

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 relative codes and standards say about these and how these can be handled.

The presenter 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 Codes and Standards requirement related to doors*
2. *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

Altaf Afridi,

Deputy VP Marketing, Middle East & Africa and head of Architectural Specification team at dormakaba.

A Civil Engineer having 15 years of extensive experience in Architectural hardware and openings industry of his total 20 years of experience. Specialist of fire rated doors, first certified FDAI (Fire Door Assembly Inspector) outside US, certified Project Management Professional (PMP), LEED AP and Life Safety code (NFPA 101) specialist related to Architectural openings.


Mr. Afridi 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 a good data base of lessons learnt. He has been doing presentations on Life Safety code at architect offices in UAE, Saudi Arabia, Jordan, Lebanon and Qatar. He has been assisting architects providing solutions at the design stage for doors, doors hardware, movable walls, glass fittings and access control products and systems..





DORMA

Architectural openings and
Codes & Standards - **the missing link.**



Welcome

Altat A. Afridi, PMP, LEED AP, FDAI
at Armed Forces Offices Club, Wednesday, Dec. 12, 2012

SESAM Safety Design in Buildings altat@dormagulf.com

SESAM **SDiB (Safety Design in Buildings)** **DORMA**

Access Control & Egress Planning



Altat A. Afridi, PMP, LEED AP, FDAI
Oct 2014, Dammam, Riyadh, Jeddah, KSA

altat.afridi@dorma.com 00971-50-5507892

Safety Design in Buildings **DORMA**

Doha Conference Crowne Plaza Doha - The Business Park, Monday, April 20, 2015

Aligning Safety, Security and
Aesthetics in Architectural Openings

Welcome

Altat A. Afridi
Regional Marketing Director – MENA, DORMA
Email: altat.afridi@dorma.com

dormakaba Safety Design in Buildings **DORMA**

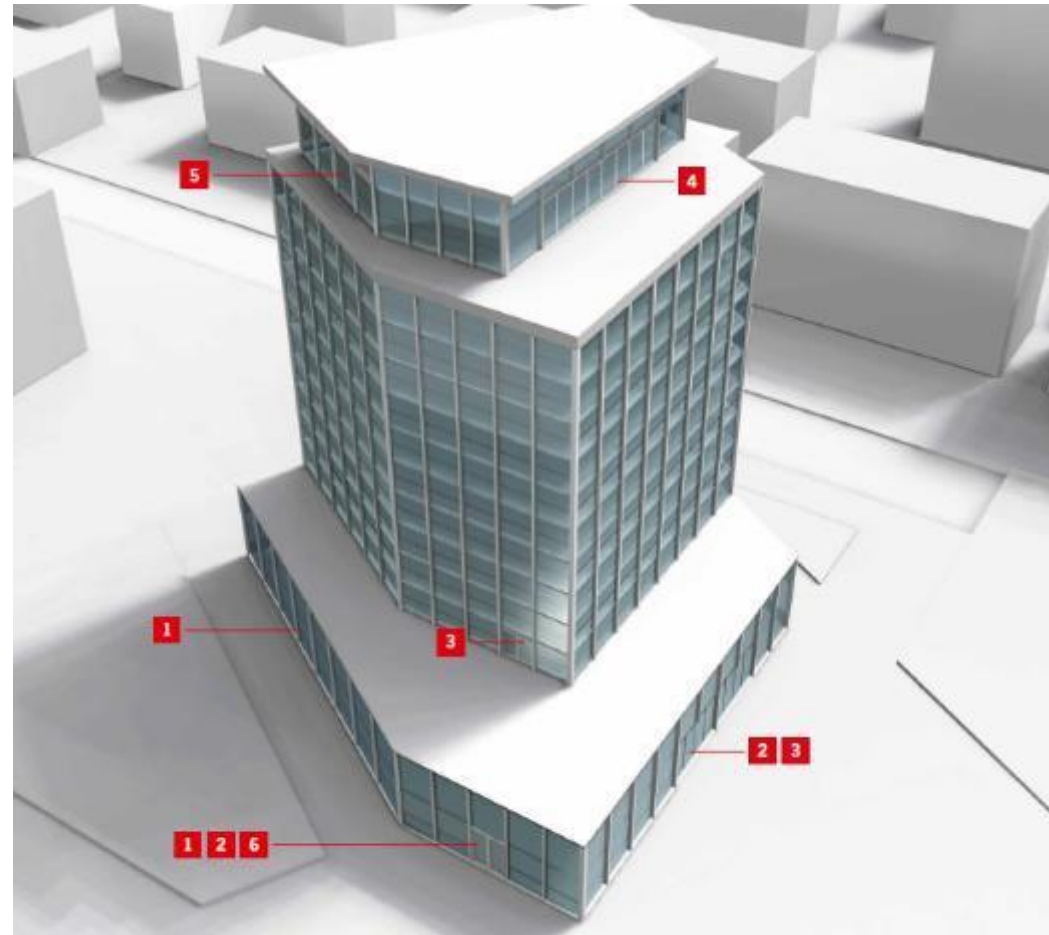
Cairo Conference Monday, October 17, 2016, Jil Marriott Hotel Cairo

INTEGRATING SAFETY & SECURITY SYSTEMS IN ASSEMBLY OCCUPANCIES
Access/Egress in Stadiums





Architectural Opening





Architectural Opening

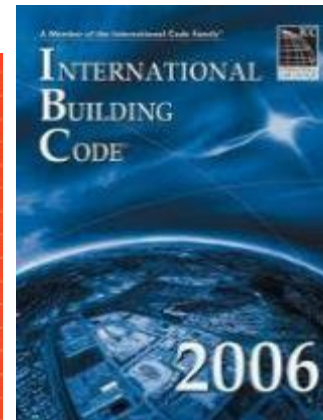
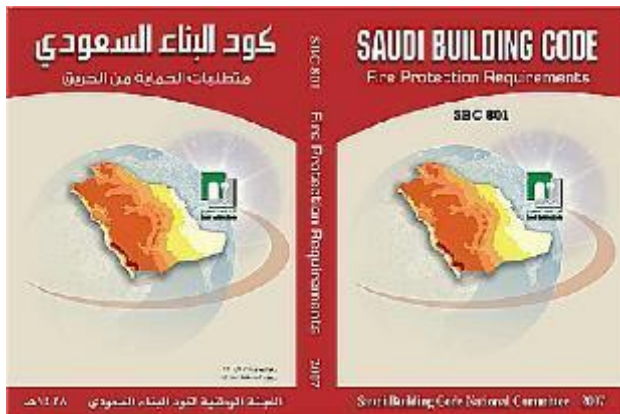
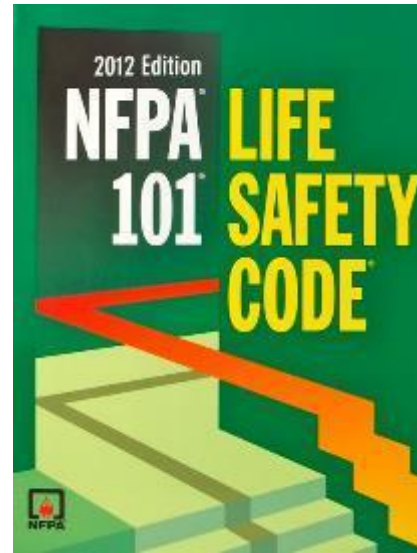
- Door is a moving structure used to block off, and allow Entrance to or Exit from a space for
 - Privacy,
 - Convenience,
 - Safety & Security.
- Helps in:
 - Air Drafts control
 - Smoke and Fire compartmentation
 - Noise Barrier.
 - Access Control
 - Egress





Codes & Standards

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



Brief history of Buildings fires

Collinwood school fire

Lakeview USA, 1908



The **Collinwood school fire**, March 4, 1908, was one of the deadliest disasters of its type in the [United States](#), resulted in the deaths of 172 students, two teachers and a rescuer.



Fire

Lake View School was built with masonry outer walls, much of the four story building's floor structure system used wooden joists, that caught fire overheated by a steam pipe.

