Connecticut
State Building and Fire Codes

Means of Egress
Fire and Building Codes

March 15 2011

Presented by

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Design & Trades Conference Office of Education and Data Management

Agenda

Means Of Egress
- Definitions
- Occupant Load
- Egress Convergence
- Egress Width
- Doors
- Stairs
- Exit Signs
- Exit
- Exit Access
- Exit Discharge
- Means of Egress From an Assembly Occupancy

Importance Means of Egress

Why is it important to have clearly defined means of egress from a building or structure?

- Fire Emergency
- Weather Event
- Structural Instability
- Terrorists Threat
- Other

Definition

- ***Means of Egress***. *A continuous and unobstructed path of vertical and horizontal egress travel from any occupied point of a building or structure to a public way. A means of egress consists of three separate and distinct parts (1)* ***the exit access****, (2)* ***the exit****, and (3)* ***the exit discharge****.*

  Code Reference:
  - *International Building Code Portion of Connecticut State Building Code (CSBC IBC): Section 1002*
  - *Connecticut Fire Safety Code (CFSC): Part IV-3.3.136*

Definition

- ***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.*

  Code Reference:
  - *International Building Code Portion of Connecticut State Building Code: Section 1002*
  - *Connecticut Fire Safety Code: Part IV-3.3.175*

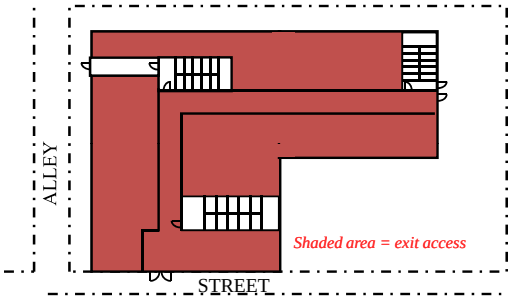
Parts of the Means of Egress

Exit Access –

- ***CFSC Part IV-3.3.63*** *-The portion of the means of egress that leads to an exit.*
- ***SBC IBC Section 1002*** *- That portion of a means of egress system that leads from any occupied portion of a building or structure to an exit.*

Exit Access

Exit Access

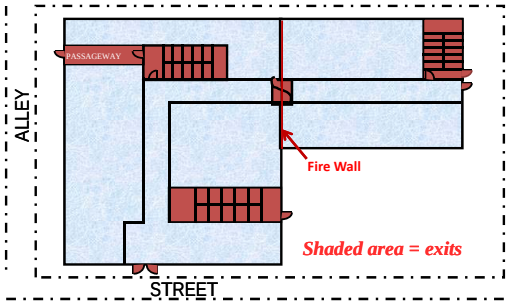


Parts of the Means of Egress

Exit –

- ***CSBC IBC Section 1002 -*** *That portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives as required to provide a protected path of egress travel between the exit access and the exit discharge. Exits include exterior exit doors at ground level, exit enclosures, exit passageways, exterior exit stairs, exterior exit ramps and horizontal exits.*
- ***CFSC Part IV-3.3.62*** *- The portion of the means of egress that is separated from all other spaces of a building or structure by construction or equipment as required to provide a protected way travel to the exit discharge.*

Exit

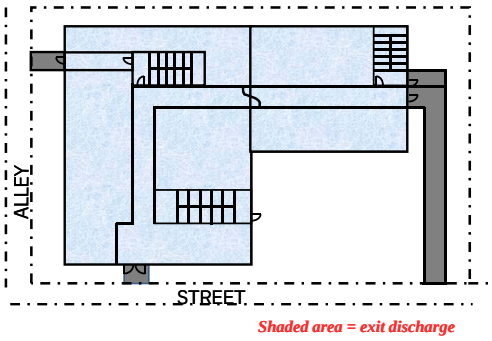


Parts of the Means of Egress

Exit Discharge –

- *CSFC Part IV-3.3.64 - The portion of the means of egress between the termination of the exit and the public way.*
- *SBC IBC Section 1002 - That portion of a means of egress system between the termination of an exit and a public way.*

Exit Discharge



Definition - Floor Area

Floor Area, - Gross

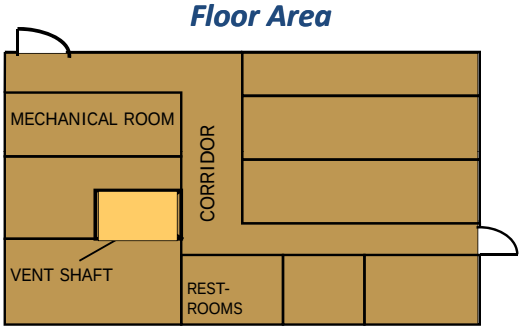
The floor area within the inside perimeter of the exterior walls of the building under consideration, exclusive of vent shafts and courts, without deduction for corridors, stairways, closets the thickness of interior walls, columns or other features. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above. The gross floor area shall not include shafts with no openings or interior courts.

Floor Area, - Net

The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

Definition - Section 1002

Floor Area

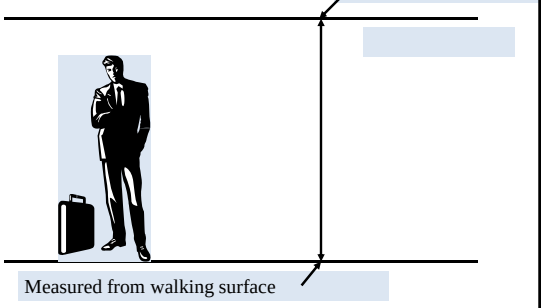


2009 Amendments

- 1003.2 Ceiling Height (as amended)
  - **The means of egress shall have a ceiling height of not less than 7 feet 6 inches**
  - **Exceptions**
    - **1. Sloped ceilings in accordance with Section 1208.2**
    - **2. Ceilings of dwelling units and sleeping units within residential occupancies in accordance with Section 1208.2**
    - **3. Allowable projections in accordance with Section 1003.3**
    - **4. Stair headroom in accordance with Section 1009.2**
    - **5. Door height in accordance with Section**

