
Section 1011.3

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

Exit Signs
Section 1011.6.1

Plainly legible letters

6" 2"

7/8" min.
Illumination of Exit Signs
Sections 1011.5, 1011.6

- Exit signs shall be lighted at all times
- Lighting by one of the following methods:
  - Internally illuminated (IBC Section 1011.5)
  - Externally illuminated (IBC Section 1011.6)
  - Of an approved self-luminous type
- Tactile signs do not require illumination.

Self-luminous or Photoluminescent
Section 1011.4

- Listed to UL 924

Power Source
Section 1011.6.3

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

Means of Egress Illumination
Section 1006.1

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

*Section 1006.3*

- Normal egress illumination by premises’ electrical supply
- Automatic illumination in event of failure of premises’ electrical supply
  - Storage batteries
  - On-site generator
  - Unit equipment

**Luminous Egress Path Markings**

*Section 1024*

- High-rise Group A, B, E, I, 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

**Exit Signs Activity**

1. Where are exit signs required in the Basement?

2. How many exit signs are needed inside the exit passageway on the First Floor?
Exit Signs Activity

3. Are exit signs required at Column Line G on the Second Floor? Yes

4. Where are exit signs required in the Conference Room and Clerical Office on the Third Floor at Column Line L?

Horizontal Exits

Module 10:

Horizontal Exits

Section 1025.1

Horizontal exit cannot be the only exit

Maximum of ½ or required exits or required egress width

In Group I-2, maximum of 2/3 of required exits or required egress width
**Horizontal Exit**

Section 1025.1

- Area E: Three exits required
- Area D: One exit required
- Area C: Two exits required

Minimum two-hour fire resistant wall

**Separation**

Section 1025.2

- When constructed as fire barrier, wall is continuous from exterior wall to exterior wall and extends from floor to underside of floor or roof above
- Horizontal exit
- Refuge area properly sized (original load plus anticipated)
- Where floor assemblies have a 2-hour rating with no unprotected openings, wall is not required to extend through all levels

**Capacity of Refuge Area**

Section 1025.4

- 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 Exit**

Section 1025.1

- 300 occupants
- 150
- 150
Meeting Travel Distance Limits with Horizontal Exits

* Travel distance exceeds maximum allowed

<200' (okay)

>200' (okay)

Horizontal exit

In regard to the horizontal exit at the Column Line G on the Third Floor:

1. What is the minimum fire-resistance-rating of this wall? 2-HR

Section 1025.2

2. What is the occupant load served by this horizontal exit from the South Wing?

Stairway door at Column Line H
Stairway door at Column Line K
Stairway door from Clerical Office
OL for South Wing = 273

Stairway door from Clerical Office serves the Clerical Office plus ½ of Conference Room = 50

273 – 50 = 223 occupants for the remaining 3 exits

223 ÷ 3 = 75 occupants per exit

75 x 0.2 = 15" of clear exit width required

Horizontal exit serves 75 occupants

In regard to the horizontal exit from the North Wing:

3 exits available

Stairway door at Column Line 7
Stairway door at Column Line 1.2
Horizontal exit at Column Line G

OL for North Wing = 180

180 ÷ 3 = 60 occupants per exit

60 x 0.2 = 12" of clear exit width required

Horizontal exit serves 60 occupants
**Horizontal Exits Activity**

4. Does the South Wing provide enough area to accommodate the refuge area?
   - Yes
   - 75 occupants x 3 ft² per person = 225 ft²

5. Does the North Wing provide enough area to accommodate the refuge area?
   - Yes
   - 60 occupants x 3 ft² per person = 180 ft²

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**Egress from Group A Occupancies Section 1028**

- Main exit >50% of required exit width
- Street
- Main exit fronts on public way
- Remaining exits >50% of required exit width

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**Assembly Seating**

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**Assembly Exits Activity**

**Given:**
- OL = 1,100 persons
- Exterior exit door from the stage is not accessible by the audience
- All exit doors provide 32" clear width
Assembly Exits Activity

1. How many exits are required?
   4
   Section 1021.2.4

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 1015.2.1

Assembly Exits Activity

3. What is the minimum required width of the main exit?
   110"
   Section 1028.2

4. What is the egress width provided at the main exit?
   128"

5. What is the minimum required width of the remaining exits?
   110"
   Section 1028.2

6. What is the egress width provided at the remaining exits?
   128"

7. What is the total egress width provided?
   256"

Smoke-protected Assembly Seating
Section 1028.6.2

- Lowest portion of roof
- 6' min.
- 15' min.
- Highest aisle or aisle accessway
Smoke-protected Assembly Seating
Section 1028.7

