

## Welcome

Architectural Openings, Codes & Standards.

How BIM (Building Information Modeling) can help us in achieving safe building in today's complex building systems.





# Course Description

**Architectural openings are more about Life Safety than egress and fire rating only.** The automatic and manual revolving, sliding or swing door can be hazardous for users unless properly designed as per relative standards and codes. More so when we deal with frameless glass assemblies and the user group includes disabled, elderly people and children.

Also, adding security hardware may cause safety issues for doors. The presentation will focus on these points, what guidelines relative codes and standards provides about these.

We will also focus on how **BIM (Building Information Modeling)** can help us in achieving **safe building** in today's complex building systems.



# Learning Objectives

1. *Review past Building Fire tragedies.*
2. *Codes and Standards requirement related to doors*
3. *How BIM can help in achieving the above*

The purpose of this presentation is to convey technical knowledge to the conference participants.

The presentation also contains slides with text that summarises the content of the presentation and the main learning objectives.

These may be used to update CPD records for relevant organisations including the Chartered Institute of Building (CIOB).



# Presenter

Abdul Jabbar,

Architectural Consultant for dormakaba based in Kuwait.

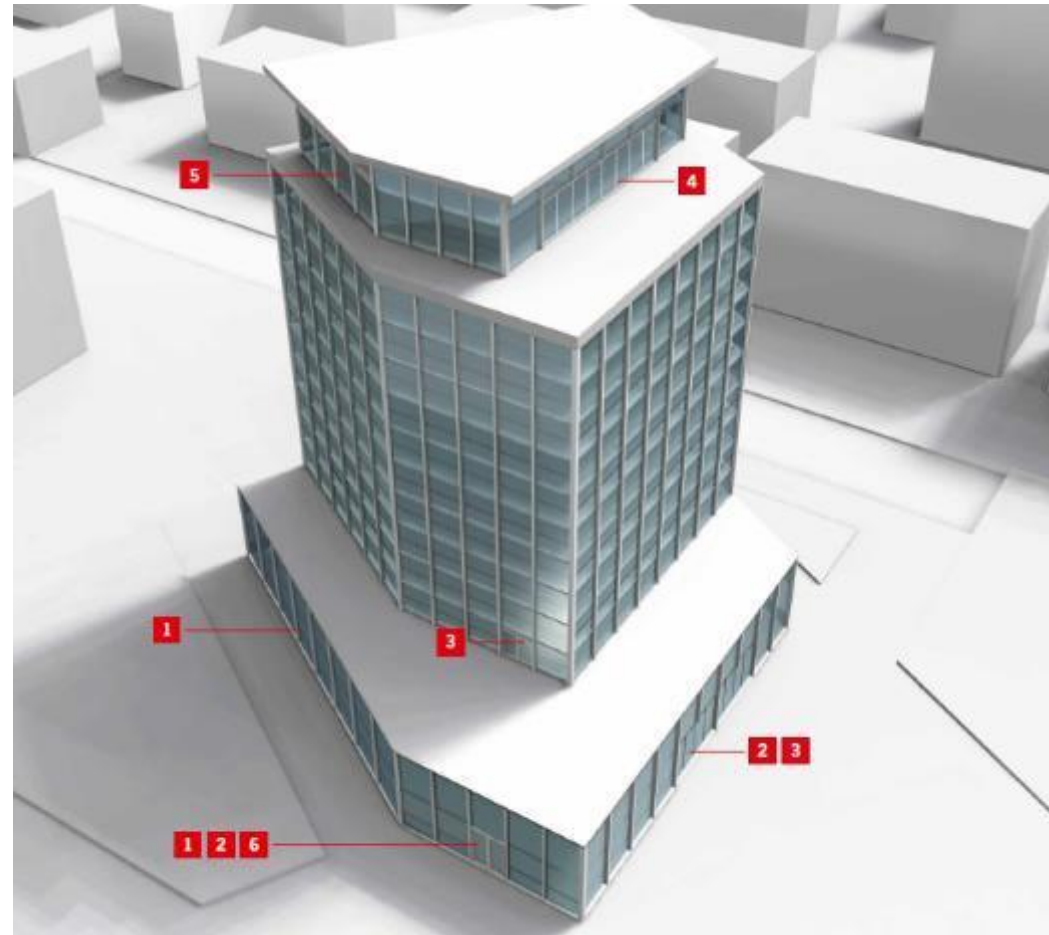
A Civil Engineer with experience over 11 years in the field of door and hardware industry currently acting as a consultant for region Kuwait in building, fire and accessibility codes as well as specifications. To promote high standards of project specification in door hardware, automatic doors, access control, Hotel locking management system, banking access solutions and Movable acoustic partitions. He is an Architectural Hardware Consultant apprentice and an active member of Door Hardware Institute USA since 2012.

Mr. Abdul Jabbar attributes his learning to working with architects, He learnt NFPA 101 Life Safety Code, NFPA 80 standard for fire doors from them while providing related solutions and thus gained good data base of lessons learnt that he is going to share with us today. He has been doing presentations on Life Safety code at architect's offices in Kuwait, Saudi Arabia and India. He has been assisting architects regularly providing holistic solutions at design stage and specifications for doors, architectural hardware, Movable acoustic walls, Automatic doors, glass fittings and other access solutions





# Architectural Opening





## Architectural Opening

- Door is a moving structure used to block off, and allow Entrance to or Exit from a space for
  - Privacy,
  - Convenience,
  - Safety & Security.
- Also helps in:
  - Air Drafts control
  - Noise Barrier.
  - Access Control
  - Smoke and Fire compartmentation
  - Egress





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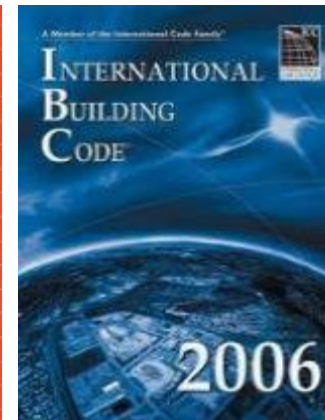
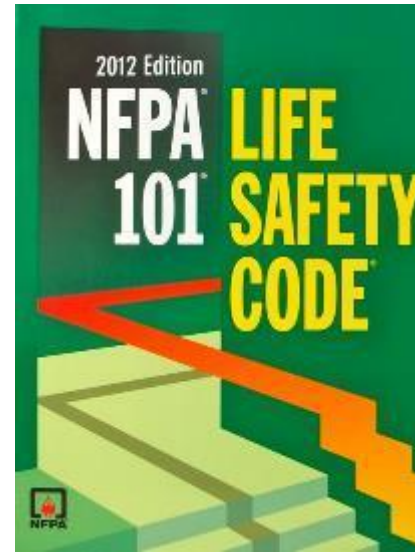


# Codes & Standards

Codes and standards establish the minimum criteria for meeting levels of construction, performance or quality of a product or process.



BS 5306-8:2000







Brief history of Buildings fires

# The Cocoanut Grove club fire



The Cocoanut Grove club was the scene of the deadliest fire in US history, **killing 492 people.**

The building's main entrance was a **Revolving door.** **Bodies piled up behind both sides of the revolving door, jamming it to the extent that firefighters had to dismantle it to enter.**



Many patrons attempted to exit through the main entrance, the same way they had entered. The building's main entrance was a single **revolving door**, which was rendered useless as the crowd stampeded in panic.

Later, after fire laws had tightened, it would become illegal to have only one revolving door as a main entrance without being flanked by outward opening doors with **panic bar** openers attached, or have the revolving doors set up so that the doors could fold against themselves in emergency situations.

Other avenues of escape were similarly useless; **side doors had been bolted shut** to prevent people from leaving without paying. **Other unlocked opened inwards**, rendering them useless against the crush of people trying to escape. **Fire officials would later testify that, had the doors swung outwards, at least 300 lives could have been spared.**



# Boston, USA, 1942

## Cocoanut Grove fire



The Shawmut Street side of the Cocoanut Grove nightclub after the fire

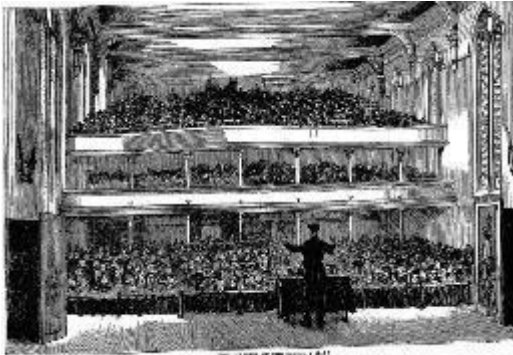
<b>Time</b>	Around 10:15 pm
<b>Date</b>	November 28, 1942
<b>Location</b>	Bay Village, Boston, Massachusetts, United States
<b>Cause</b>	Ignition of decorative cloth
<b>Deaths</b>	492



Brief history of Buildings fires

# Victoria Hall tragedy

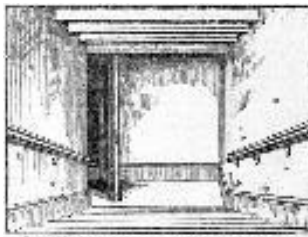
## Sunderland, Great Britain, 1883



There was no fire in the building. 183 children, aged between 3 and 14, were crushed to death in a stampede for the stage when free toys were offered. The disaster is the worst of its kind in British history.

### Events

At the end of the show an announcement was made that children would be presented with a [prize](#) upon exit. Worried about missing out on the treats, many of the estimated 1,100 children in the gallery stampeded toward the staircase leading downstairs. **At the bottom of the staircase, the door had been opened inward and bolted in such a way as to leave a gap only wide enough for one child to pass at a time.** It is believed this was to ensure orderly checking of tickets. With few accompanying adults to maintain order, the children surged down the stairs toward the door. Those at the front became trapped, and were crushed to death by the weight of the crowd behind them.



### Aftermath

With the [compressive asphyxia](#) of 183 children between 3 and 14 years old, the disaster is the [worst of its kind](#) in British Newspaper reports at the time triggered a mood of national outrage and the resulting inquiry recommended that public venues be fitted with a minimum number of outward opening emergency exits.