Ceiling Height

Section 1003.2

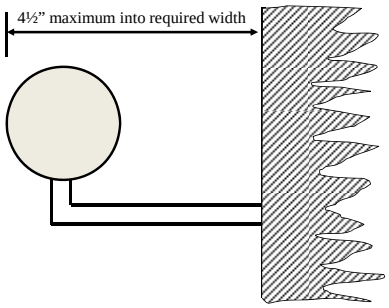


2009 Amendments

- **1003.3.2 Free-Standing Objects**
  - A free-standing object mounted on a post or pylon shall not overhang that post or pylon more than 4 inches where the lowest point of the leading edge is more than 27 inches and less than 80 inches above the walking surface. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches, the lowest edge of such sign or obstruction shall be 27 inches maximum or 80 inches minimum above the finish floor or ground

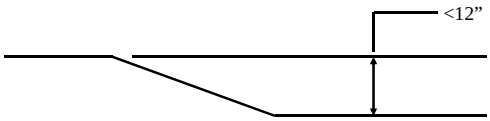
Horizontal Projections

Section 1003.3.3



Elevation Change

Section 1003.5



Change required to be made by “sloped surface,” including:

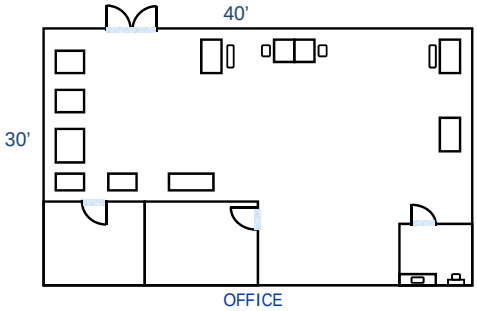
- Ramp complying with Section 1010.1 if slope >1:20 (5 percent)

2009 Amendments

- 1003.8 Security Device (added)
  - Any security device or system that emits any medium that could obscure a means of egress in any building, structure or premises shall be prohibited
- 1003.9 Mirrors (added)
  - Mirrors shall not be placed on exit doors. Mirrors shall not be placed in or adjacent to any exit in such a manner as to confuse the direction of egress travel

Design Occupant Load

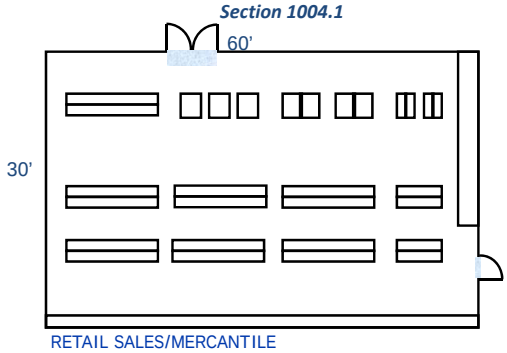
Section 1004.1



Minimum occupant load = 1200 ÷ 100 = 12

Design Occupant Load

Section 1004.1



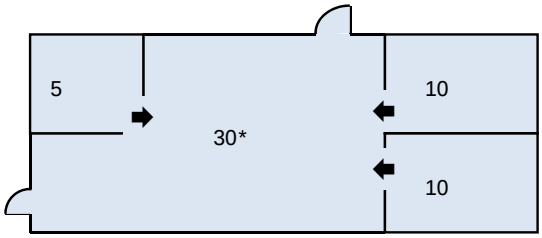
Minimum occupant load = 1800 ÷ 30 = 60

2009 Amendments

- **1004.1.2 Number by Table 1004.1.2 (as amended)**
  - The number of occupants computed at a rate of one occupant per unit of area as prescribed in Table 1004.1.2
  - **Exception**
    - Day care occupancies shall be calculated at a rate of one occupant per 35 square feet of net area

Number by Combination

Section 1004.1.3



**Number by combination will establish the occupant of this space as 30 + (10 + 10 + 5) = 55 for determining egress requirements*

Increased Occupant Load

Section 1004.2

3'0" x 6'8" door providing 32" of clear width (typical)

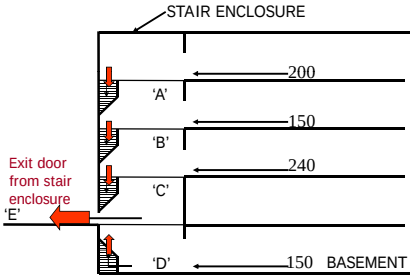
44" stairway with 37" clear width between handrails (typical)

Exiting From Multiple Levels

Section 1004.4

Egress Convergence

Section 1004.5



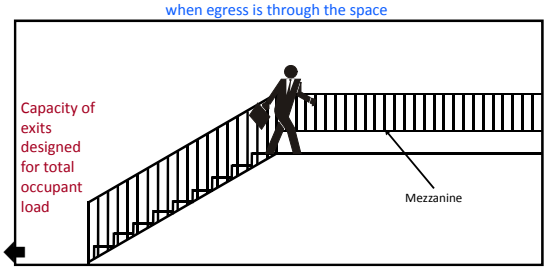
GIVEN:

- 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

Mezzanine Levels

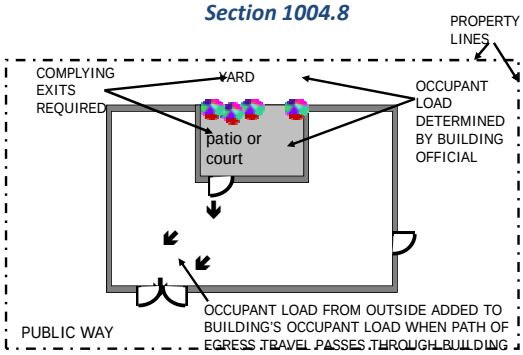
Section 1004.6

Occupant load of mezzanine added to room below when egress is through the space



Outdoor Areas

Section 1004.8



2009 Amendments

- **1005.1 Minimum Required Egress Width (as amended)**
  - The means of egress width shall not be less than required by this section. The total width of means of egress in inches shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1005.1 and not less than specified elsewhere in this code. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress
  - **Exception**
    - Means of egress complying with Section 1024