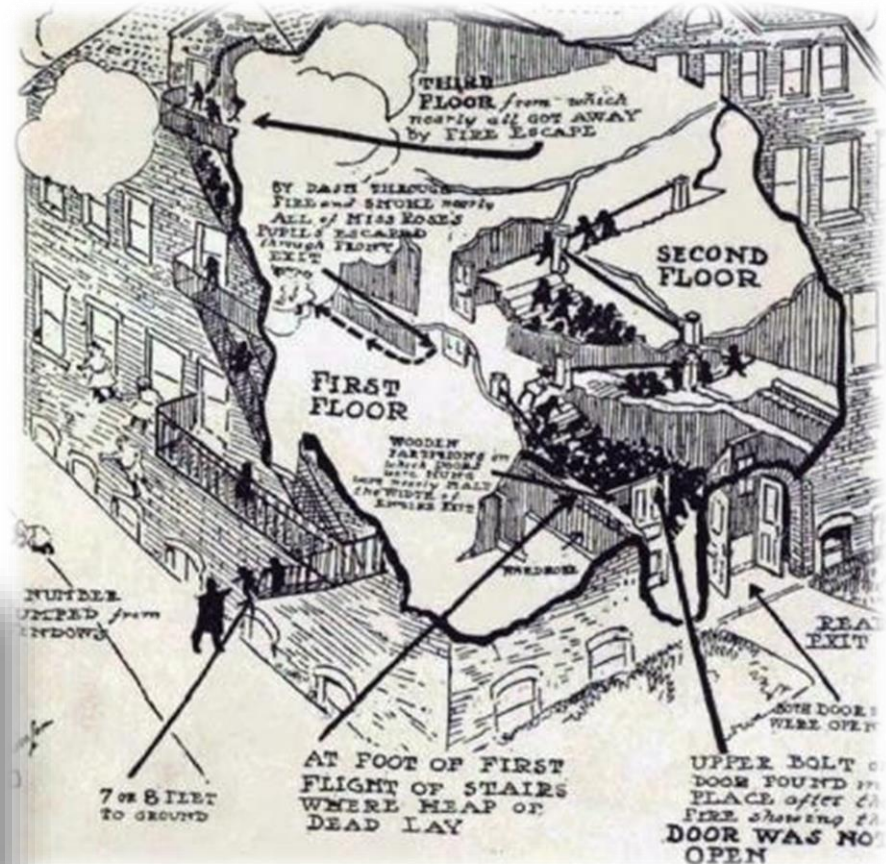


The building's main staircase extended from the front doors of the building, up to the third floor, and had **no fire doors**. **The stairwell acted like a chimney**, helping to spread the fire quickly.

Flames quickly blocked escape routes, leaving many students pressed against doors that were locked or opened inward.



Panic lead to the crush of a large number of students in stairwell vestibules. **Some children died jumping from second- and third-story windows**. Community members watched as victims trapped in the building were burned beyond recognition.





Brief history of Buildings fires

Iroquois Theater fire

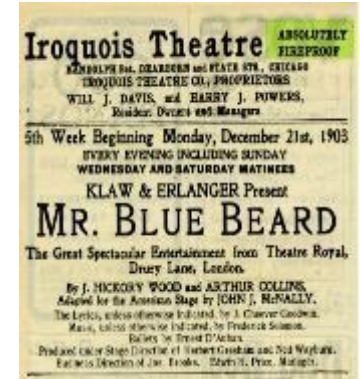
Chicago, 1903



Iroquois Theater advertised itself as the "**fireproof**" construction. Designed with the latest in fire-safety technology, it had **27 exits** and bragged its 1,700-seat audience could **empty the theater in less than five minutes**.

Architect Benjamin H. Marshall wanted to assure the public that the Iroquois was safe. He studied a number of fires that had occurred in the past and made every effort to make sure that no tragedy would occur in the new theater.

The Iroquois had **25 exits**. The stage had also been fitted with an **asbestos curtain** that could be quickly lowered to protect the audience. **Sprinklers** were included in design.



The Iroquois was designed for **1,600** people. It is believed there was an overflow crowd of nearly **2,000** people filling the seats and standing four-deep in the aisles. Another crowd filled the backstage area with **400** actors.

Fire started at stage

The gallery and upper balconies sustained the greatest loss of life as the patrons had been **trapped by locked doors** at the top of the stairways. The firefighters found **200** bodies stacked there. When it was all over, **572** people died in the fire and more died later, bringing the eventual **death toll up to 602**, including **212 children**



The investigation discovered that:

- Two **vents of the building's roof** had been **nailed shut**.
- "Fireproof" asbestos curtain** was **combustible**.
- The **sprinklers** were **too unsightly** and **too costly** and had **never had them installed**.
- Nine pair of iron panels over the doors were **padlocked**.
- The doors of the outside exits, which were supposed to make it possible for the theater to empty in five minutes, **opened to the inside (Door Swinging in)**.



Brief history of Buildings fires

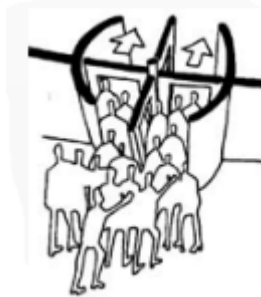
The Cocoanut Grove club fire

Boston, USA, 1942



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. **Bodies piled up behind both sides of the revolving door**, jamming it until it broke.

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.**



Cocoanut Grove fire



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

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



Brief history of Buildings fires

Victoria Hall tragedy

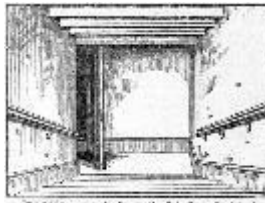
Sunderland, Great Briton, 1883



There was not 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, which led to the invention of 'push bar' emergency doors.** This law still remains in full force as of 2013.





Brief history of Buildings fires

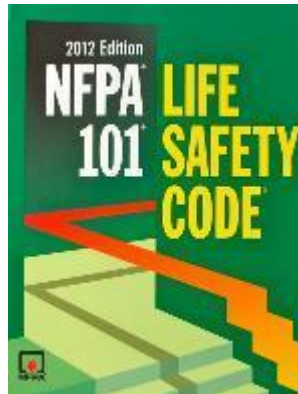
The Kathmandu Disaster (Stadium)

Nepal, 1988

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

- Structure : **No proper Roofing**
- Fans attempted to flee from a hailstorm inside the stadium.
- **Exit doors were closed.**
- Spectators rushed to the stadium's **eight exits** but found **only one open.**



