

# In Case of Fire, Use Stairs- and Elevators

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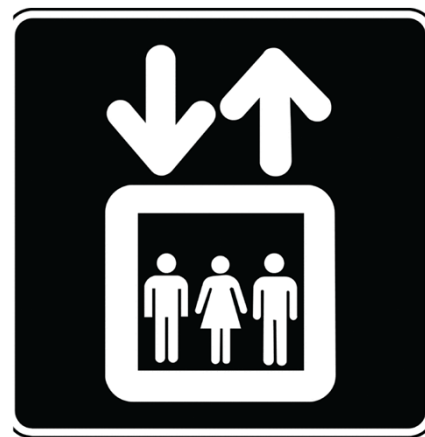


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## AGENDA

Introduction  
Background  
Code Perspective  
Health Care Project  
Considerations  
Challenges  
Discussion



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What, When, or Where?

- Year First Modern Era Elevator Invented?



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

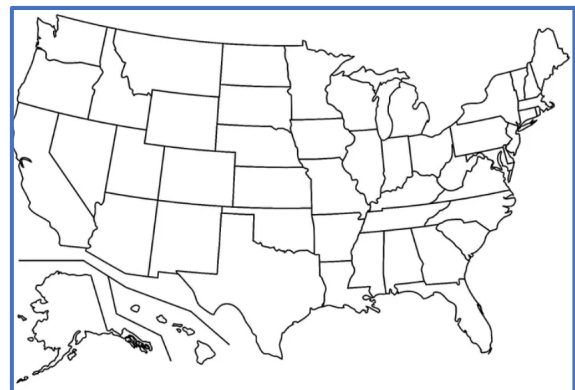
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What, When, or Where?

- Location of First Well-Known Installation in the US?



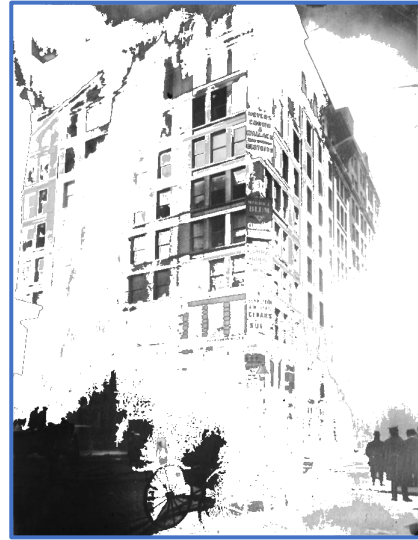
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## What, When, or Where?

- First Used for Fire Evacuation (Year/Event)?



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## What, When, or Where?

- Year First Code Provisions Considered?



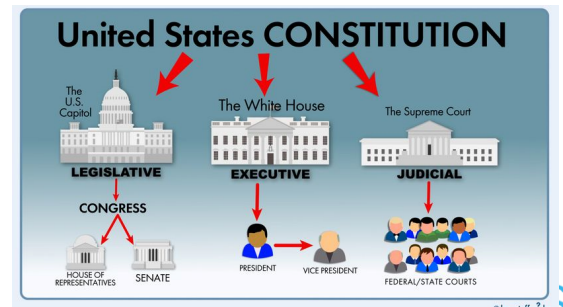
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## What, When, or Where?

- Federal Legislation that Accelerated Elevator Use Concept for Emergencies?



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## Elevator Types/Service/Categories: Hospital



PASSENGER



FREIGHT



FIRE SERVICE



HOSPITAL

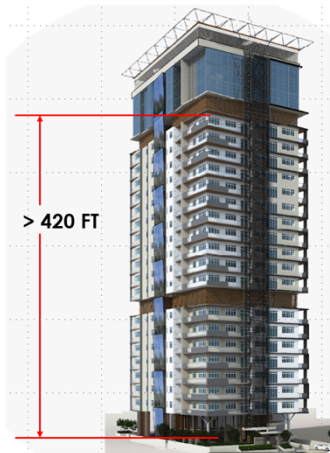
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## WHAT ARE WE TALKING ABOUT? AND WHY WOULD I DO THIS?

-Voluntary Option-NFPA 101, Chapter 7

-Sort of Voluntary Option-IBC, Chapter 4



### Section 403.5.2 Additional Exit Stairway

1. Some exceptions
2. No credit towards egress
  - Egress Capacity
  - Scissor Stair
3. Design Criteria
4. Messaging

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## What's the Deal!!

420 Feet

Not R2

Timed Egress Not an Option



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# Then.....