Brief history of Buildings fires

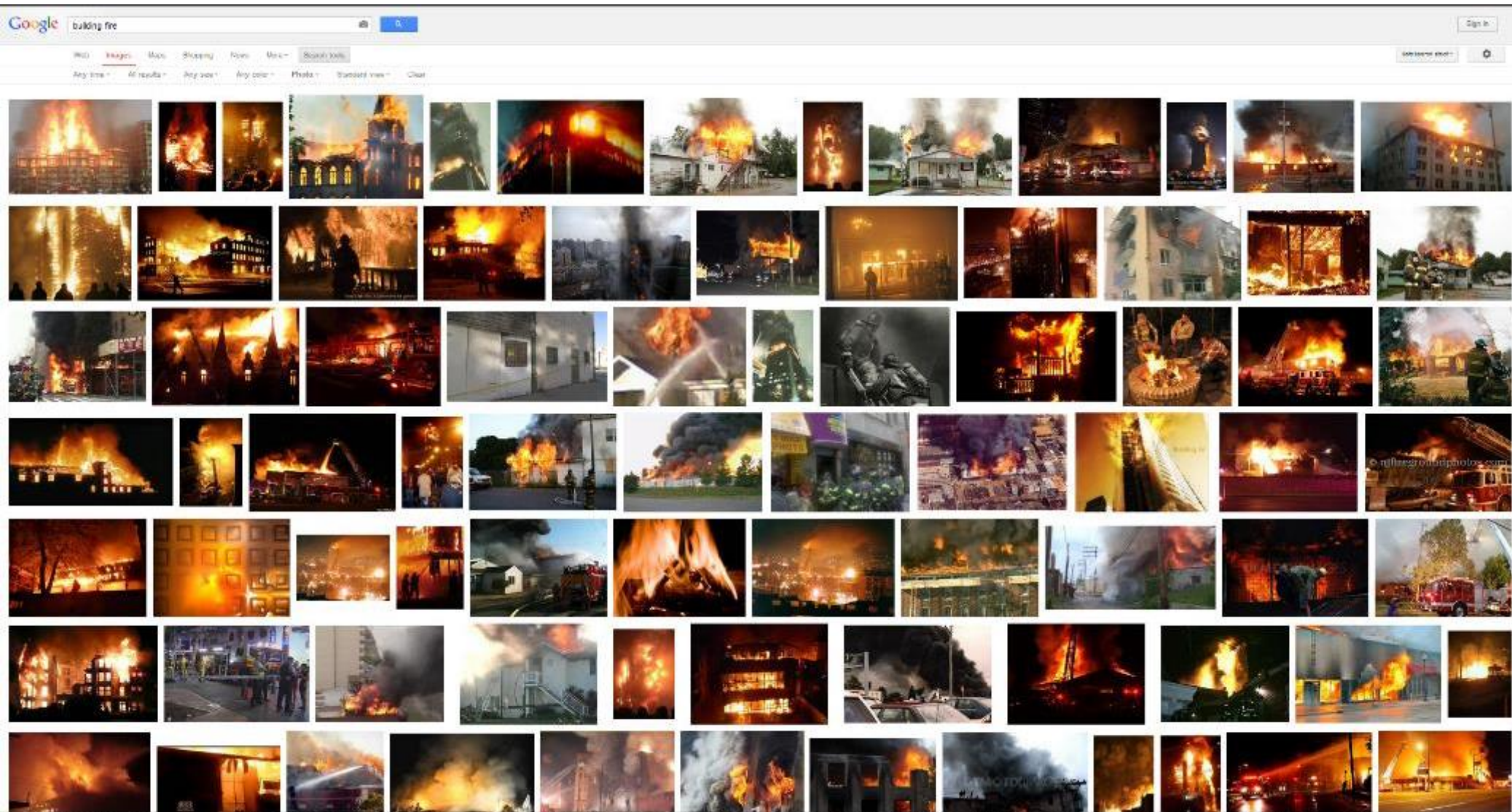
## The Kathmandu Disaster (Stadium)

Nepal, 1988

At least **93 killed** & more than **100 Injured**)

- Fans attempted to flee from a hailstorm inside the stadium.
- Spectators rushed to the stadium's **eight exits** but found **only one open**.







Brief history of Buildings fires



A fire gutted 17 floors of a 33-storey residential building in the Al Nahda area of Sharjah



FRIDAY, JULY 16, 2010

Massive fire guts Sharjah residential building



Al Tayer Tower in flames (left) and after firemen have controlled the blaze on Saturday morning (right)

ABU DHABI  
Two people have died and 32 more were injured after an early morning fire in the Tourist Club area of the capital.





Brief history of Buildings fires

# Qatar

Fire in Villagio Mall , Qatar – in May 2012 ( 19 killed – 13 were nursery kids)



DOHA: A fire at a nursery in a main shopping centre in the Qatari capital killed 19 people including 13 children



Brief history of Buildings fires

## Qatar

Fire in Villagio Mall , Qatar – in May 2012 ( 19 killed – 13 were nursery kids)

Horror as toddlers are left trapped in first floor nursery after staircase collapses

Firefighters forced to break through roof to evacuate victims

Relative of one two-year-old victim said building did not appear to have fire alarms or sprinklers



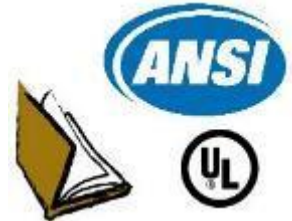
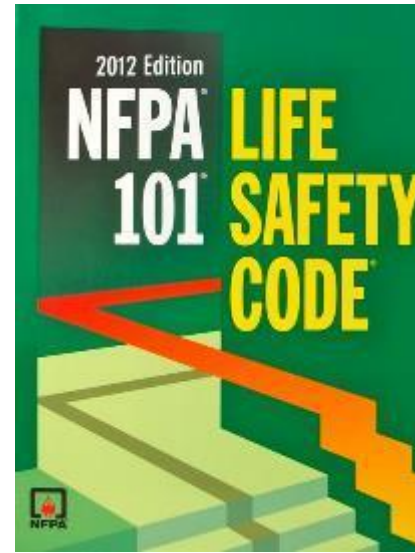


# Codes & Standards

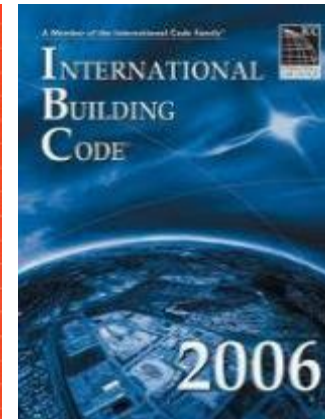
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BS 5306-8:2000



الإدارة العامة للإطفاء  
KUWAIT FIRE SERVICE DIRECTORATE







# Occupant Load

## 7.3.1 Occupant Load.

### 7.3.1.1 Sufficient Capacity.

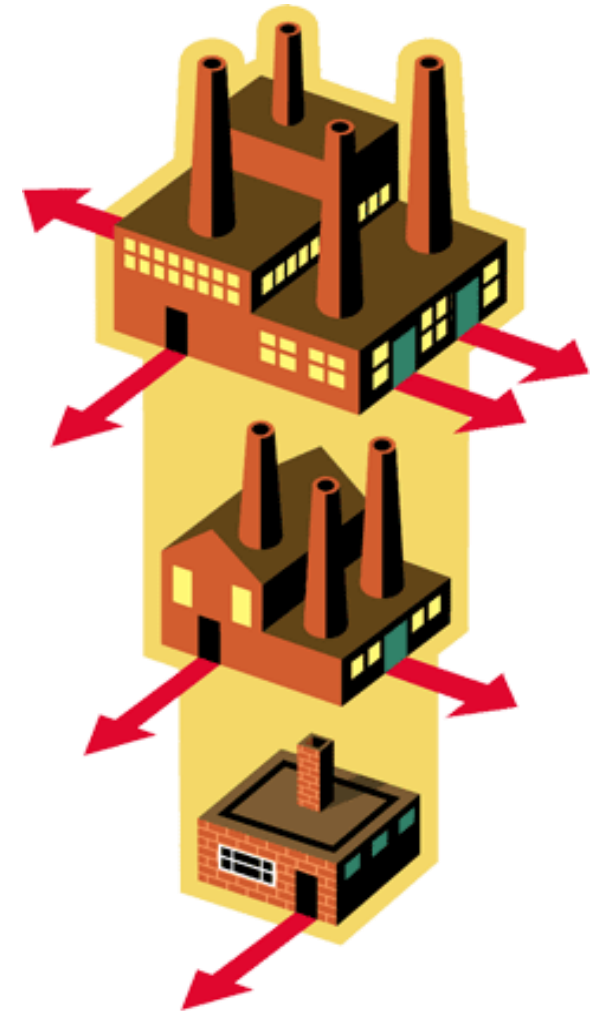
7.3.1.1.1 The total capacity of the means of egress for any story, balcony, tier, or other occupied space shall be sufficient for the occupant load thereof.

# Number of Exits

7.4.1.2 The number of means of egress from any story or portion thereof, other than for existing buildings as permitted in Chapters 11 through 43, shall be as follows:

- (1) Occupant load more than 500 but not more than 1000 — not less than 3
- (2) Occupant load more than 1000 — not less than 4

18.2.4.1 Not less than two exits shall be provided on every story.





# Fire Rated doors to be Self Closing and Self Latching

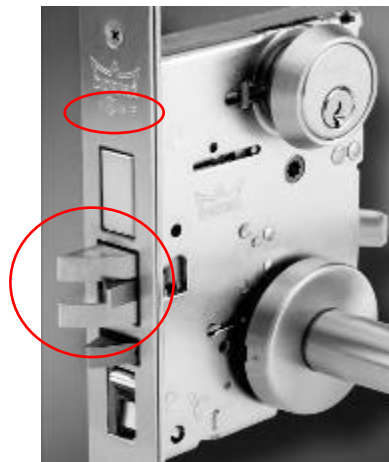
NFPA 80 Standard for Fire doors...

**6.1.3 Operation of Doors.** All swinging doors shall be closed and latched at the time of fire.

## 6.1.3.2 Self-Closing Doors.

**6.1.3.2.1** Self-closing doors shall swing easily and freely and shall be equipped with a closing device to cause the door to close and latch each time it is opened.