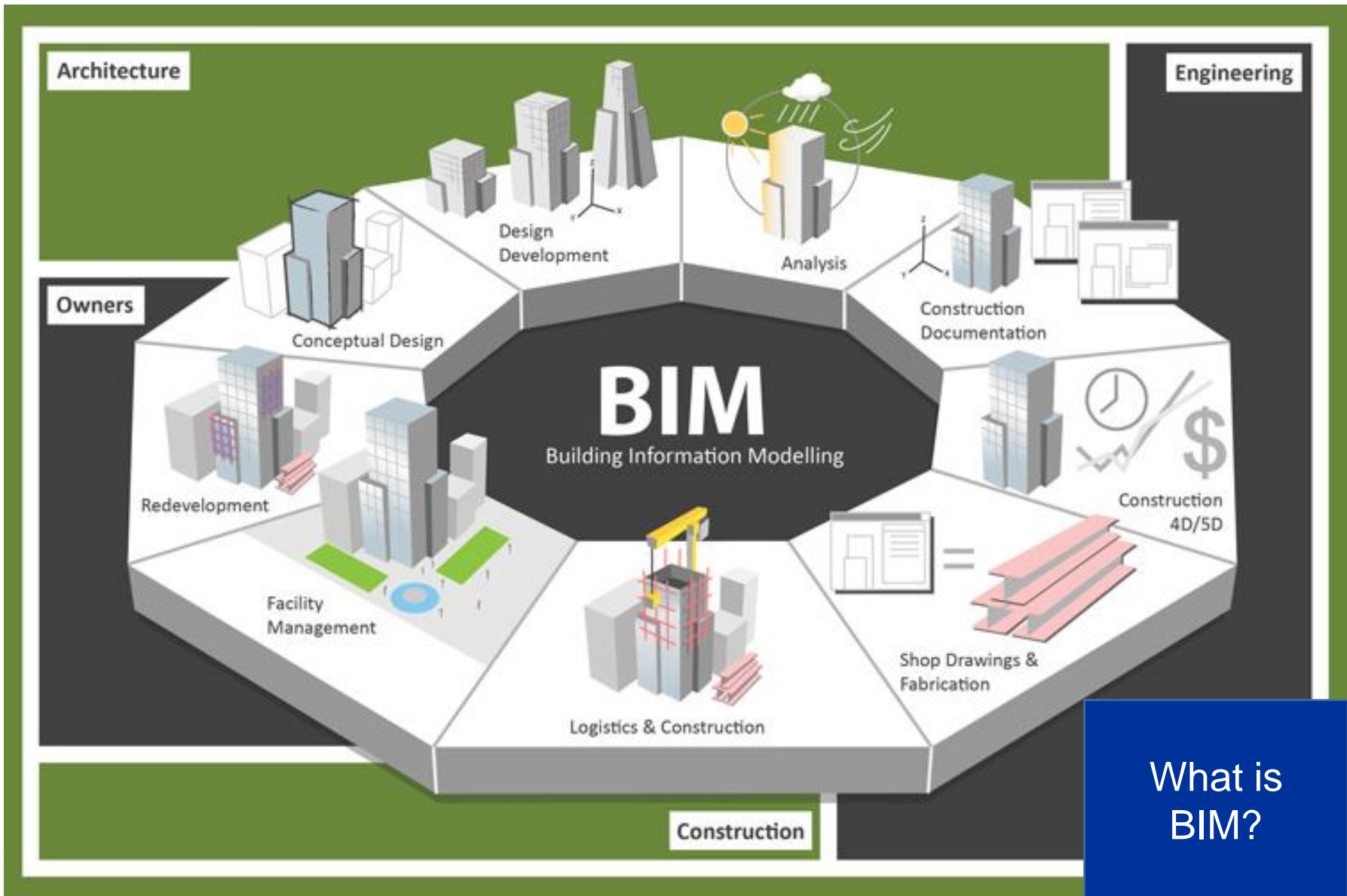


Conventionally BIM is **Building Information Modeling**, but it can be used as **BI²M**.

**Building
Information
Modeling**



**Building
Information *with
intelligence*
Modeling**



What is BIM?



Building Products & BIM

Fire Rated doors to be Self Closing and Self Latching

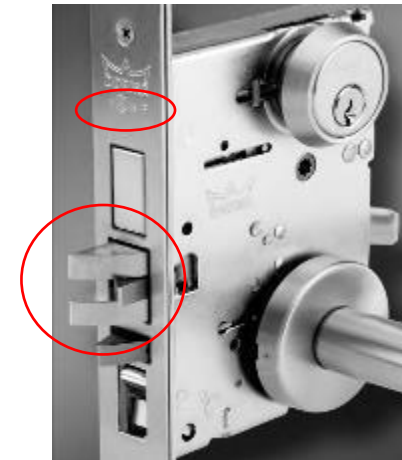
NFPA 80 Standard for Fire doors...

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.

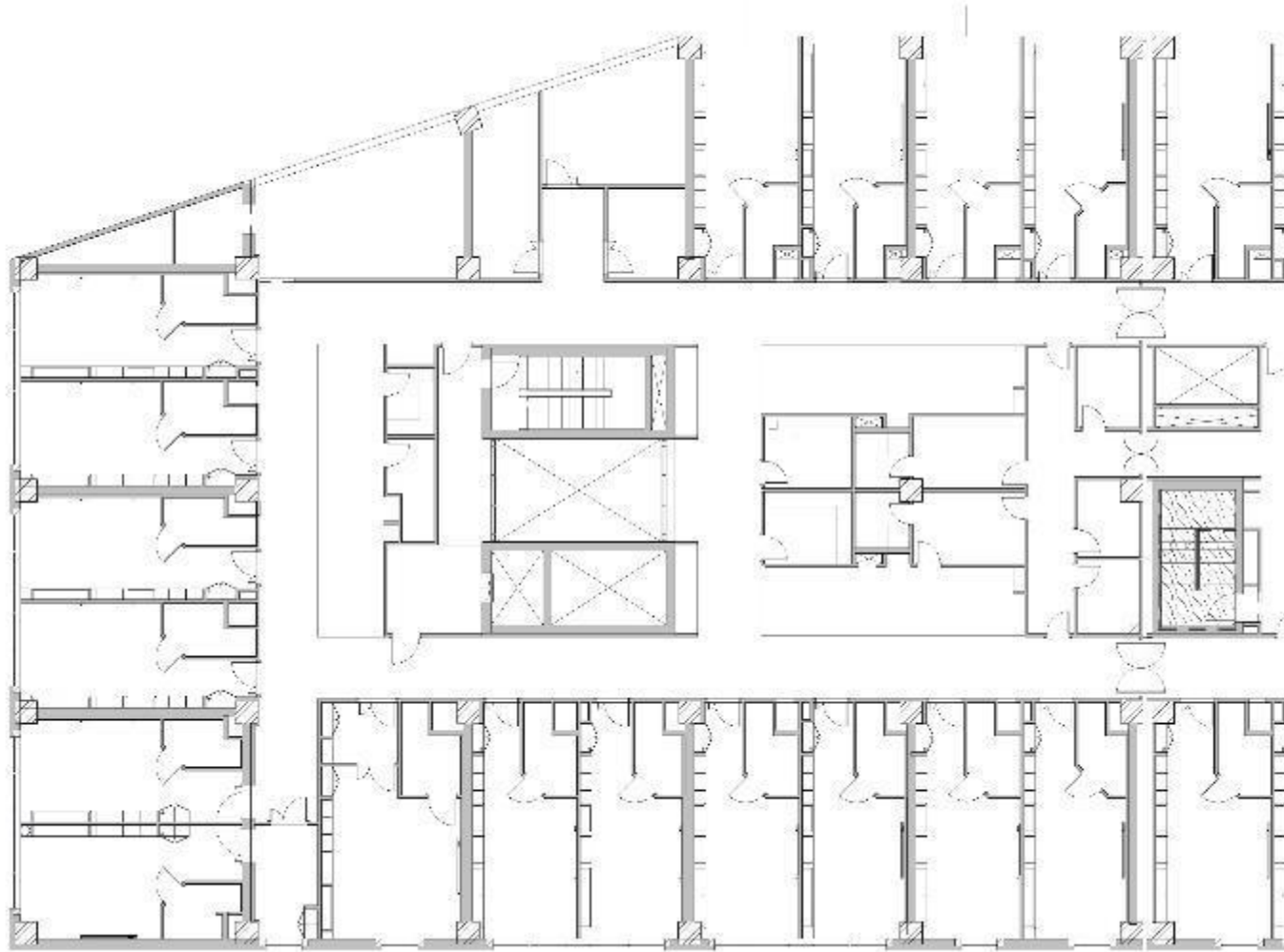
6.1.3.2.1 Self-closing doors shall swing easily and freely and shall be equipped with a closing device to cause the door to close and latch each time it is opened.