Third Stair

Occupant Evacuation Elevator

Timed Egress Considered



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## Considerations

- Reduce Building Height
- Add Redundant Stair
- Lose Real Estate
- Spend more \$\$ on Elevator Design
- Fight City Hall



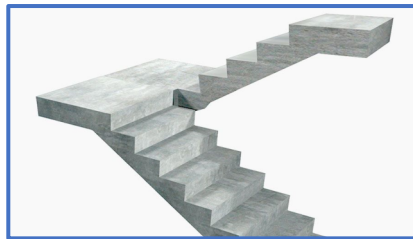
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# Considerations

- ~~Reduce Building Height~~
- Add Redundant Stair
- Lose Real Estate
- Spend more \$\$ on Elevator Design
- ~~Fight City Hall~~



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# Area of a Stair??

- Average:
  - This Project: 275 sq ft (One Stair)
  - 28 Floors: 7,700 sq ft
  - Revenue/FT<sup>2</sup>: \$500.00\*
  - \$3.85M
- Other Considerations (Life Cycle Cost)
  - Upkeep/Cleaning
  - Lighting
  - ITM
    - Doors, Emergency Lighting, FRR Walls, Standpipe



It was my understanding there would be no math.

\* MD Clarity: RCM Metrics Guide

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# NYC Projects

- Balancing Act
- NYC BC-Main Driver
- NFPA 101-2012 Integration

NEW YORK CITY BUILDING CODE

Handbook

ASME A17.1-2013, Safety Code for Elevators and Escalators  
CSA B44-13, Safety Code for Elevators

Edward A. Donoghue, CPCA

72 National Fire Alarm and Signaling Code 2016

APPENDIX K

CHAPTER K1

ASME A17.1-2013, SAFETY CODE FOR ELEVATORS

NYC Buildings SLS

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# NYC Health Care Project

- New Construction
- Predominant Occupancy Category/Function of Use
  - Health Care Occupancy: NFPA 101
  - Group I-2: NYC BC
- Number of Stories: 32
- Total Building Height: 575 ft.
- Health Care Floors: 496 ft

HOSPITAL

EMERGENCY ROOM

Top of Bulkhead = 574'-8"

Proposed MSK Pavilion

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# Options

## SECTION BC 403 HIGH-RISE BUILDINGS

- Section 403.5.2 Additional Exit Stairway
- Exception 1: In buildings where all passenger elevators for general public use and all other elevators for occupant self-evacuation comply with sections 3008.1 through 3008.11.

### 403.1 Applicability.

High-rise buildings shall comply with Sections 403.2 through 403.8.

### 403.5.2 Additional exit stairway.

For buildings other than Group R-2 that are more than 420 feet (128 m) in building height, one additional exit stairway meeting the requirements of Sections 1011 and 1023 shall be provided in addition to the minimum number of exits required by Section 1006.3. The total width of any combination of remaining exit stairways with one exit stairway removed shall not be less than the total width required by Section 1005.1. Stairs sharing any common wall, floors, ceilings, access stair assemblies, or other enclosures shall not be considered the additional exit stairway required by this section.

**Exceptions:** An additional exit stairway shall not be required to be installed in any of the following instances:

1. In buildings where all passenger elevators for general public use and all other elevators used for occupant self-evacuation comply with Sections 3008.1 through 3008.11;
2. In buildings where all of the following conditions are met:
  - 2.1. The commissioner has approved a timed egress analysis establishing the egress time it would take for a full building evacuation, utilizing the stairs required by Section 1006 and the additional stair that would have been required pursuant to Section 403.5.2;
  - 2.2. The commissioner has approved a timed egress analysis establishing the egress time it would take for a full building evacuation, utilizing the combination of the stairs required by Section 1006 and elevators used for occupant self-evacuation as follows:
    - 2.2.1. Such analysis need only utilize a number of designated elevators designed for occupant self-evacuation necessary to demonstrate an evacuation time that is less than the time established in Exception 2.1; and
    - 2.2.2. Every bank of passenger elevators for general public use shall be served by at least one such designated elevator;
  - 2.3. All elevators in the building that either are passenger elevators for general public use or are used for occupant self-evacuation shall comply with Sections 3008.1 through 3008.11. However, the standby power generating equipment required by Section 3008.9 need only be sized to satisfy the loads required to simultaneously operate those elevators identified in the timed egress analysis described in Exception 2.2.

The minimum number of exits required by Section 1006 are all at least 25 percent wider than the exit width required by Chapter 10. The increase in the stair width shall not be utilized in the timed egress analyses required by Exceptions 2.1 and 2.2.