2009 Amendments

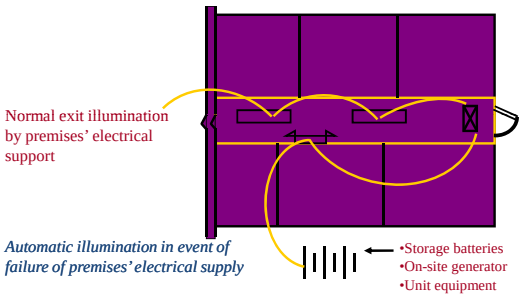
- **1005.1.1 Balanced Egress Capacity**
  - Delete section in its entirety and replace with
- **1005.1.1 Multiple Means Of Egress (add)**
  - Multiple means of egress in buildings requiring more than one exit and in rooms or spaces requiring more than one means of egress shall be sized so that the loss of any one means of egress shall not reduce the required capacity of the remaining means of egress to a fraction less than that determined as:

Formula & Meaning

- **R-1/R = C**
  - **Where**
    - **R** = the number of required means of egress from a room, space or story as determined by Section 1014 or 1018
    - **C** = the minimum fraction of required egress capacity remaining after the loss of any one means of egress

Illumination Emergency Power

Section 1006.3

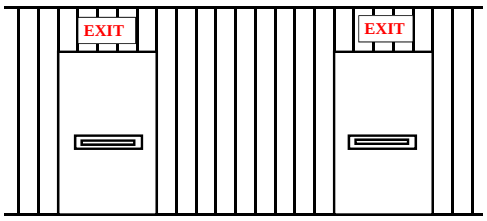


2009 Amendments

- **1006.3.1 When Required (added)**
  - The emergency means of egress illumination system shall be arranged to provide the required illumination automatically in the event of any interruption of normal lighting due to any of the following:
    - 1. Failure of a public utility or other outside electrical power supply
    - 2. Opening of a circuit breaker or fuse
    - 3. Manual acts including accidental opening of a switch controlling normal lighting facilities

Doors

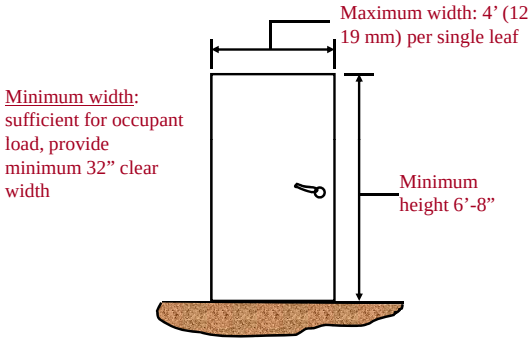
Section 1008.1



•Where additional doors are installed for egress purposes, they shall conform to all provisions of Section 1008.1.

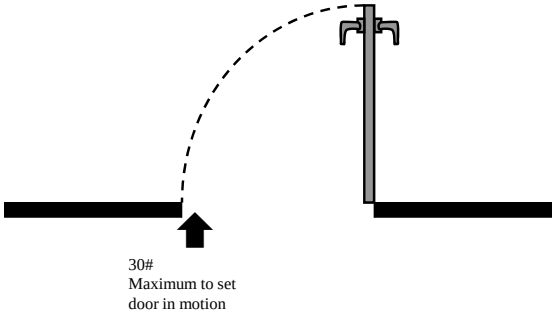
Size of Doors

Section 1008.1.1



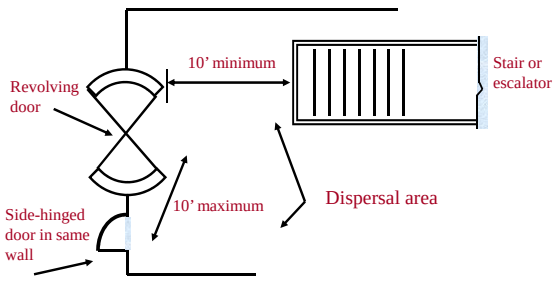
Door Swing

Section 1008.1.2



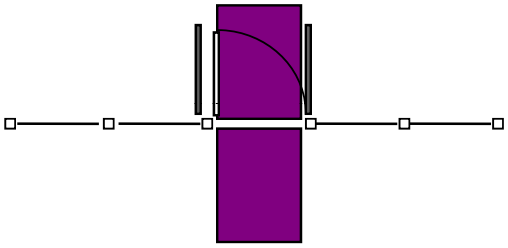
Revolving Doors

Section 1008.1.3.1



Special Doors

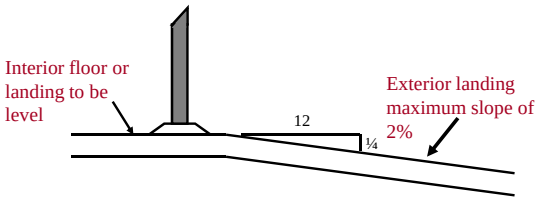
Section 1008.1.3.2



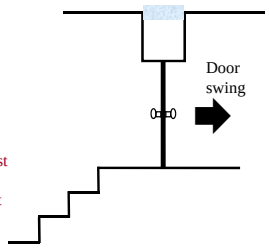
Provisions cover swinging doors & sliding doors

Floor Elevation at Doors

Section 1008.1.4



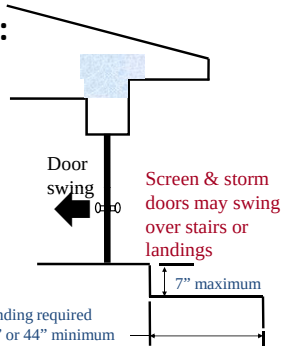
Exception:



Interior flight of stairs (door must not swing over first step when swinging towards stairs – except screen doors)

EXCEPTION 1.1 (for R-2 and R-3 only)

Exception:

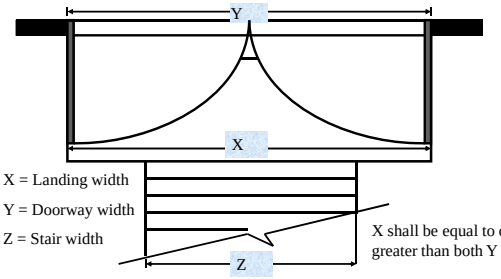


Exterior stairways

EXCEPTION 2

Landings at Doors

Section 1008.1.5



X = Landing width

Y = Doorway width

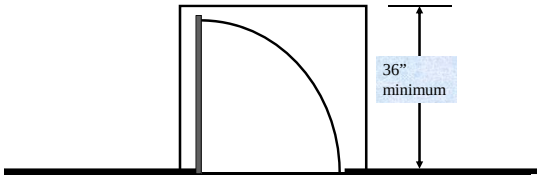
Z = Stair width

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

Landings at Doors

Section

1008.1.5

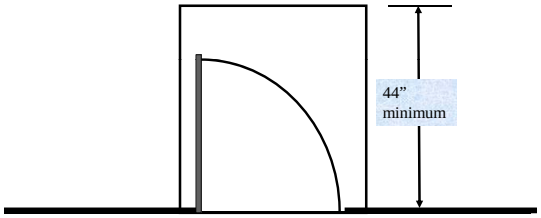


R-3, U and within individual dwelling units of R-2

Landings at Doors

Section

1008.1.5

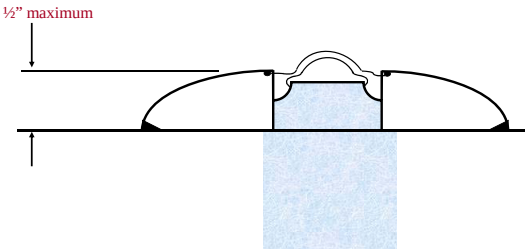


All other occupancies

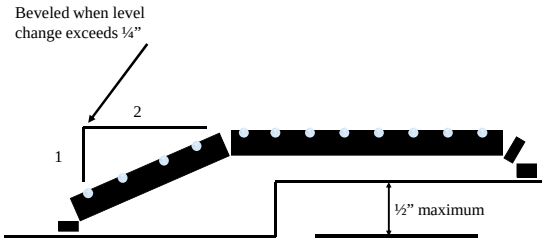
Thresholds

Section

1008.1.6

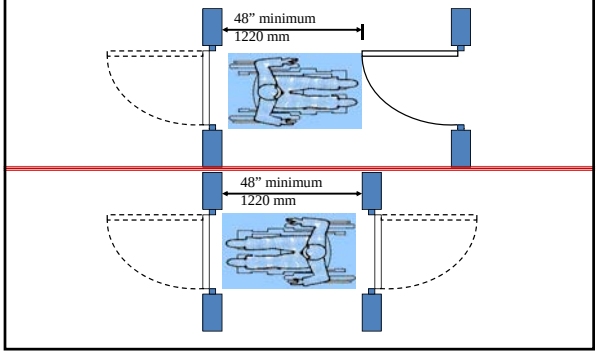


Exception:



Door Arrangement

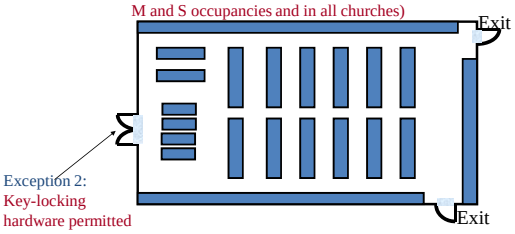
Section 1008.1.7



Door Operations

Section 1008.1.8.3

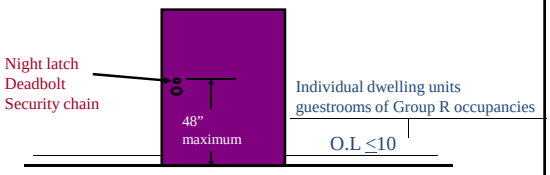
(Group A - having occupant load ≤300, B, F, M and S occupancies and in all churches)



*Door must swing free without any latching devices when unlocked

Locks and Latches

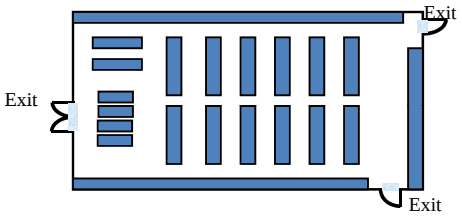
Section 1008.1.8.3



Such devices must be openable from the inside without the use of a key or tool and mounted at a height a minimum of 34” and a maximum of 48” above the finished floor

Delayed Egress Locks

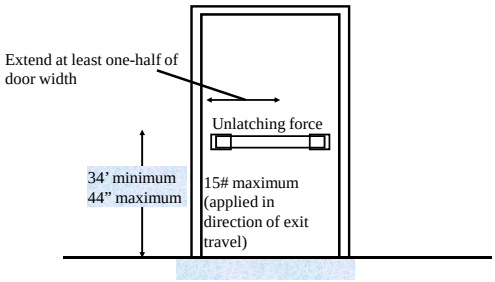
Section 1008.1.8.6



Automatic sprinkler system or automatic smoke or heat detection system is required throughout the building