**6.1.3.2.2** The closing mechanism shall not have a hold-open feature.





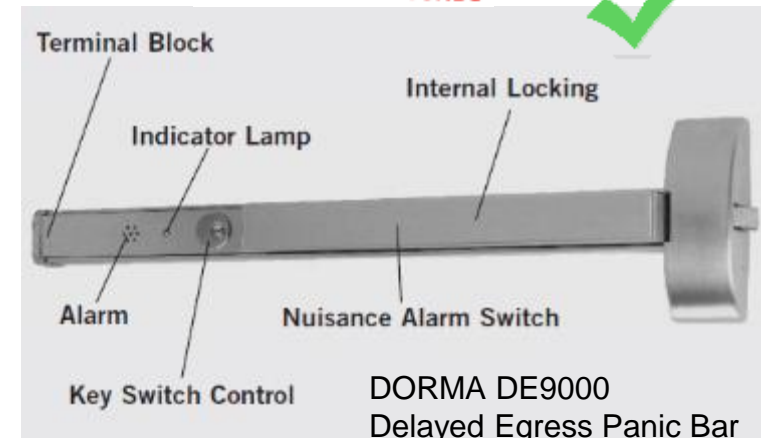
# Emergency Exit/Escape doors



12.2.2.2.3 Any door in a required means of egress from an area having an **occupant load of 100 or more persons** shall be permitted to be provided with a latch or lock only if the latch or lock is **panic hardware or fire exit hardware** complying with 7.2.1.7, unless otherwise permitted by the following:

- (1) This requirement shall not apply to delayed-egress locks as permitted in 12.2.2.2.5.
- (2) This requirement shall not apply to access-controlled egress doors as permitted in 12.2.2.2.6.

**PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS**



# Automatic sliding doors

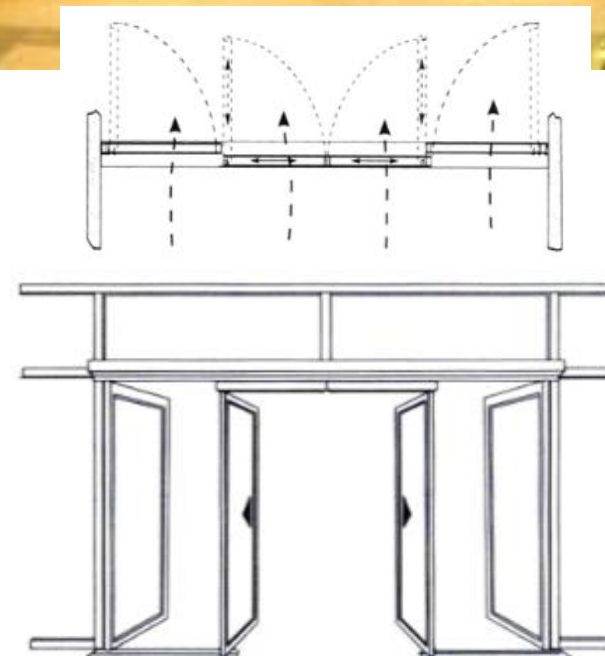
## 7.2.1.9\* Powered Door Leaf Operation.

IN EMERGENCY, PUSH TO OPEN

7.2.1.9.1.5\* In the **emergency breakout mode**, a door leaf located within a two-leaf opening shall be exempt from the minimum 32 in. (810 mm) single-leaf requirement of 7.2.1.2.3.2(1), provided that the clear width of the single leaf is not less than 30 in. (760 mm).

A.7.2.1.9.1.5 Although a single power-operated door leaf located within a two-leaf opening might alone not provide more than 30 in. (760 mm) of clear width in the **emergency breakout mode**, where both leaves are broken out to become **side hinged**, the required egress width is permitted to be provided by the width of the entire opening.

7.2.1.9.1.6 For a biparting sliding door assembly in the **emergency breakout mode**, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 32 in. (810 mm) single-leaf requirement of 7.2.1.2.3.2(1) if a clear opening of not less than 32 in. (810 mm) is provided by **all leaves broken out**.





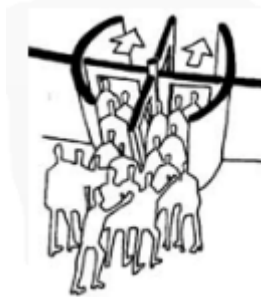
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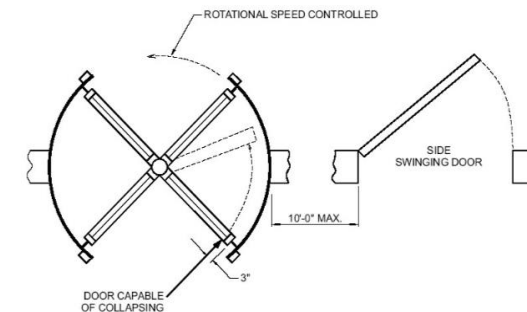
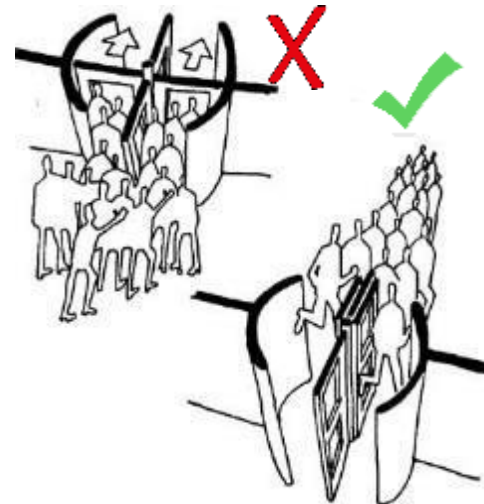


# Revolving Doors

## 7.2.1.10 Revolving Door Assemblies.

7.2.1.10.1 Revolving door assemblies, whether used or not used in the means of egress, shall comply with the following:

- (1) Revolving door wings shall be capable of being collapsed into a book-fold position, unless they are existing revolving doors approved by the authority having jurisdiction.
- (2) When revolving door wings are collapsed into the book-fold position, the parallel egress paths formed shall provide an aggregate width of 36 in. (915 mm), unless they are approved existing revolving door assemblies.
- (6) Each revolving door assembly shall have a conforming side-hinged swinging door assembly in the same wall as the revolving door within 10 ft (3050 mm) of the revolving door, unless one of the following conditions applies:



# Turnstiles

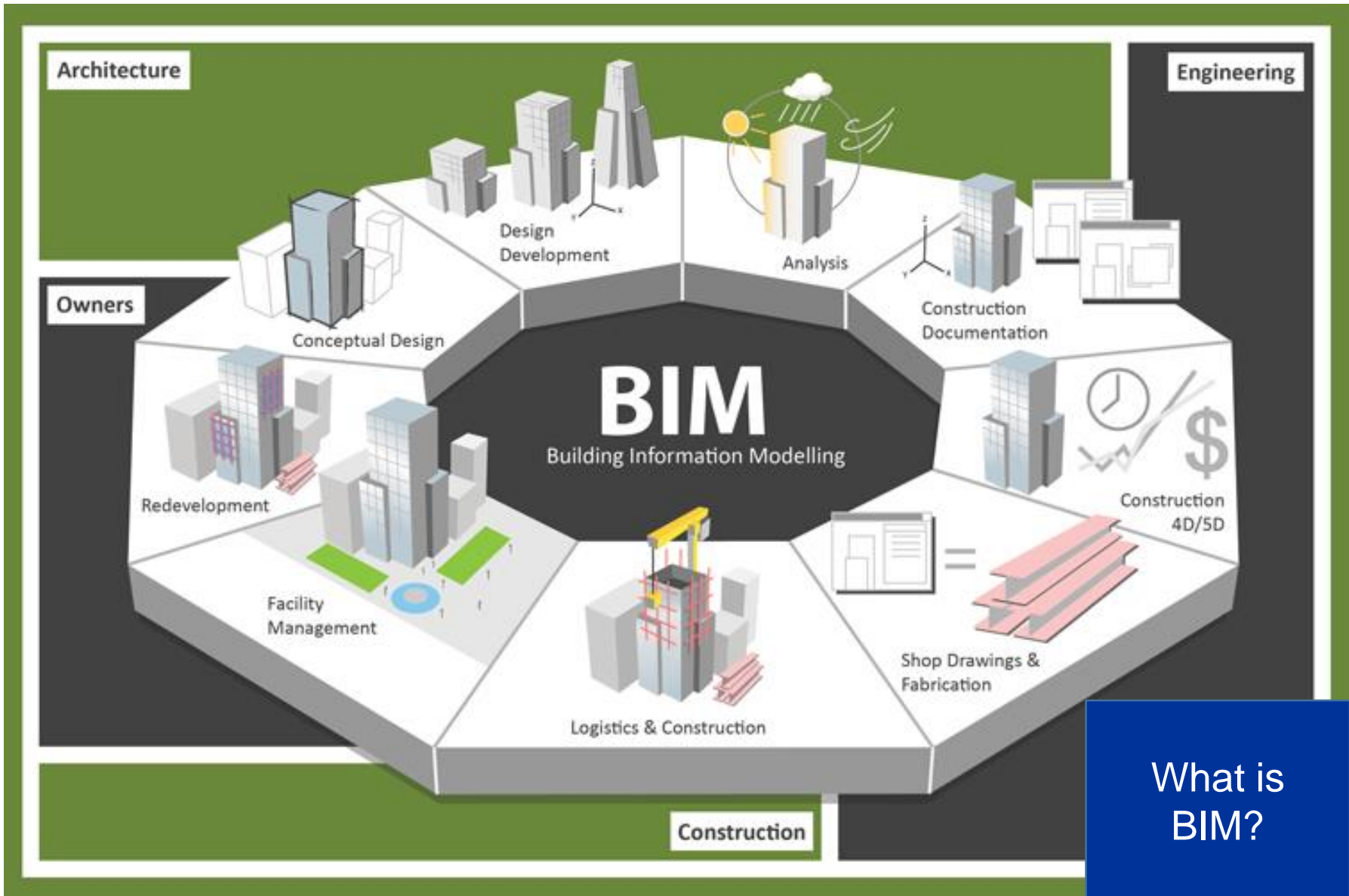
## 7.2.1.11 Turnstiles.