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



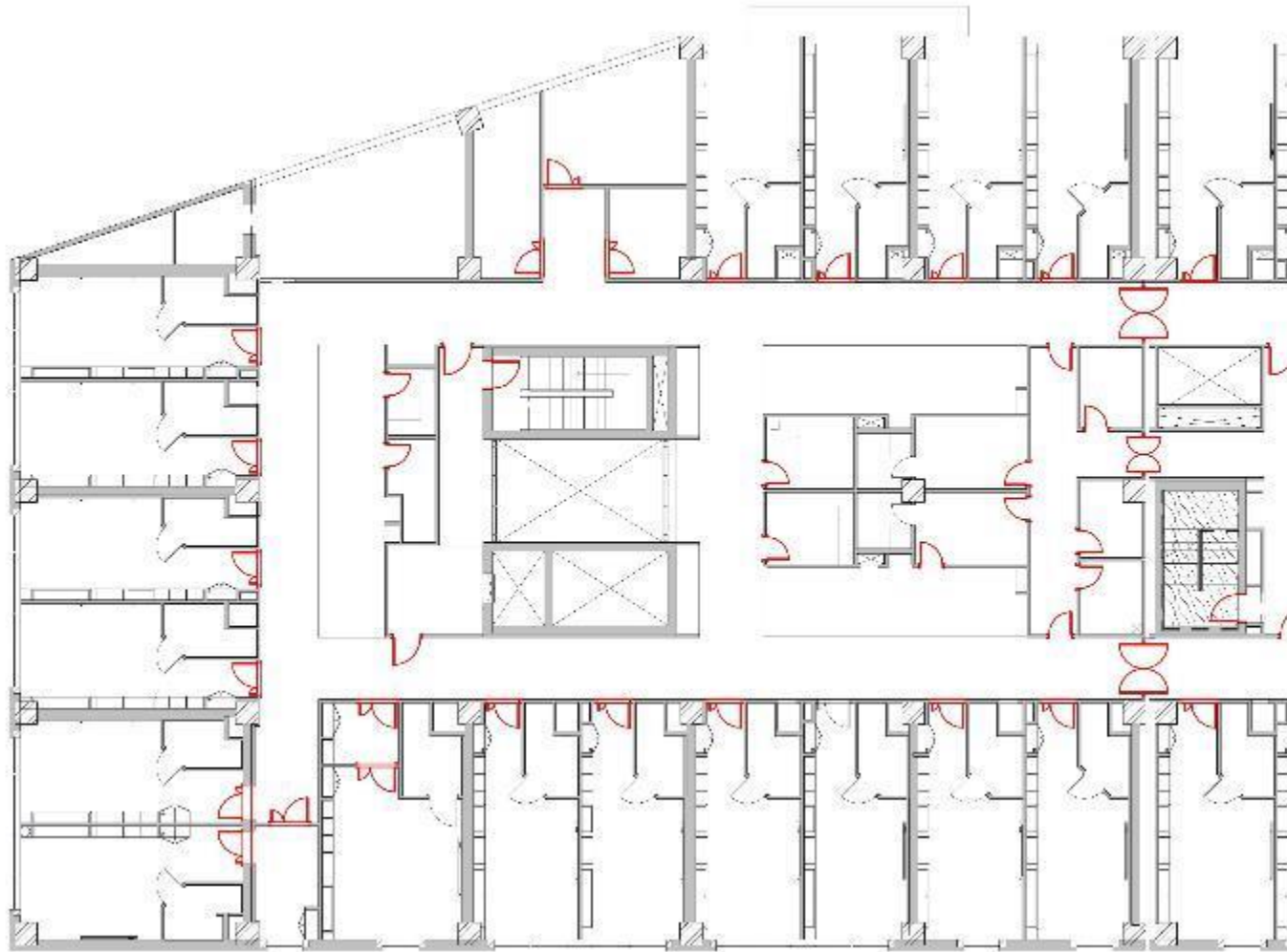


Fire Rated doors to be Self Closing and Self Latching





Fire Rated doors to be Self Closing and Self Latching





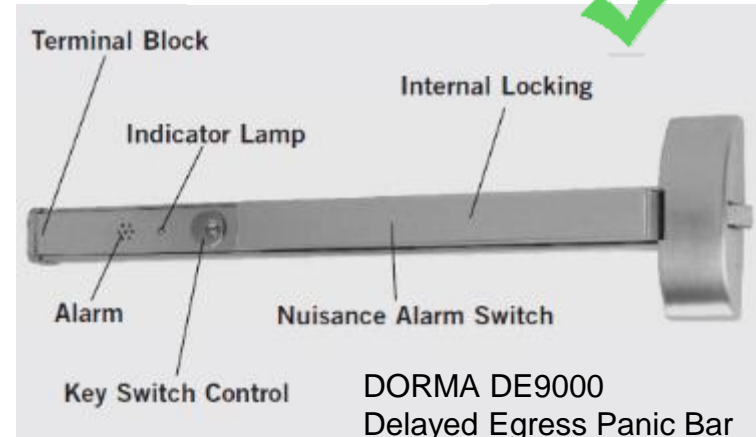
Emergency Exit/Escape doors

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.