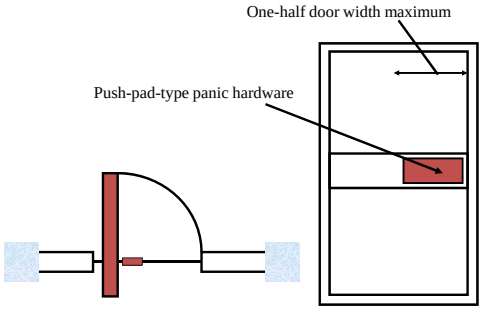
Panic and Fire Exit Hardware

Section 1008.1.9



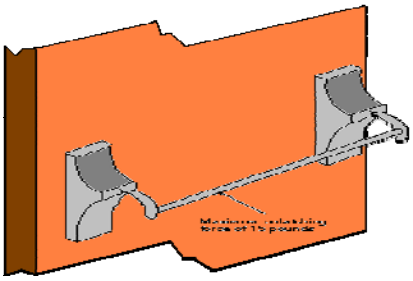
Panic and Fire Exit Hardware

Section 1008.1.9



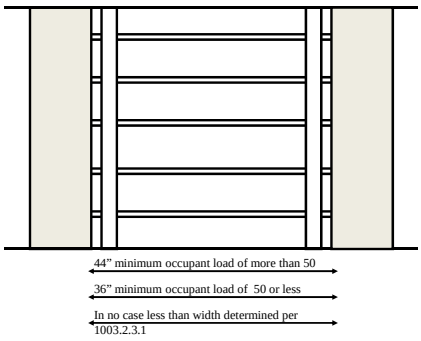
Panic and Fire Exit Hardware

Section 1008.1.9



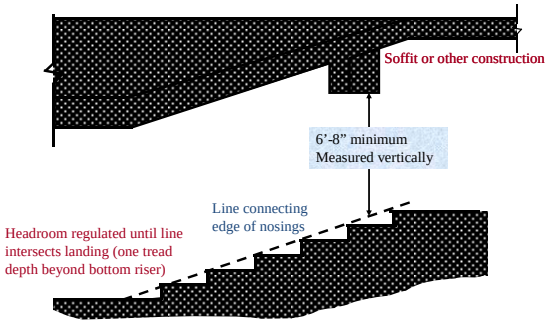
Stairway Width

Section 1009.1



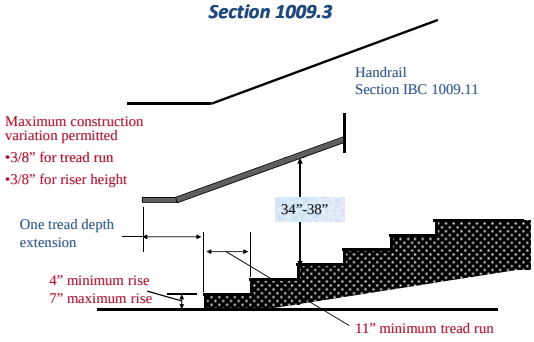
Headroom Clearance

Section 1009.2



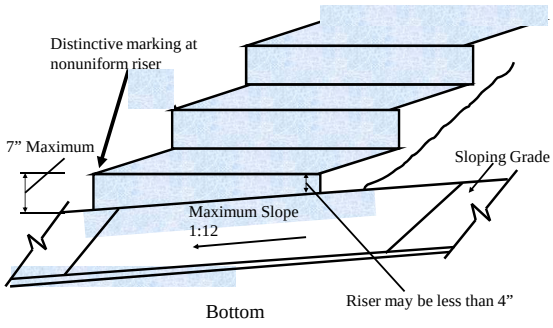
Stair Treads and Risers

Section 1009.3



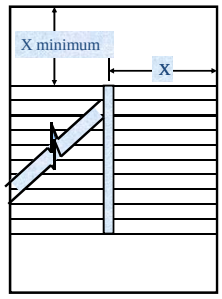
Stair Treads and Risers

Section 1009.3.1



Stairway Landings

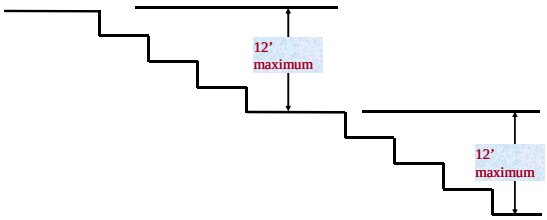
Section 1009.4



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

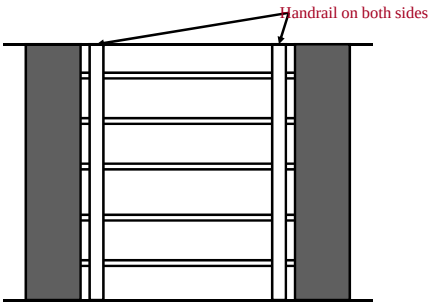
Vertical Rise

Section 1009.6



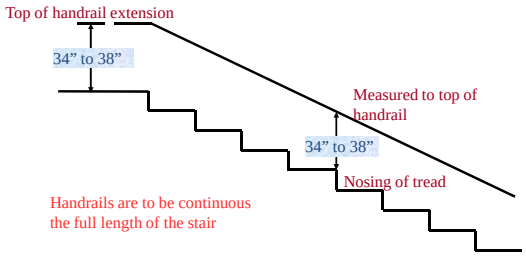
Handrails

Section 1009.11



Handrails

Section 1009.11.1 - Height

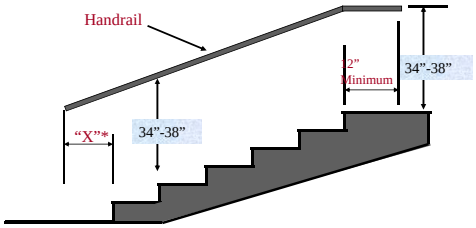


2009 Amendments

- **1009.11.2 Intermediate Handrails (amended)**
  - Intermediate handrails are required for stairs with a required width exceeding 75 inches so that all portions of the stairway width required for egress capacity are within 30 inches of a handrail. On monumental stairs, handrails shall be located along the most direct path of egress travel.

Handrails Extensions

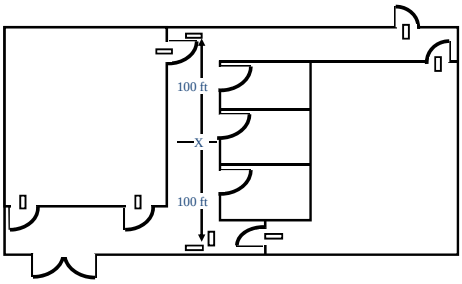
Section 1009.11.5



*Extension "X" Continues to slope for the depth of one trend beyond bottom riser

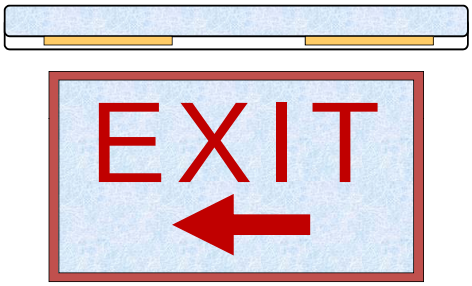
Exit Signs

Section 1011



Where Required

Section 1011.1



2009 Amendments

- **1011.1.1 Floor Proximity Exit Signs (amd)**
  - Where exit signs are required by Section 1011.1 of this code, exit access doors and exit doors shall additionally be marked by floor proximity exit signs in Group A occupancies with an occupant load of more than 300, Group B medical occupancies, Group I-1 occupancies, Group I-2 occupancies, Group R-1 hotels and motels and Group R-2 dormitories.