7.2.1.11.1.2 Where turnstiles are approved by the authority having jurisdiction and permitted in Chapters 11 through 43, each turnstile shall be credited for a capacity of 50 persons, provided that such turnstiles meet the following criteria:

- (1) They freewheel in the egress direction when primary power is lost, and freewheel in the direction of egress travel upon manual release by an employee assigned in the area.
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- (3) They are not in excess of 39 in. (990 mm) in height and have a clear width of not less than 16½ in. (420 mm).

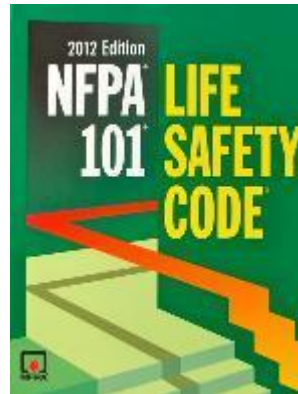
7.2.1.11.2 Turnstiles exceeding 39 in. (990 mm) in height shall meet the requirements for revolving door assemblies in 7.2.1.10.





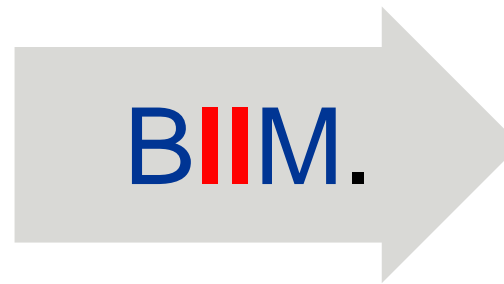
What is BIM?





Conventionally BIM is **Building Information Modeling**, but it can be used as **BIIIM**.

**Building  
Information  
Modeling**



**Building  
Information *with  
intelligence*  
Modeling**



Building Products & BIM



# Occupant Load

## 7.3.1 Occupant Load.

### 7.3.1.1 Sufficient Capacity.

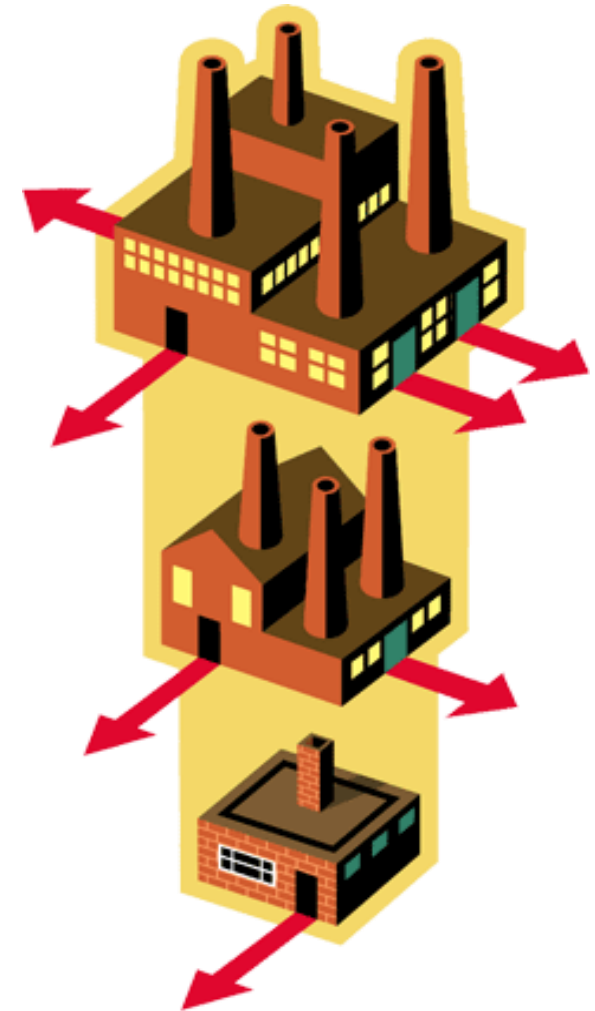
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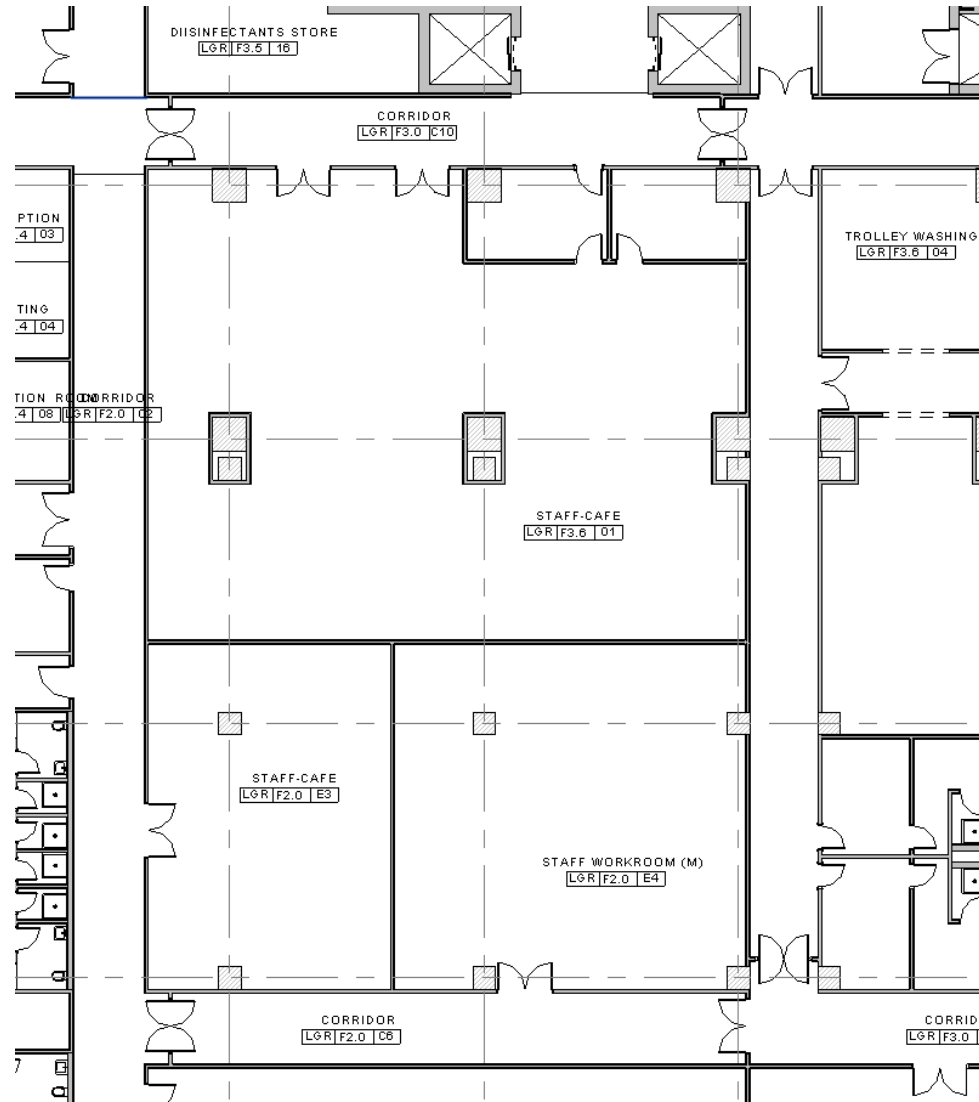
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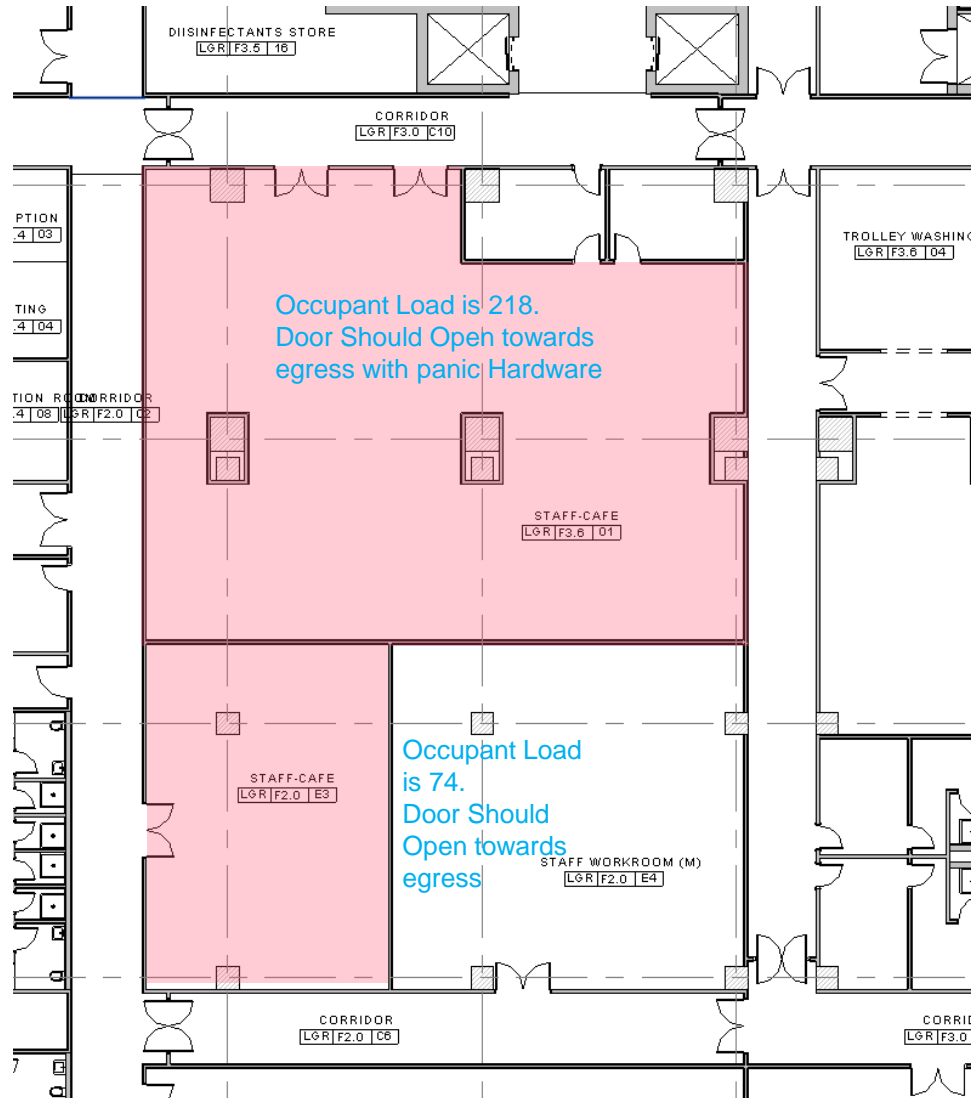
# Occupant Load