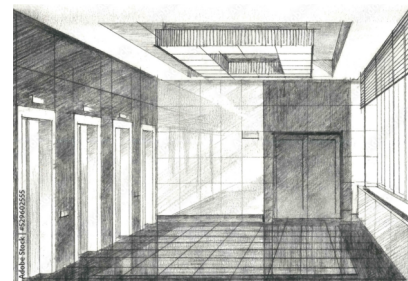
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## Good News: *It's Not So Bad\**

- Already Need Elevators
  - Elevator Cars-Same
  - Elevator Shaft-Same
- Enhancements
  - Elevator Lobby
  - Communication
  - Fire Alarm System Interface/Elevator Controls
  - Back Up Power
  - Water Intrusion Plan
  - Control/Power Cable



\* Thank You- Dido, 1998

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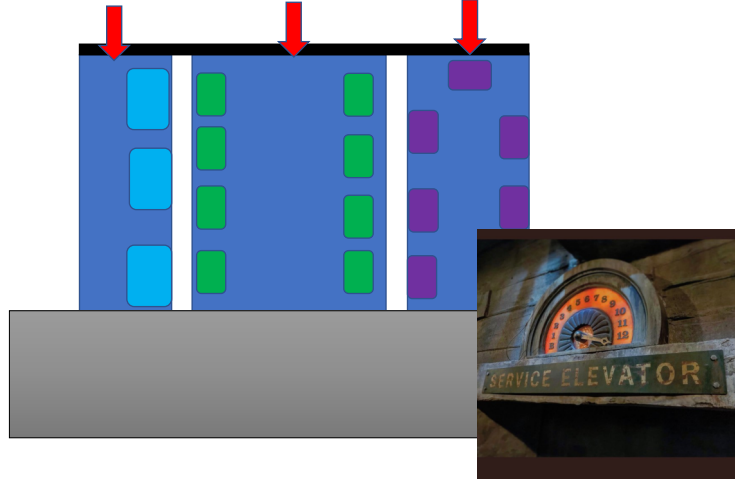
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## General Layout

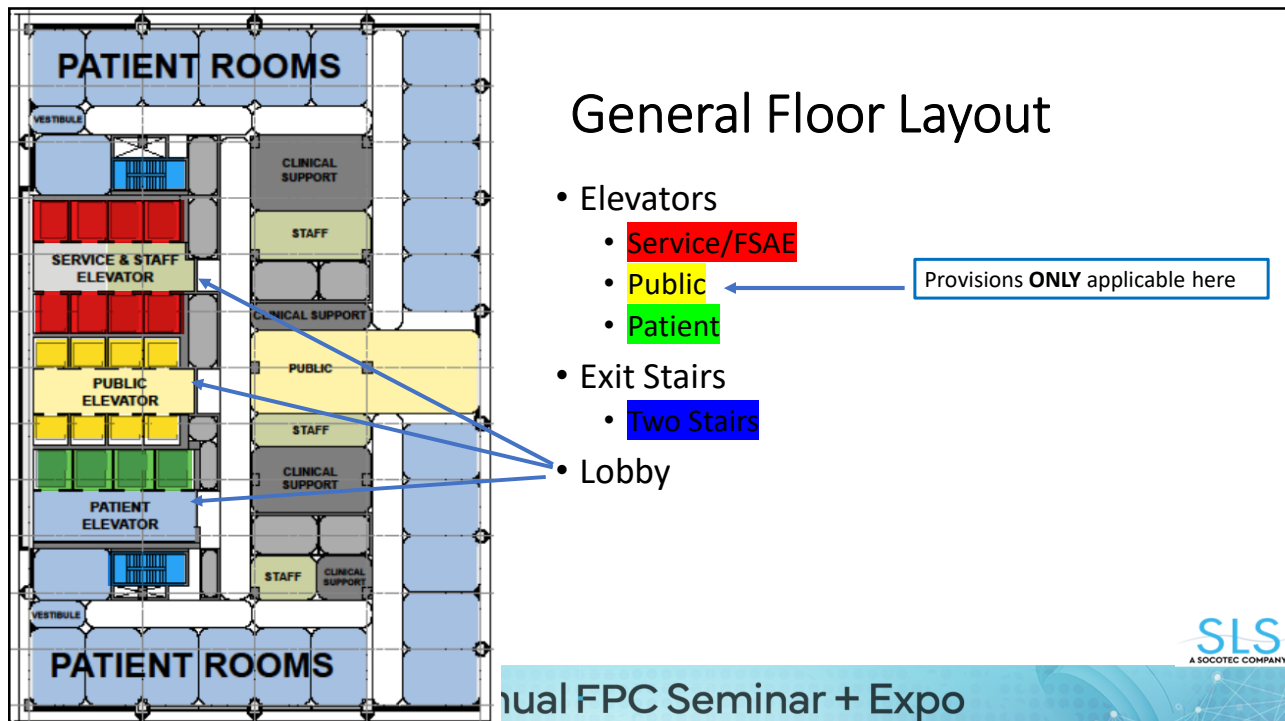
| Hospital Service | | Passenger | | Staff Access/Service/FSAE