- Exit access travel distance

Comparator: Indoor vs Outdoor Smoke-protected Assembly Seating

Table 1028.6.2
Width of Means of Egress for Smoke-protected Assembly Seating

Travel Distance
Section 1028.7

- Allowed ravel distance for assembly spaces without smoke protection are consistent with other occupancies
Common Path of Egress Travel  
Section 1028.8  

- 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  
Section 1027.1  

Exits shall discharge directly to the exterior of the building.
Exit Discharge  
Section 1027.1 Exc 2

Module 13: 
Accessible Means of Egress

Accessible Means of Egress  
Section 1007

- Accessible routes – Section 1104
- Interior exit stairways – Sections 1007.3 and 1022
- Interior exit access stairways – Sections 1007.3 and 1009.3
- Exterior exit stairways – Sections 1007.3 and 1026
- Elevators – Section 1007.4
- Platform lifts – Section 1007.5
- Horizontal exits – Section 1025
- Ramps – Section 1010
- Areas of refuge – Section 1007.6
- Exterior area for assisted rescue – Section 1007.7

Exit Discharge  
Section 1027.1 Exc 2

Public Way

Security Fence

Safe Dispersal Area

>5 ft² per occupant

50’ minimum

Building

Accessible Means of Egress

Section 1007
Scoping Requirements for Accessible Means of Egress

- In spaces required to be accessible
  - 1 accessible means of egress is required when only 1 means of egress is required
  - 2 accessible means of egress are required if two or more means of egress are required
- In buildings >4 stories:
  - Minimum of 1 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 1008.1

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

Elevators
Section 1007.4

- In building with five 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
Enclosed Stairways

- Enclosed exit stairways — IBC Section 1007.3
- Identification — IBC Section 1007.9
- Stairway landings — IBC Section 1009.5
- Exit enclosure exterior walls — IBC Section 1022.6
- Other signs — IBC Section 1110.3

Exit Discharge
Section 1007.1

Requirements for Areas of Refuge

- Stairways — IBC Section 1007.3
- Elevators — IBC Section 1007.4
- Areas of refuge — IBC Section 1007.6
- Separation (areas of refuge) — IBC Section 1007.6.2
- Horizontal exits — IBC Section 1025

Technical Requirements for Areas of Refuge

- Fire Department Communication System—Section 907.2.13.2
- Areas of refuge—Section 1007.6
- Size—Section 1007.6.1
- Two-way communication—Section 1007.6.3
- Two-way Communication—Section 1007.8
Area of Refuge – Stairways
Section 1007.3

Maintain minimum clear egress width
Sections 1005.1 & 1018.2

Provide Signs
Sections 1007.9 & 1011.4

30” x 48” Wheelchair space
Section 1007.6.1

Signs, Instructions and two-way communication
Sections 1007.8, 1007.10 & 1007.11

Travel Distances
Section 1007.6

Area of Refuge – Sign
Section 1007.9

Provide signs and instructions
Section 1007.9 & 1007.11

30” x 48” Wheelchair space
Section 1007.6.1

Exterior Area for Assisted Rescue
Section 1007.7

Maneuvering clearance
ICC A117.1

Provide signs and instructions
Section 1007.9 & 1007.11

1-HR fire-resistant construction

Accessibility of Means of Egress (ICC A117.1)
Accessible Means of Egress Activity

1. Small nonsprinklered mercantile business with a main entrance and a service entrance/2nd exit in the rear.
   A. How many entrances are required to be accessible?
      1– only the main entrance must be an accessible entrance.
      Section 1105.1
   B. If the occupant load is less than 50, how many exits are required to be accessible?
      1
      Section 1007.1

Accessible Means of Egress Activity

2. Large one-story, unlimited-area building, with one main entrance and four required exits provided around the perimeter of the store.
   A. How many entrances would be required to be accessible?
      1– only the main entrance is the only public entrance.
      Section 1105.1
   B. How many exits are required to be accessible?
      2
      Section 1007.1

Accessible Means of Egress Activity

C. If the occupant load is 50 or more, how many exits are required to be accessible?
   2
   Section 1007.1

D. If there are steps out the back door, so that exit discharge is not possible, what are the design options?
   Area of refuge
   Exterior area of assisted rescue
   Section 1007.2

Accessible Means of Egress Activity

C. Which exits would they have to be? What about travel distances?
   No distance separation required

D. If they built a storage area in the back that included an employee entrance and employee break room (50 or more occupants), how would that affect entrance and means of egress requirements?
   Both means of egress would be required to be accessible
   means of egress per Section 1007.1. The employee entrance would be required to be an accessible entrance per Section 1105.1.3 as a restricted entrance.
Questions?

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