Code Compliance



# Occupant Load



Code Compliance



# Fire Rated doors to be Self Closing and Self Latching

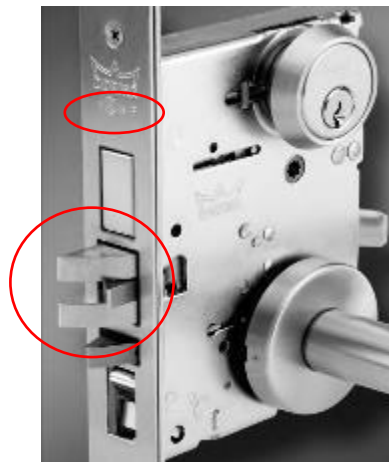
NFPA 80 Standard for Fire doors...

**6.1.3 Operation of Doors.** All swinging doors shall be closed and latched at the time of fire.

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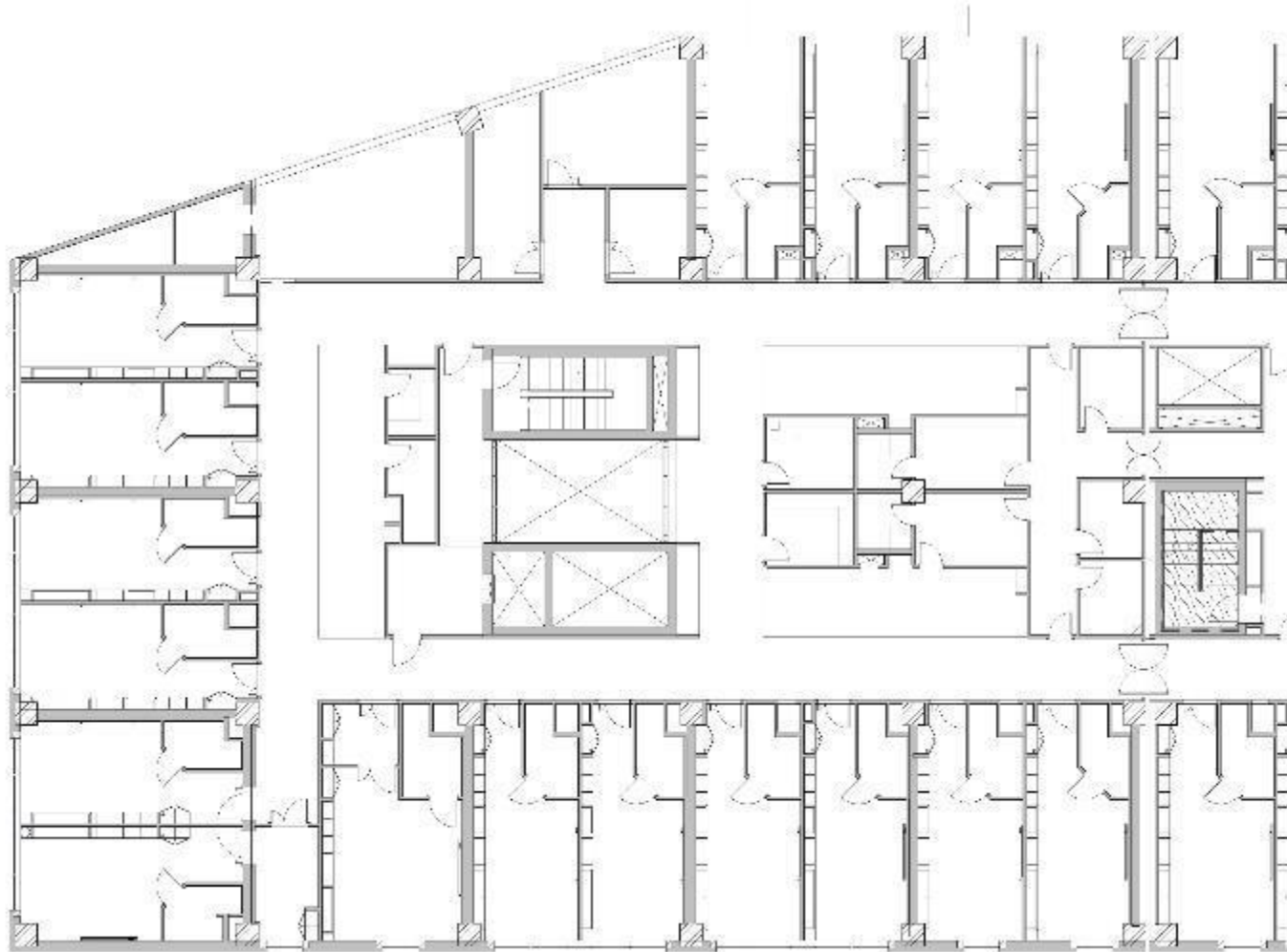
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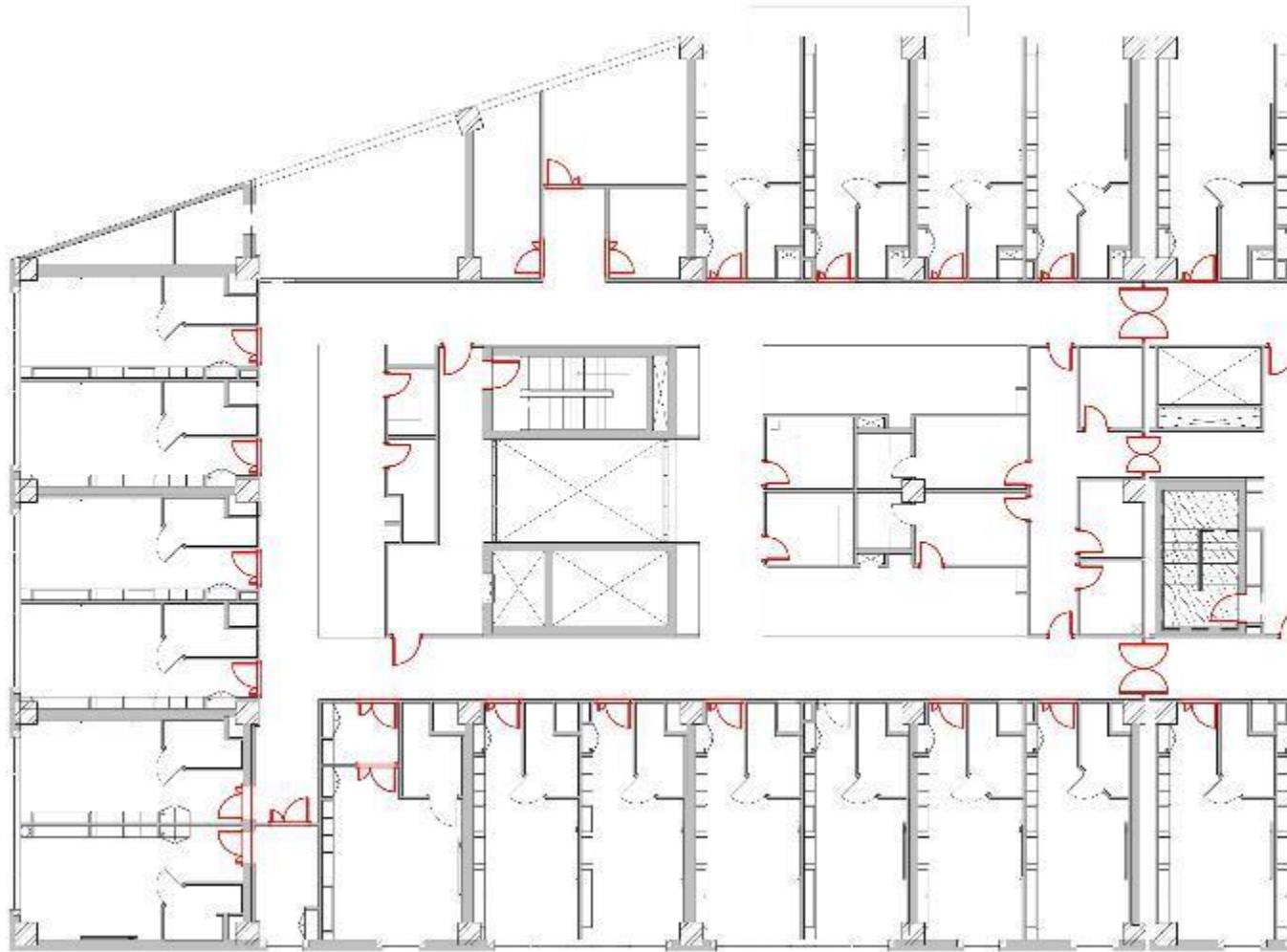


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# Fire Rated doors to be **Self Closing** and **Self Latching**