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## Terms and Stuff

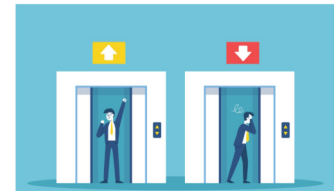
### Occupant Evacuation Elevators (OEE)

- Brick-and-Mortar Code Criteria
  - Lobby
  - Shaft Wall
  - Water Intrusion
  - Signage



### Occupant Evacuation Operations (OEO)

- How it Works
  - Tasking
  - HBIF
  - Flow of Information/Communication
  - Fire Department Interface



How to use elevator correctly?

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G GEAR ELEVATOR

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## NYC BC: Section 3008

SECTION	TOPIC
3008	OCCUPANT EVACUATION ELEVATORS
3008.1	General
3008.2	RESERVED
3008.3	Automatic sprinkler system
3008.4	Water protection.
3008.5	RESERVED
3008.6	Hoistway enclosure protection
3008.7	Occupant evacuation elevator lobby.
3008.8	Elevator system monitoring.
3008.9	Electrical power.
3008.10	Emergency voice/alarm communication system
3009.11	Hazardous material areas

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## Closer Look: NYC BC 3008.4

**Code Compliance Letter:**  
Occupant Evacuation Elevator  
and Fire Service Access  
Elevator Water Protection  
Approach

Methods Include:  
Trench Drain  
Floor Drain  
Sloped Floor Surface

**3008.4 Water protection.** An approved method to prevent water from infiltrating into the hoistway enclosure from the operation of the automatic sprinkler system outside the enclosed occupant evacuation elevator lobby shall be provided.



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## Closer Look: NYC BC 3008.6

**Reinforcement of:**

Vertical Shaft Design Criteria

Shaft Integrity Enhancement  
(Section 403.2)

**3008.6 Hoistway enclosure protection.** Occupant evacuation elevator hoistways shall be located in shaft enclosures complying with Section 713.

Required because of high  
rise/buildings greater  
than 420 feet



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## Closer Look: NYC BC 3008.7

### Multiple Requirements:

Exit Stair Access

Smoke Barrier with 1 hr FRR

Size

Signage

Two Way Communication

### 3008.7 Occupant evacuation elevator lobby.

The occupant evacuation elevators shall open into an elevator lobby in accordance with Sections 3008.7.1 through 3008.7.6. Egress is permitted through the elevator lobby in accordance with Item 1 of Section 1016.2



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## Closer Look: NYC BC 3008.7

### Multiple Requirements:

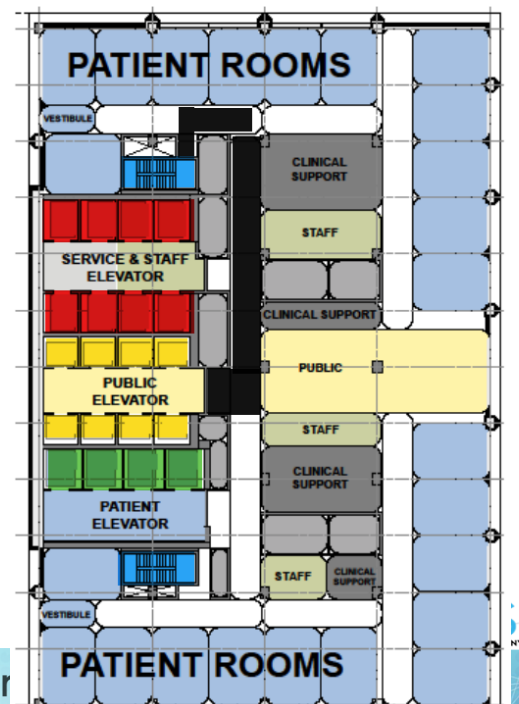
Exit Stair Access

Smoke Barrier with 1 hr FRR

Size

Signage

Two Way Communication



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## Closer Look: NYC BC 3008.7