2009 Amendments

- **1011.1.1.2 Approval (add)**
  - Floor proximity exit signs shall be listed and labeled in accordance with UL 924, Emergency Lighting and Power Equipment, Edition 9, dated February 24, 2006

2009 Amendments

- **1011.1.2 Accessible Exits (amd)**
  - Where exit signs are required by Section 1011.1 of this code, accessible exit doors at the level of exit discharge that lead directly to accessible paths of exit discharge shall additionally be marked by the International Symbol of Accessibility. Such symbol shall be not less than 6 inches high and shall be incorporated into the required exit sign or shall be located directly adjacent to it. Such symbol shall meet the requirements of Section 1011.

2009 Amendments

- **1013.2 Egress Through Adjoining Spaces (amended)**
  - Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are accessory to the area served; are not a high hazard occupancy and provide a discernable path of egress travel to an exit. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes. An exit access shall not pass through a room that can be locked to prevent egress. Means of egress from dwelling units or sleeping areas shall not lead through other dwelling units, sleeping areas, toilet rooms or bathrooms.

Exceptions

- 1. Means of egress are not prohibited through a kitchen area serving adjoining rooms constituting part of the same dwelling unit or sleeping unit.
- 2. Means of egress are not prohibited through adjoining or intervening rooms or spaces in a Group H occupancy when the adjoining or intervening rooms or spaces are of the same or a lesser hazard occupancy group

- 3. Not more than 50% of the required exit access may travel through stockrooms in Group M occupancies when the stock is of the same hazard classification as that found in the main retail area; when the stockroom is not subject to locking from the egress side; and when there is a 44 inch wide aisle defined by full or partial height fixed walls or similar fixed construction that will maintain the required width and lead directly from the retail area to the exit without obstructions

Exit or Exit Access Doorways Required

Section 1014.1

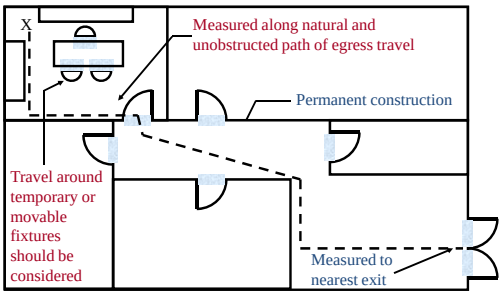
TABLE 1014.1

SPACES WITH ONE MEANS OF EGRESS

OCCUPANCY	MAXIMUM OCCUPANT LOAD
A, B, E, F, M, U	50
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4, R	10
S	30

Exit Access Travel Distance

Section 1015



Exit Access Travel Distance

Section 1015

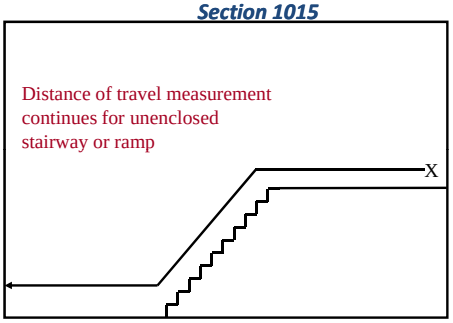


TABLE 1015.1

A, E, F-1, I-1, M, R or S-1

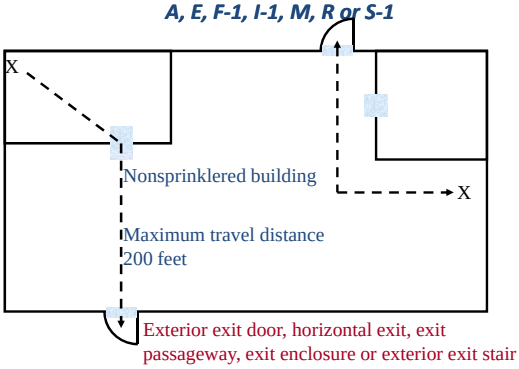
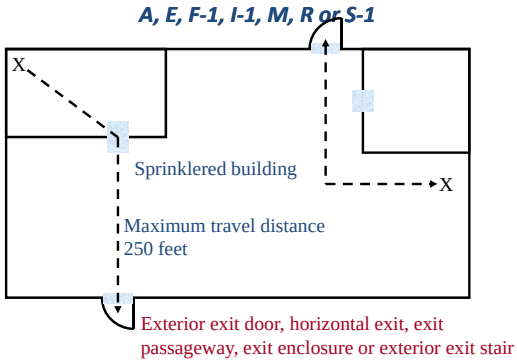


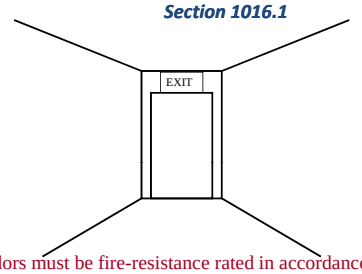
Table 1015.1

A, E, F-1, I-1, M, R or S-1



Corridor Construction

Section 1016.1



Corridors must be fire-resistance rated in accordance with IBC Table 1016.1. The corridor walls must comply with the provisions of IBC 708.

Table

1016.1

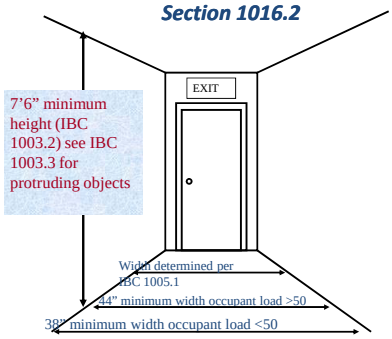
TABLE 1016.1
CORRIDOR FIRE-RESISTANCE RATING

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

a. For requirements for occupancies in Group I-2, see Section 407.3.
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.7.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.