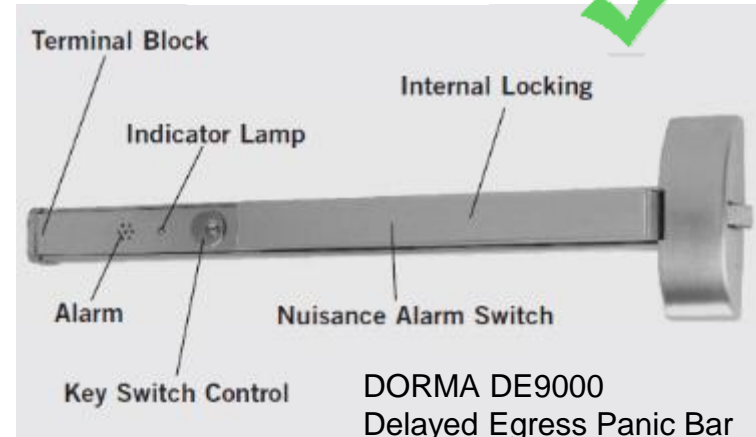
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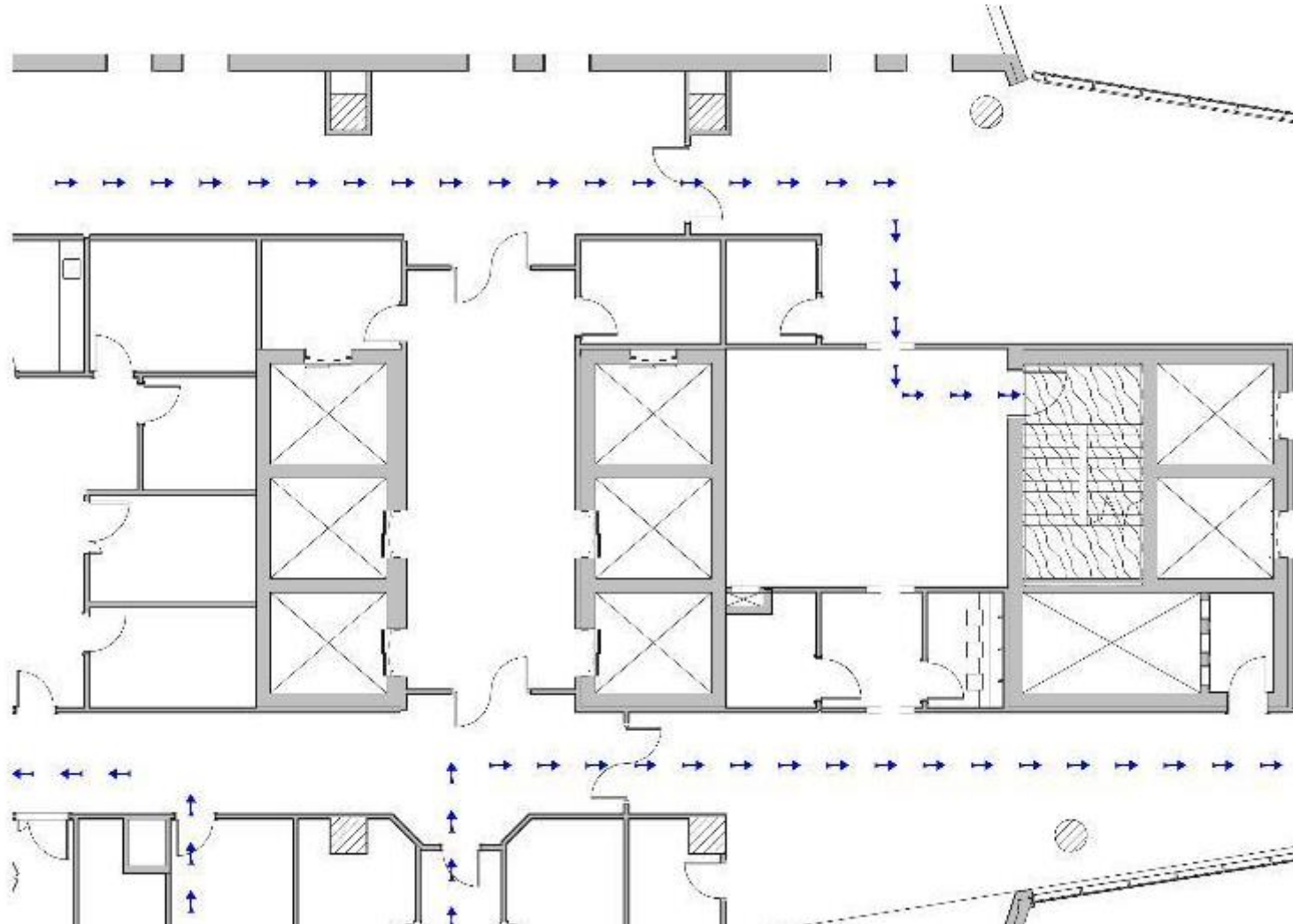


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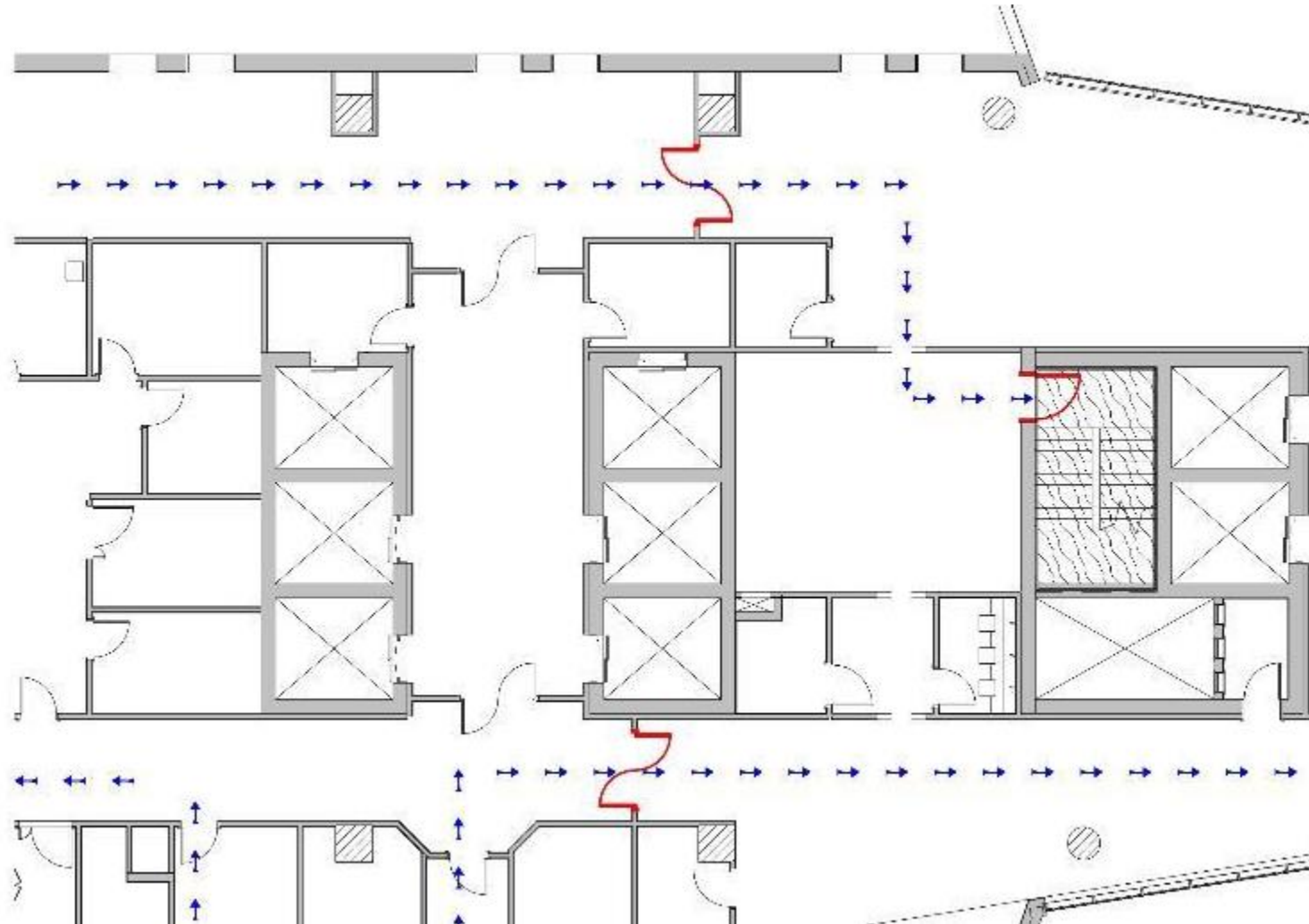