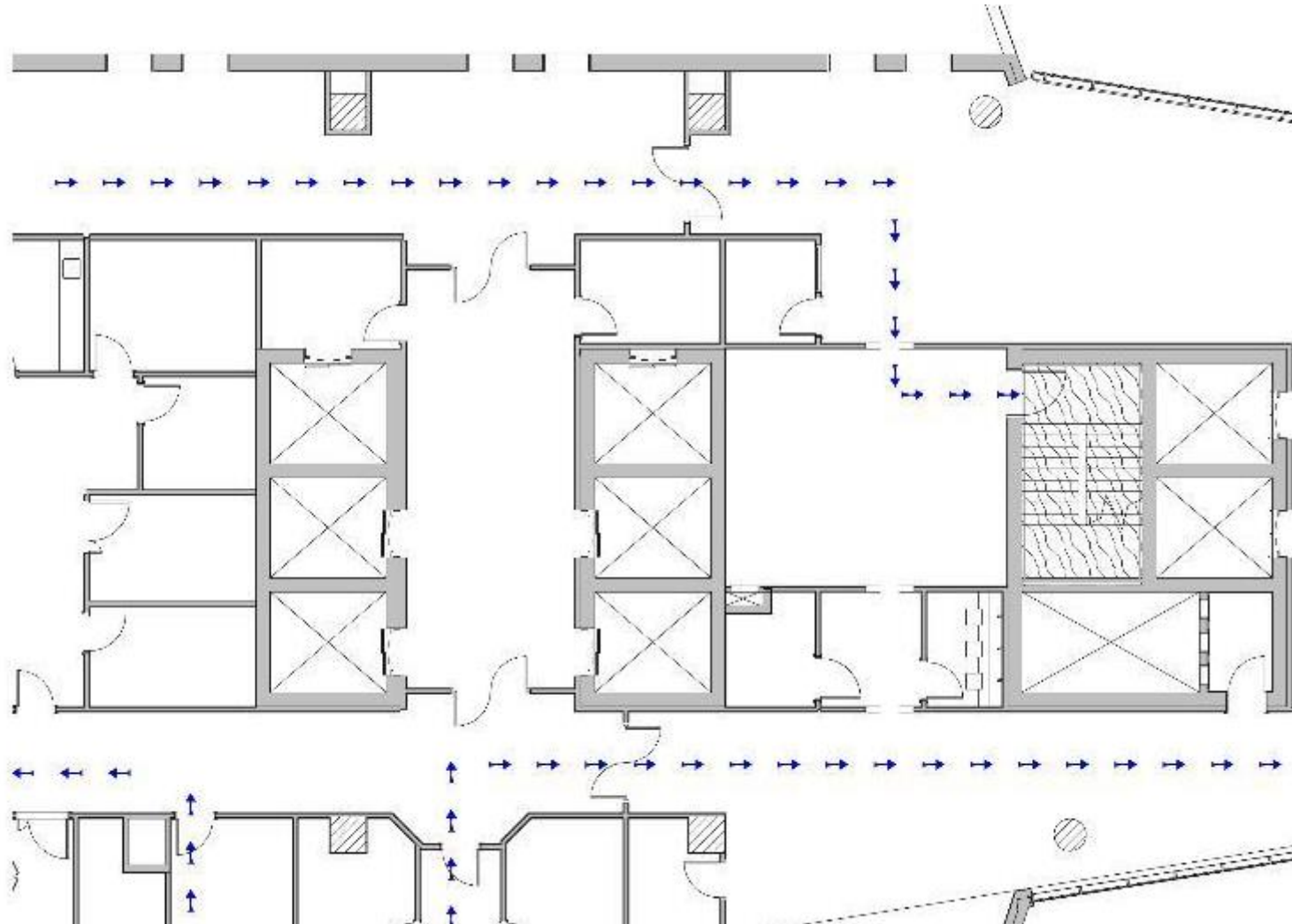


PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS



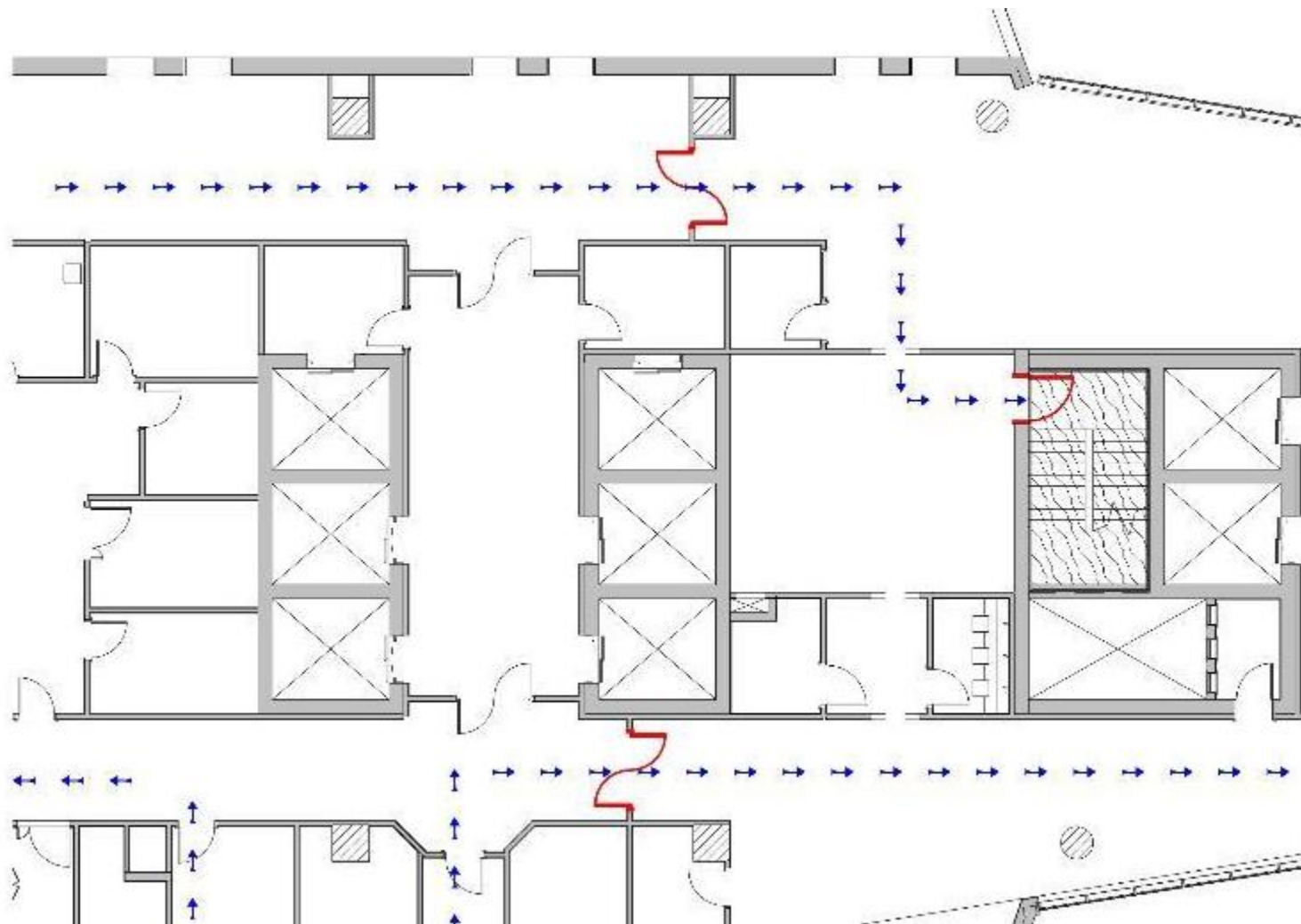


Emergency Exit/Escape doors





Emergency Exit/Escape doors





Occupant Load

7.3.1 Occupant Load.

7.3.1.1 Sufficient Capacity.

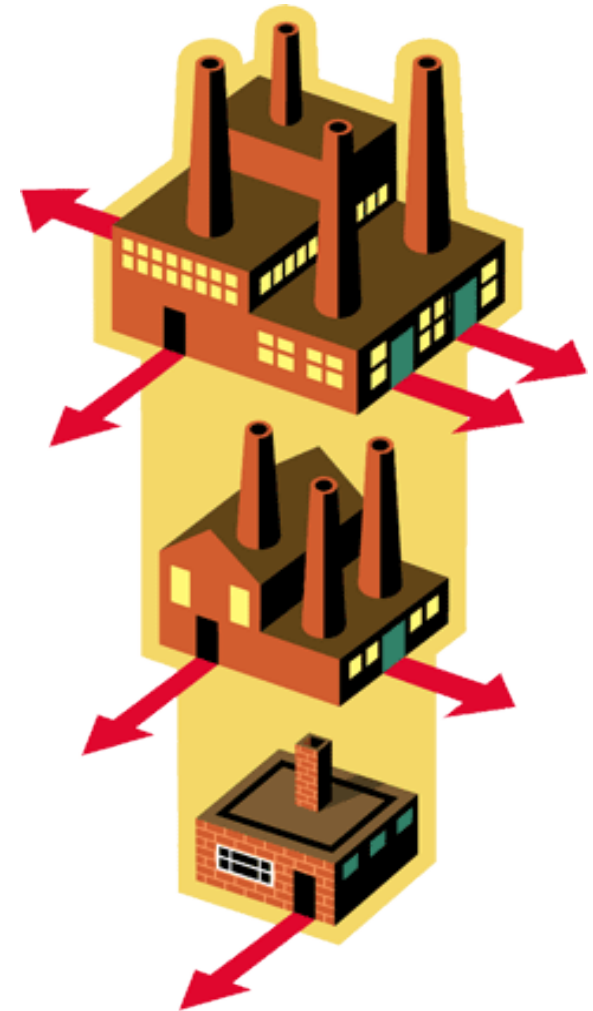
7.3.1.1.1 The total capacity of the means of egress for any story, balcony, tier, or other occupied space shall be sufficient for the occupant load thereof.

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.