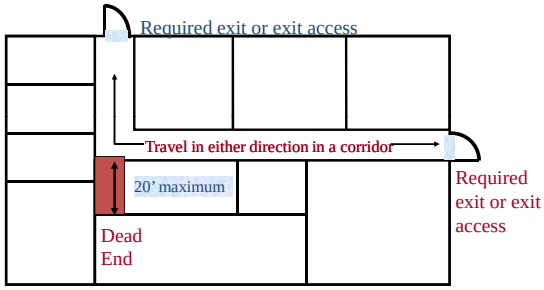
Corridor Width

Section 1016.2



Dead End

Section 1016.3



Exits

Section 1017

- **General - 1017.1**
  - ***Exits are not to be used for any purpose***
    - **To interfere with means of egress**
- **Exterior Exit Doors - 1017.2**
  - ***When structure is used for human occupancy***
    - **Minimum of one exterior door**

Minimum Number of Exits

Section 1018.1

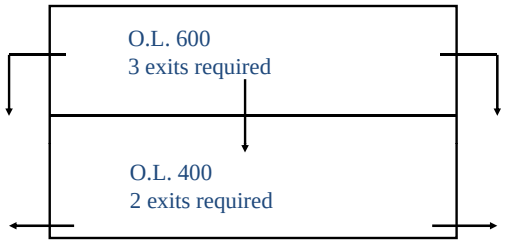
TABLE 1018.1

MINIMUM NUMBER OF EXITS FOR OCCUPANT LOAD

OCCUPANT LOAD	MINIMUM NUMBER OF EXITS
1-500	2
501-1,000	3
More than 1,000	4

Minimum Number of Exits

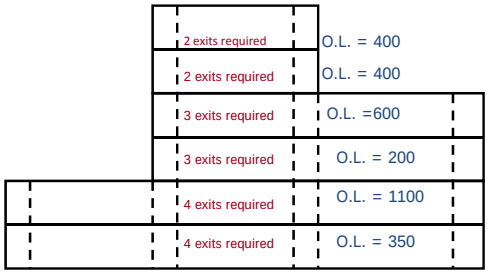
Section 1018.1



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

Minimum Number of Exits

Section 1018.1



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

Minimum Number of Exits

Section 1018.1

Occupant load of 501 to 1,000

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

Building With One Exit

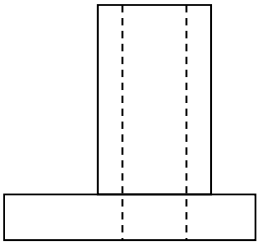
Section 1018.2

TABLE 1018.2
BUILDINGS WITH ONE EXIT

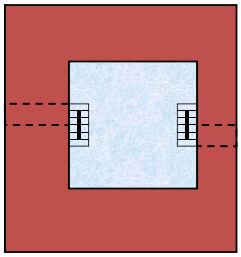
OCCUPANCY	MINIMUM HEIGHT OF BUILDING ABOVE GRADE PLANE	MAXIMUM OCCUPANTS (OR DWELLING UNITS) PER FLOOR AND TRAVEL DISTANCE
A, B, E, F, M, U	1 Story	50 occupants 75'
H-2, H-3	1 Story	3 occupants and 25'
H-4, H-5, I, R	1 Story	10 occupants and 75'
S	1 Story	30 occupants and 100'
B, F, M, S	2 Stories	30 occupants and 75'
R-2	2 Stories	4 dwelling units and 50'

Exit Continuity

Section 1018.3



Elevation

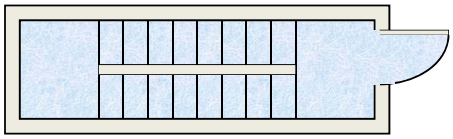


Plan

Exit Enclosures Required

Section 1019.1

Interior exit stairways shall be enclosed as specified in IBC 1019



Enclosures Required by 1019.1
- **Interior exit stairways & exit ramps**
  1. **To be enclosed with fire barriers**
- **Exit enclosures to have a fire resistance rating**
  1. **Not less than 2 hours**
     a. **When connecting four stories or more**
  2. **Not less than 1 hour**
     a. **Connecting less than four stories**
  3. **Enclosure construction as per Section 706**

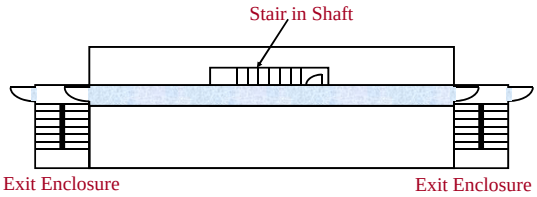
Exceptions to IBC 1019.1

Enclosures required

Exceptions
1. **Equipped throughout with automatic sprinkler**
   a. **Other than Group H & I**
   b. **Stairway for occupant load less than 10**
   c. **Not more than 1 story above level of exit discharge**
      1.) **Not required to be enclosed**
2. **A-5 with all portions of MOE 50% or more open**
   a. **To outside at upper portion**
3. **Stairway serving not more than 3 story**
   a. **Within single residential dwelling in**
      1.) **R-2 or R-3**
      2.) **Sleeping units in R-1**

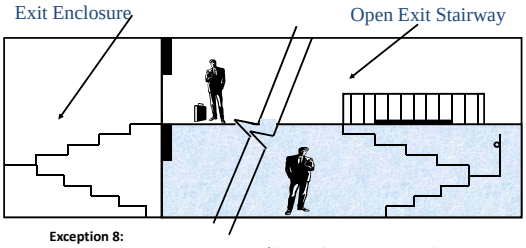
IBC 1019.1

Exception 4:



4. **Stairways that are not required MOE are not required to be enclosed**
5. **Stairways in open parking structures**
   A. **Serving only the parking structure - not required to be enclosed**
6. **Stairways in I-3 as provided in section 408.3.6**
   1. **Not required to be enclosed**
7. **MOE stairway as required by 410.5.4**
   A. **Not required to be enclosed *(stage exit)***

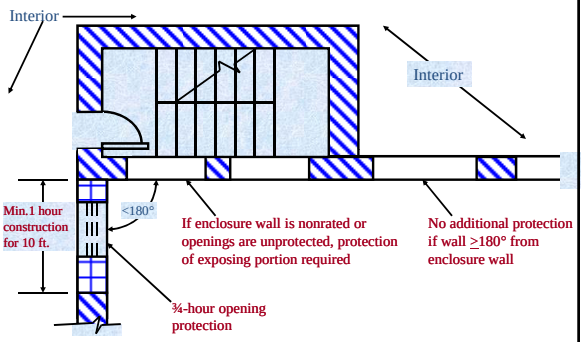
IBC 1019.1
Exception 8:



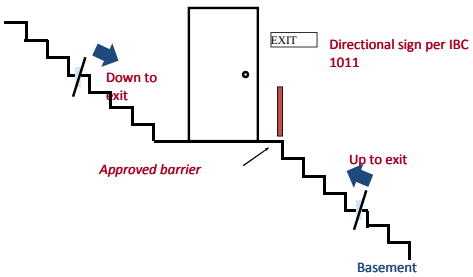
Exception 8:

- **Stairways connecting the 1st & 2nd floors of R-1 Bed & Breakfast shall not be required to be enclosed**
- **Stairways connecting 2nd & 3rd floors of R-1 Bed & Breakfast shall be enclosed**

Vertical Enclosure Exterior Walls
Section 1019.1.4



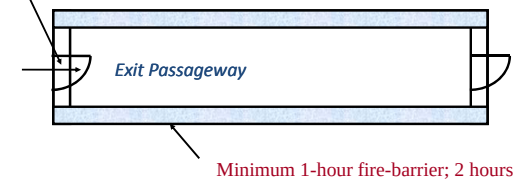
Discharge Identification
Section 1019.1.6



Exit Passageway

Section 1020.1

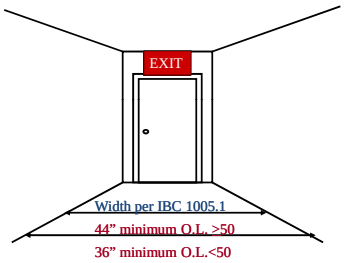
Door with 1-hour protection rating in 1-hour passageway; 1½-hour protected opening in 2-hour construction



Minimum 1-hour fire-barrier; 2 hours where extending a 2-hour exit enclosure

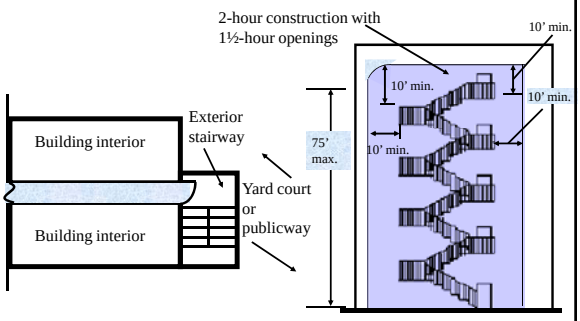
Exit Passageway

Section 1020.1



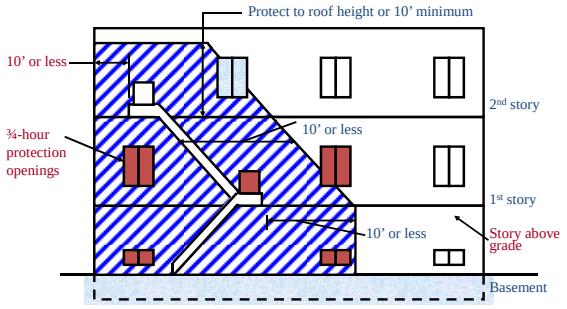
Exterior Exit Stairways

Section 1022



Exterior Ramps and Stairway Protection

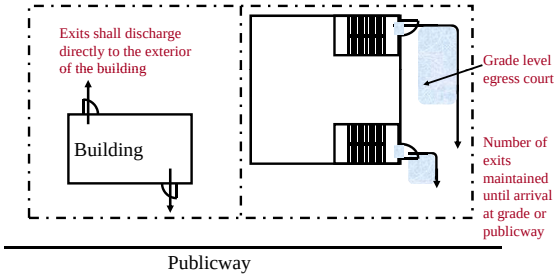
Section 1022.6



Exit Discharge

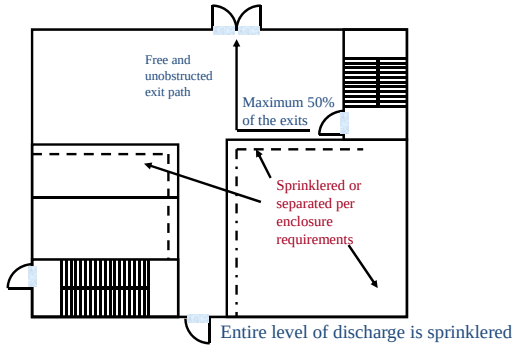
General

Section 1023.1



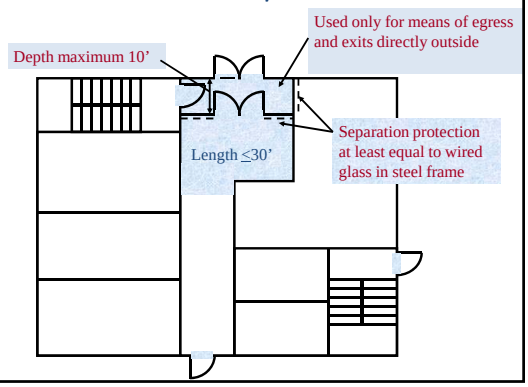
Exit Discharge

Section 1023 Exception 1



Exit Discharge

Section 1023.1 Exception 2



2009 Amendments

- **1023.2.1 Remoteness (add)**
  - Where two or more doors leading to exit discharge are required, a minimum of two such doors shall be placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the building served measured in a straight line between doors. Additional doors leading to exit discharge shall be arranged a reasonable distance apart so that if one becomes blocked, the others will be available.

2009 Amendments

- **1024.2 Assembly Main Exit (amended)**
  - In Group A occupancies that are newly constructed, have an increase in the number of occupants by addition or alteration or are created by change of occupancy and that have a single main entrance, such main entrance shall also be the main exit. The main entrance/exit shall be of sufficient width to accommodate not less than two thirds of the occupant load, but such width shall not be less than the total required width of all means of egress leading to the exit.

Maintaining the Means of Egress Discussion:

Front of Building

103

Maintaining the Means of Egress Discussion:

Front and Side of Building

104

Maintaining the Means of Egress Discussion:

Back and Side of Building

Office of Education and Data Management 105

Summary

Means Of Egress
- Occupant Load
- Egress Convergence
- Egress Width
- Doors
- Stairs
- Exit Signs
- Exit
- Exit Access
- Exit Discharge
- Means of Egress From an Assembly Occupancy

Questions??

CT Department of Public Safety
Division of Fire, Emergency and Building Services

- Office of the State Building Inspector
  (860) 685 - 8310
- Office of the State Fire Marshal
  (860) 685 - 8350
- Office of Education and Data Management
  (860) 685 – 8330

http://www.ct.gov/dps/

Thank-you !