# Emergency Exit/Escape doors





# Emergency Exit/Escape doors



# Automatic sliding doors

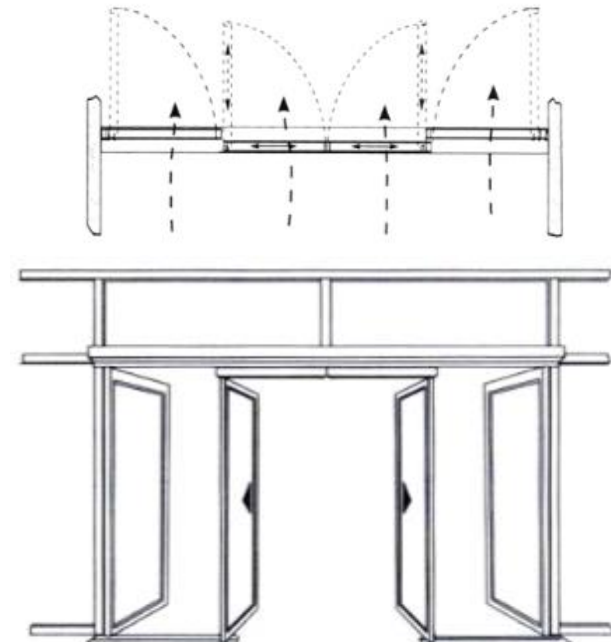
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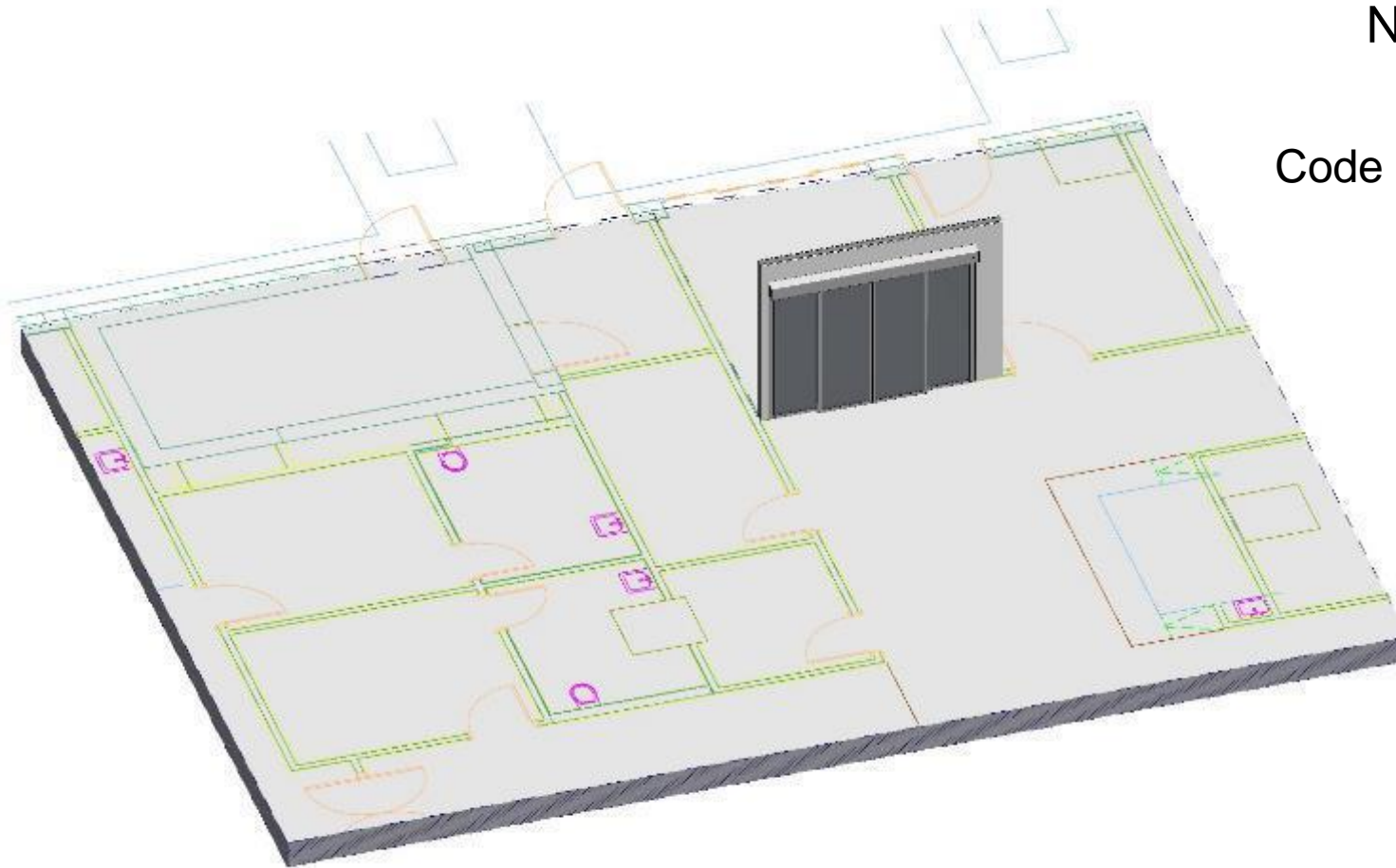




# Automatic sliding doors

NFPA 7.2.1.9

Code Compliance



Check the following as per NFPA 7.2.1.9

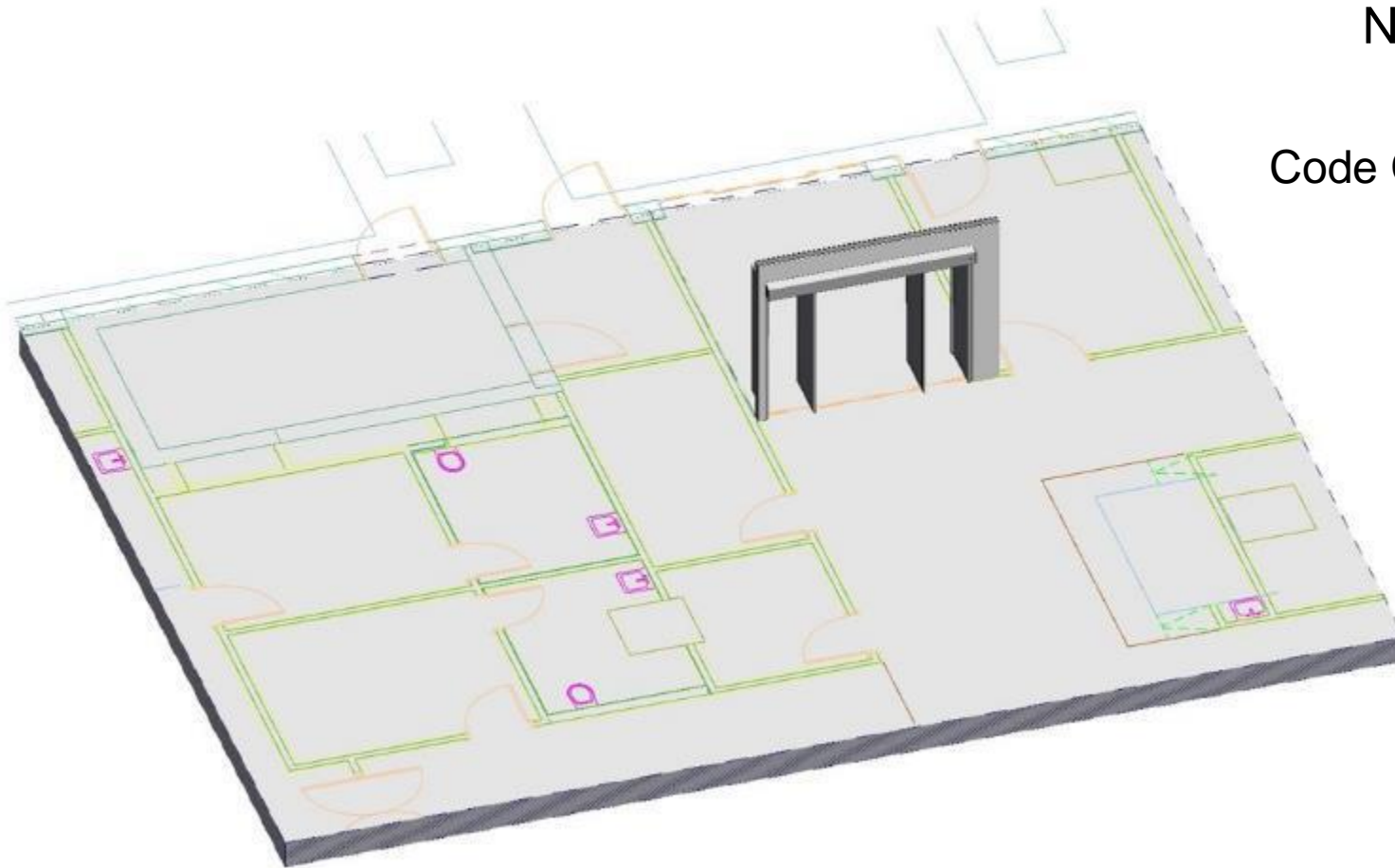
1. Emergency Breakout, Clear width of Single Panel not less than 32 in.(810mm)



# Powered Door Leaf Operation

NFPA 7.2.1.9

Code Compliance



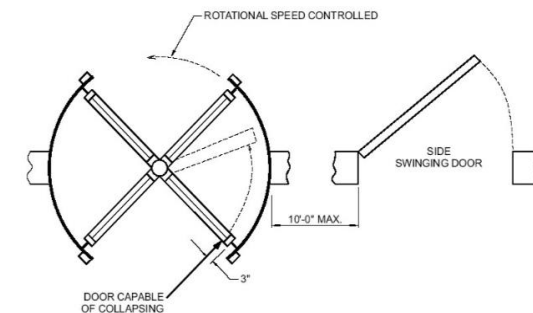
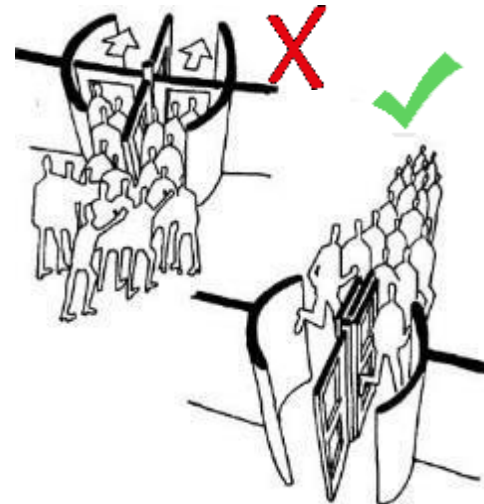