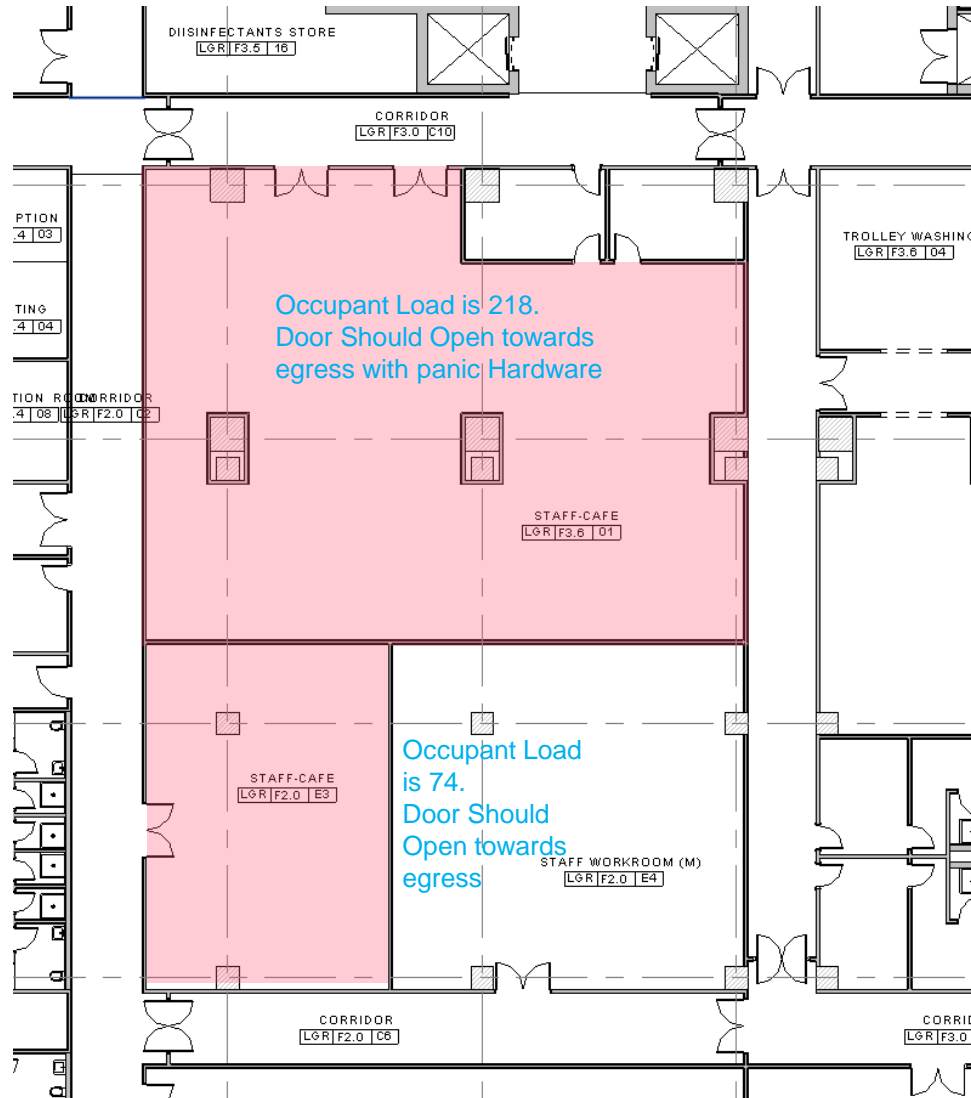
Occupant Load



Code Compliance



Occupant Load



Code Compliance

Powered Door Leaf Operation

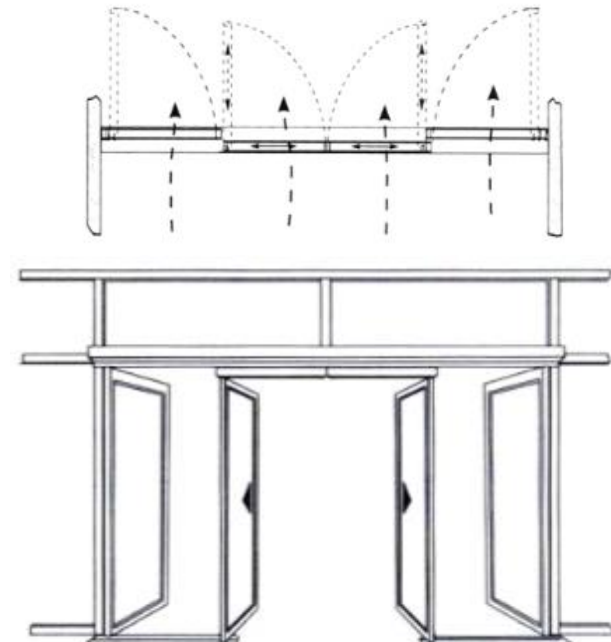
7.2.1.9* Powered Door Leaf Operation.

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.

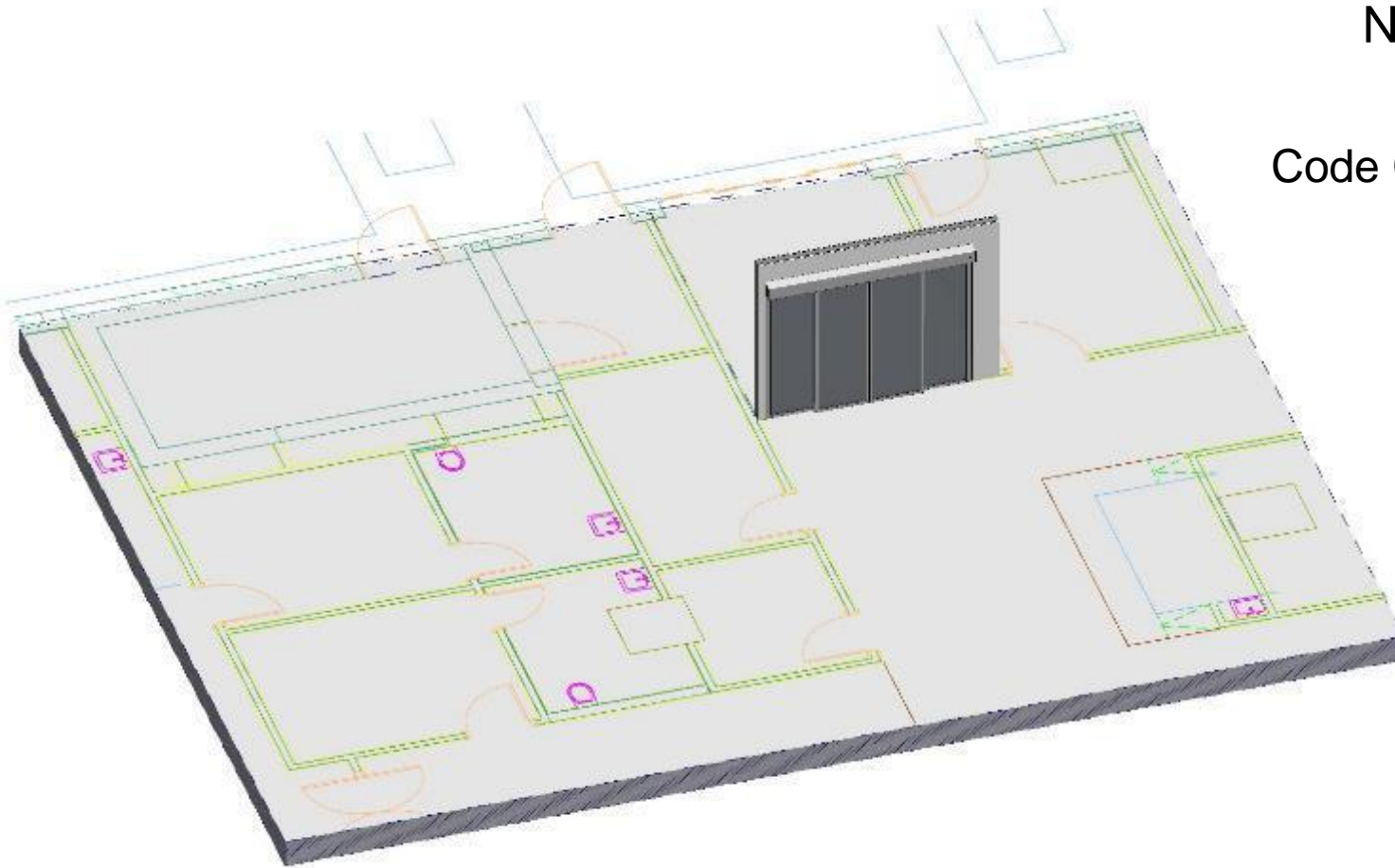
7.2.1.9.1.6 For a biparting sliding door assembly in the emergency breakout mode, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 32 in. (810 mm) single-leaf requirement of 7.2.1.2.3.2(1) if a clear opening of not less than 32 in. (810 mm) is provided by all leaves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