# Revolving Doors

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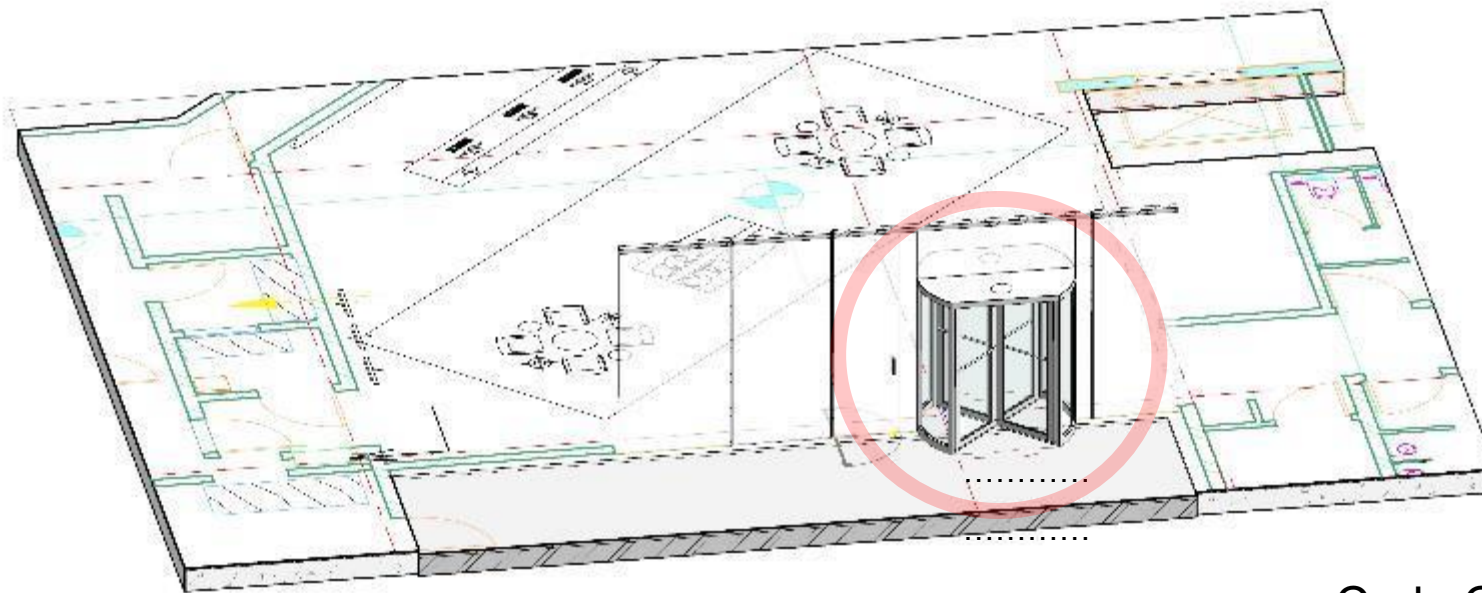
- (1) Revolving door wings shall be capable of being collapsed into a book-fold position, unless they are existing revolving doors approved by the authority having jurisdiction.
- (2) When revolving door wings are collapsed into the book-fold position, the parallel egress paths formed shall provide an aggregate width of 36 in. (915 mm), unless they are approved existing revolving door assemblies.
- (6) Each revolving door assembly shall have a conforming side-hinged swinging door assembly in the same wall as the revolving door within 10 ft (3050 mm) of the revolving door, unless one of the following conditions applies:





# Revolving Doors

NFPA 7.2.1.10



Code Compliance

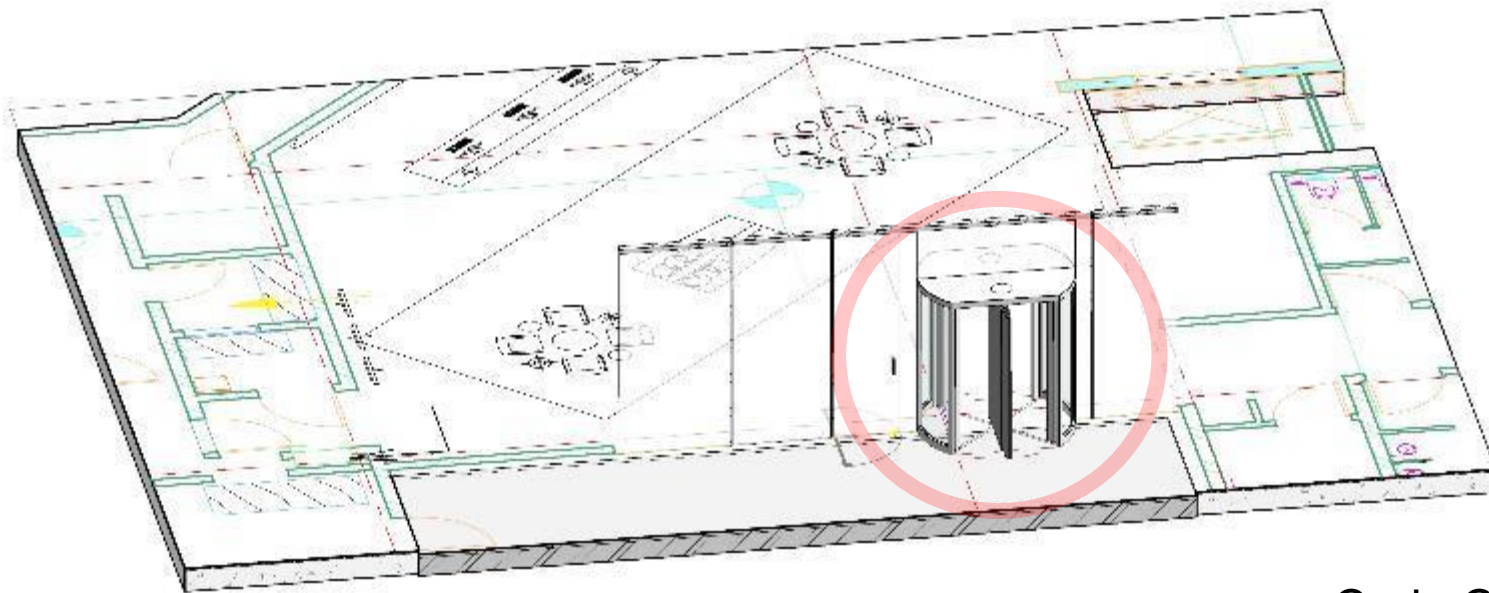
1. Capable of being Collapsed into book-fold position.
2. In book fold position Parallel Egress paths shall provide an width of 36 in.(915mm).
3. Should have a confirming Side-hinged swinging door assembly within 10ft (3050mm) from the revolving door.





# Revolving Doors

NFPA 7.2.1.10



Code Compliance

# Turnstiles

## 7.2.1.11 Turnstiles.

7.2.1.11.1.2 Where turnstiles are approved by the authority having jurisdiction and permitted in Chapters 11 through 43, each turnstile shall be credited for a capacity of 50 persons, provided that such turnstiles meet the following criteria:

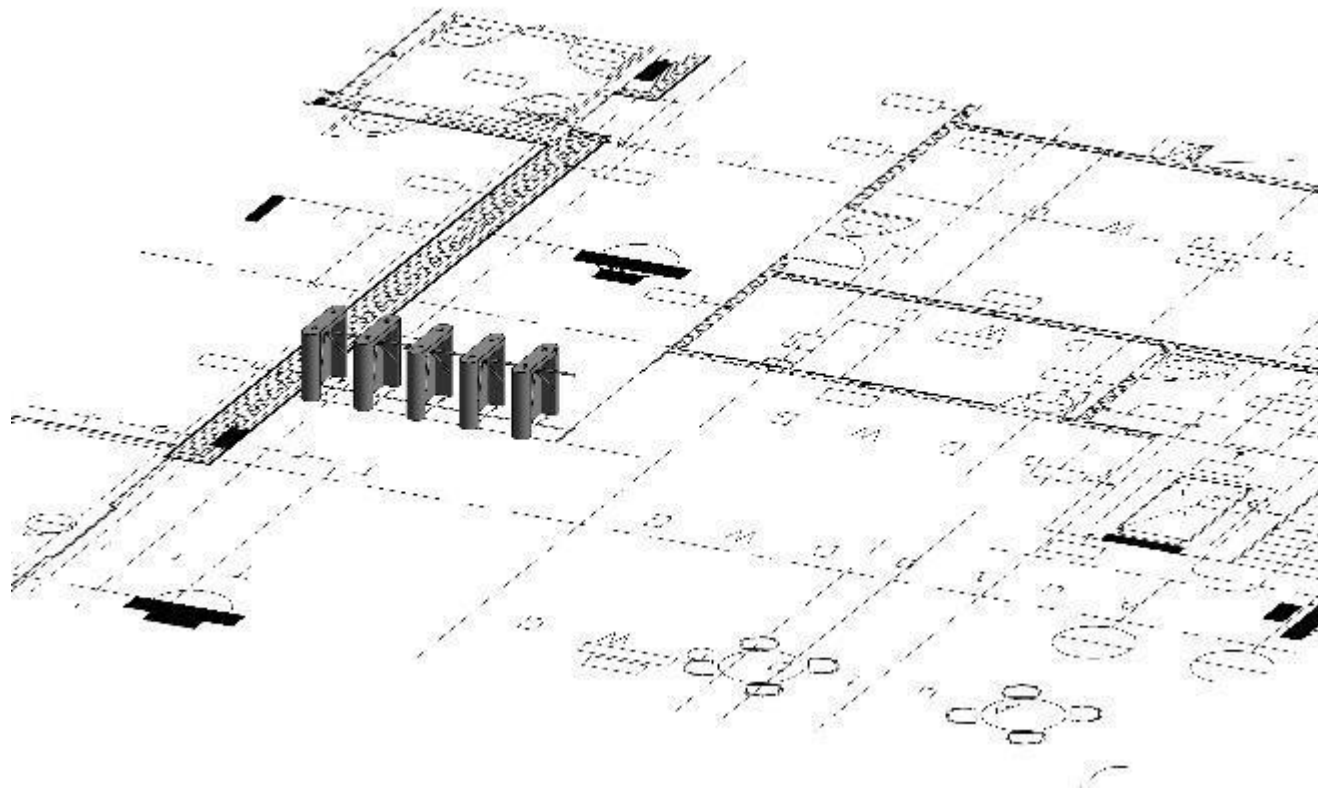
- (1) They freewheel in the egress direction when primary power is lost, and freewheel in the direction of egress travel upon manual release by an employee assigned in the area.
- (2) They are not given credit for more than 50 percent of the required egress width.
- (3) They are not in excess of 39 in. (990 mm) in height and have a clear width of not less than 16½ in. (420 mm).

7.2.1.11.2 Turnstiles exceeding 39 in. (990 mm) in height shall meet the requirements for revolving door assemblies in 7.2.1.10.





# Turnstiles

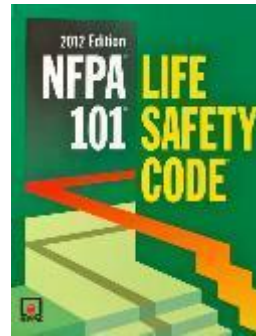


NFPA 7.2.1.11

Code Compliance

Check the following Criteria as per NFPA 7.2.1.11

1. Freewheel in direction of egress when power is lost.
2. Freewheel in the direction of egress travel upon manual release.
3. Maximum height of 39 in (910mm) and Width not less than 16 1/2 in. (420mm)



## Thank you

Architectural Openings, Codes & Standards.

How BIM (Building Information Modeling) can help us in achieving safe building in today's complex building systems.