Powered Door Leaf Operation

NFPA 7.2.1.9

Code Compliance



Check the following as per NFPA 7.2.1.9

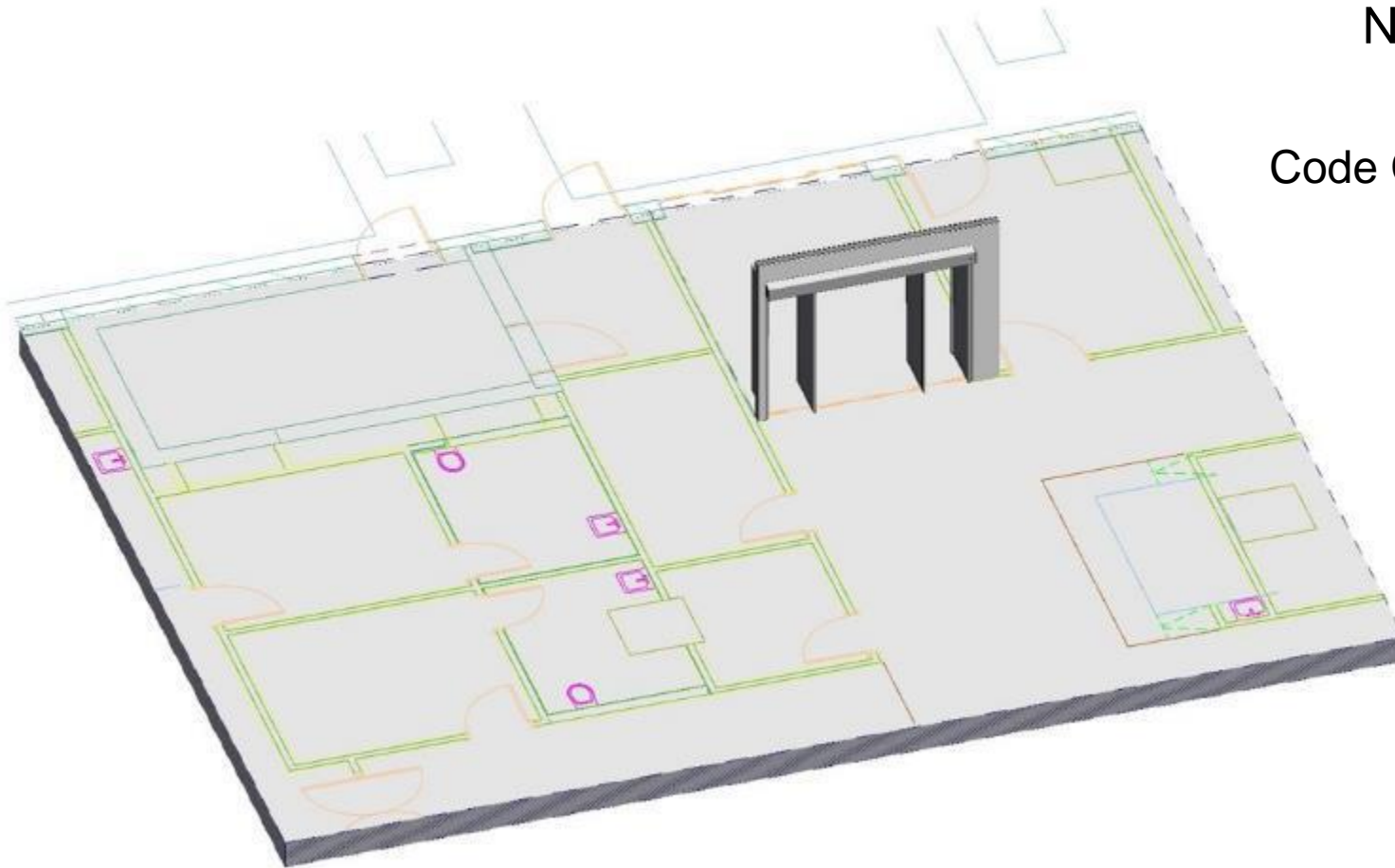
1. Emergency Breakout, Clear width of Single Panel not less than 32 in.(810mm)



Powered Door Leaf Operation

NFPA 7.2.1.9

Code Compliance





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Boston, USA, 1942



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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. **Bodies piled up behind both sides of the revolving door**, jamming it until it broke.

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.**



Cocoanut Grove fire



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

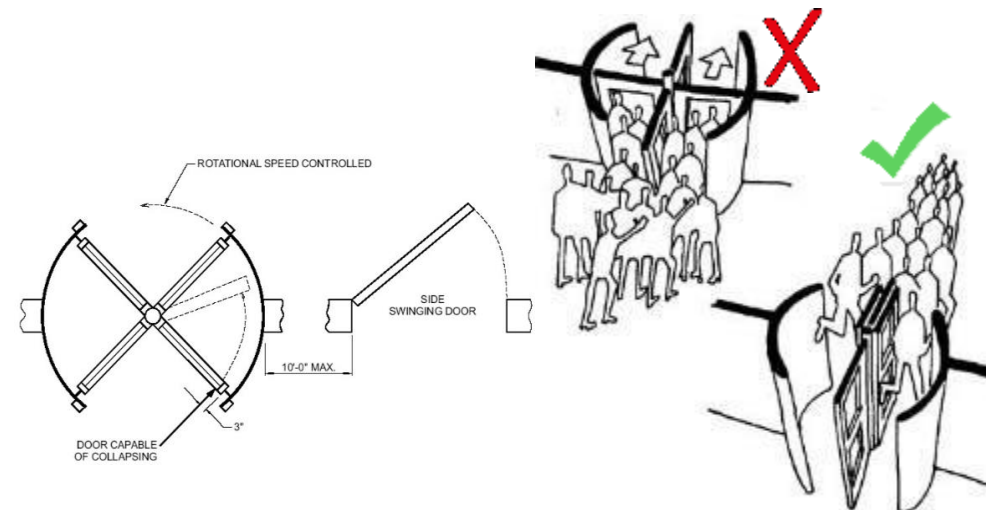
Time	Around 10:15 pm
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Revolving Doors

7.2.1.10 Revolving Door Assemblies.

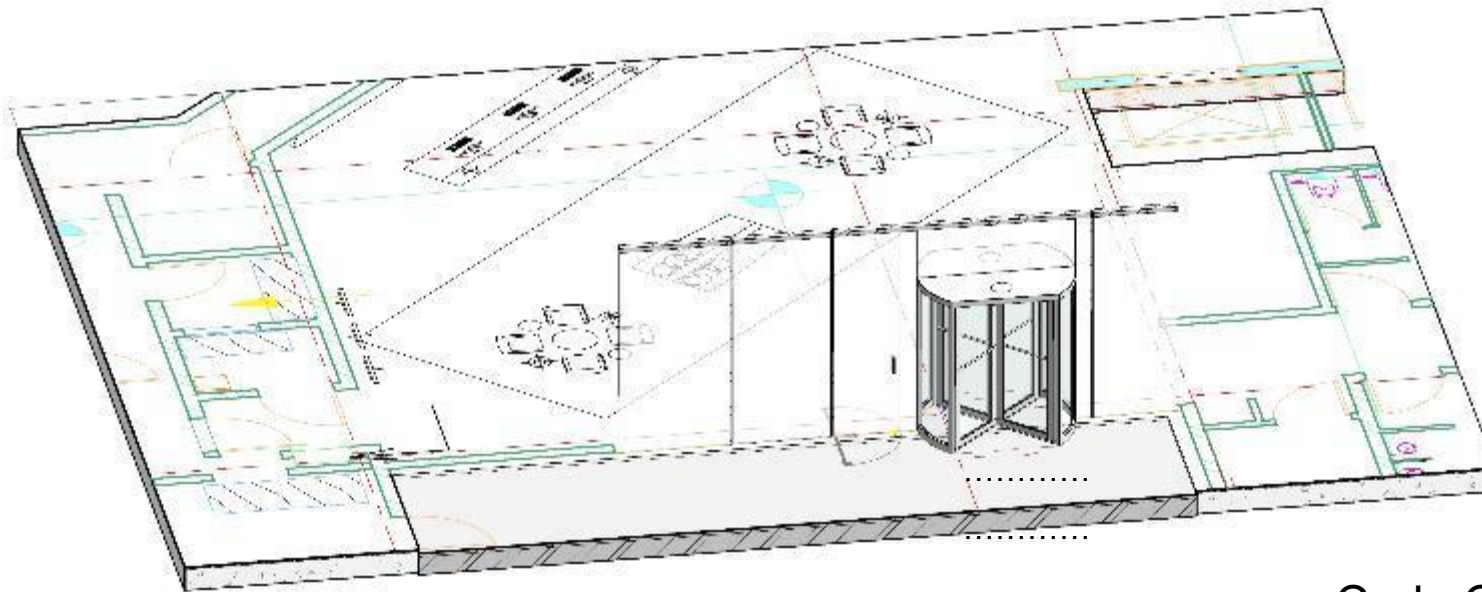
7.2.1.10.1 Revolving door assemblies, whether used or not in the means of egress, shall comply with the following:

- (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:



Revolving Doors

NFPA 7.2.1.10



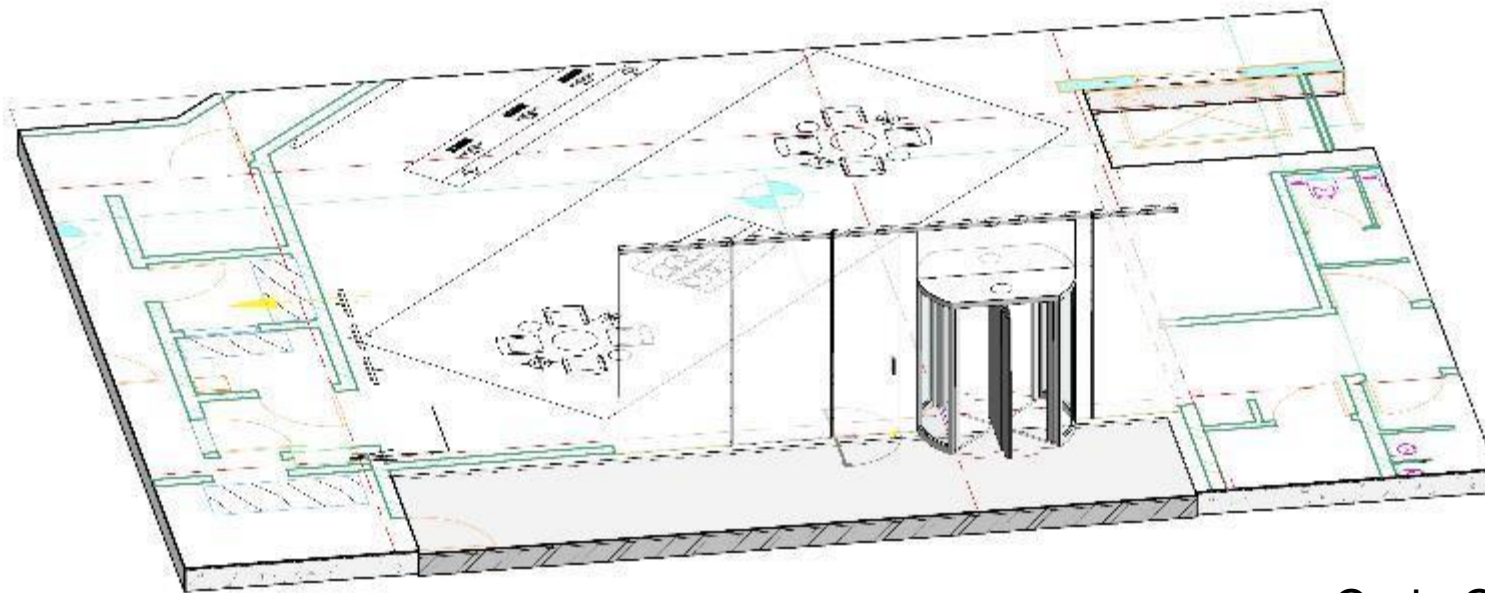
Code Compliance

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:

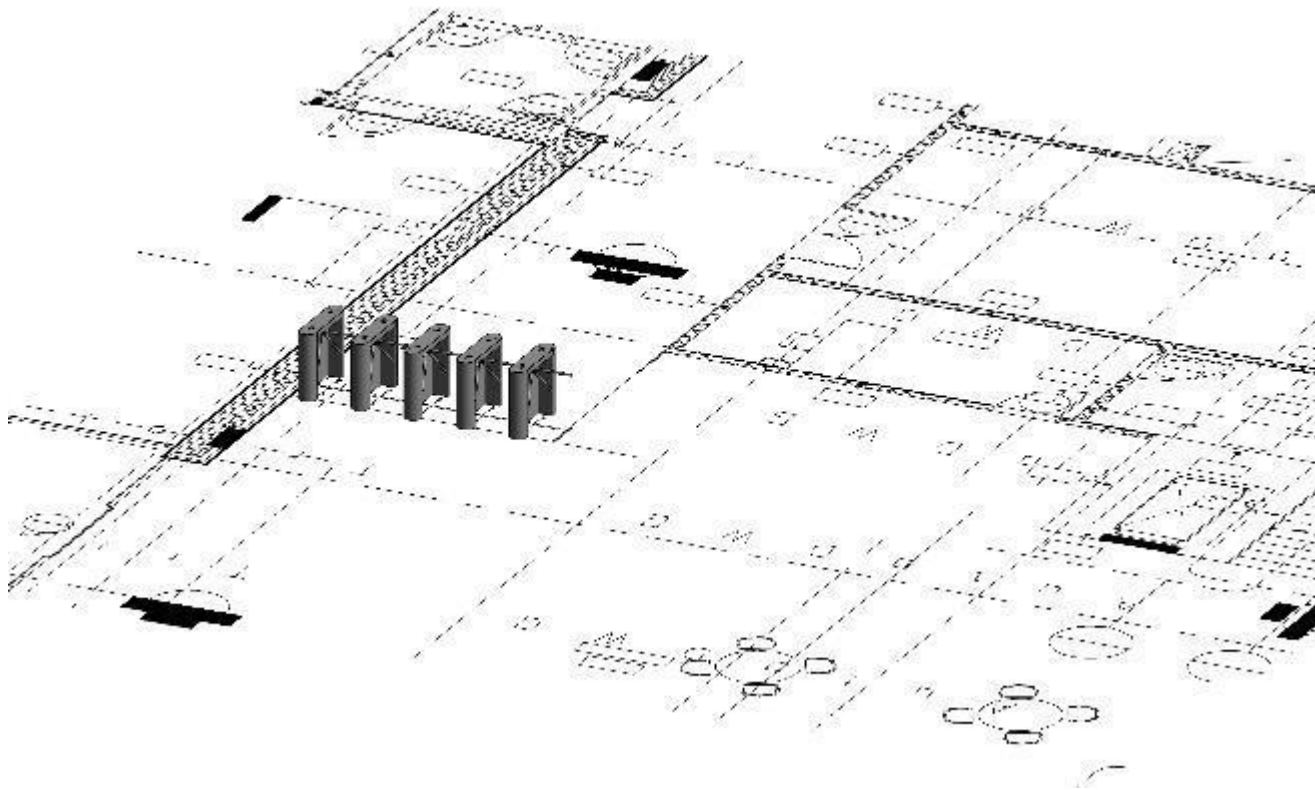
- (1) They freewheel in the egress direction when primary power is lost, and freewheel in the direction of egress travel upon manual release by an employee assigned in the area.
- (2) They are not given credit for more than 50 percent of the required egress width.
- (3) They are not in excess of 39 in.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

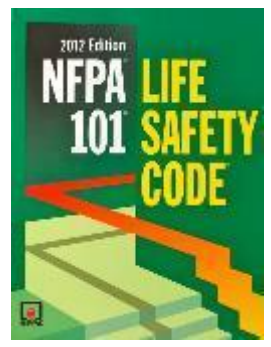
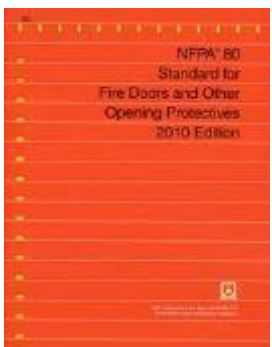
Check the following Criteria as per NFPA 7.2.1.11

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)



Riyadh Conference

Sunday, April 30, 2017, Moevenpick Hotel Riyadh



Thank you

Architectural Openings, Codes & Standards.

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