### Multiple Requirements:

Exit Stair Access

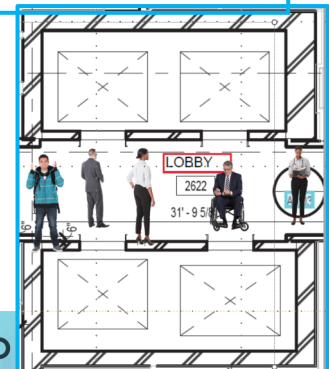
Smoke Barrier with 1 hr FRR

Size

Signage

Two Way Communication

- 3 ft<sup>2</sup> per person for 25% of the floor population
- 1 wheelchair space for every 50 people



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## Closer Look: NYC BC 3008.7

### Multiple Requirements:

Exit Stair Access

Smoke Barrier with 1 hr FRR

Size

Signage

Two Way Communication



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## Closer Look: NYC BC 3008.8

- Car location
- Travel direction
- Car occupied
- Power status (normal/standby)
- Status of FA initiation device in: lobby, machine room/space, control room, hoistway

**3008.8 Elevator system monitoring.** The occupant evacuation elevators shall be continuously monitored at the fire command center or a central control point approved by the fire department and arranged to display all of the following information:

- Capability to manually initiate Phase I recall

**3008.8.1 Elevator recall.**



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## Closer Look: NYC BC 3008.9

Normal/back up power for:

- Each OEE car
- Ventilation/cooling for MR, control spaces
- Car lighting



**3008.9 Electrical power**

**Type 60/Class 6/Level 1**

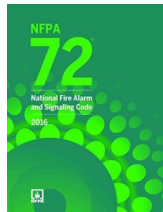
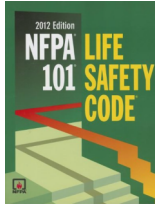
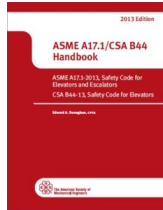


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## Other Considerations: OEO Mode/Function

### Applicable Codes



### Additional Information



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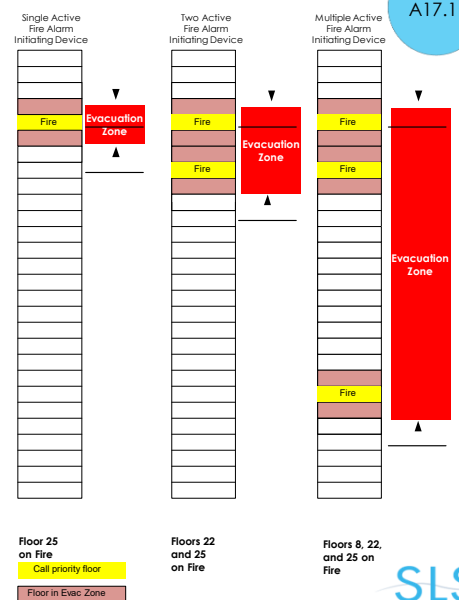
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## ELEVATOR CODE (ASME A17.1) REQUIREMENTS

### Tasking of Elevators in Occupant Evacuation Operation (OEO)

1. Fire Alarm System detects possible fire conditions remote from the elevator lobbies and declares an evacuation floor/ zone
2. Normal elevator operation ceases. Only calls from the evacuation floor/zone are accepted
3. As Fire Alarm System expands evacuation zone, passenger evacuation requests from more floors are accepted.



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## Information-Situation Awareness

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A17.1

OEO Lobby Display

In-car Passenger Display





Fixed Signage

Dynamic Messaging

-Visual

-Audible



OEO Icon	MSG ID	OEO Messages	Comments
	1	Elevator Evacuating	Towards Discharge Level
	2	Collecting Passengers For Evacuation	Away From Discharge Level
	3	Elevator Evacuating	Towards Discharge Level
	4	Collecting Passengers For Evacuation	Away From Discharge Level
	5	Loading Passengers Do Not Exit Car	
	6	At Evacuation Floor Exit Car Quickly	

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## Information-Situation Awareness

OEO Lobby Display

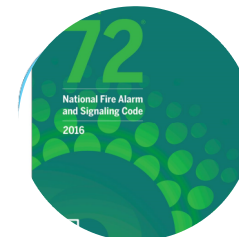
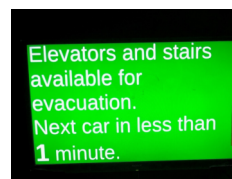
In-car Passenger Display

Fixed Signage

Dynamic Messaging

-Visual

-Audible



Close Coordination with NFPA 72



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# Operating Features: NFPA 101



## 4.8.2 Plan Requirements.

### 4.8.2.1 \*

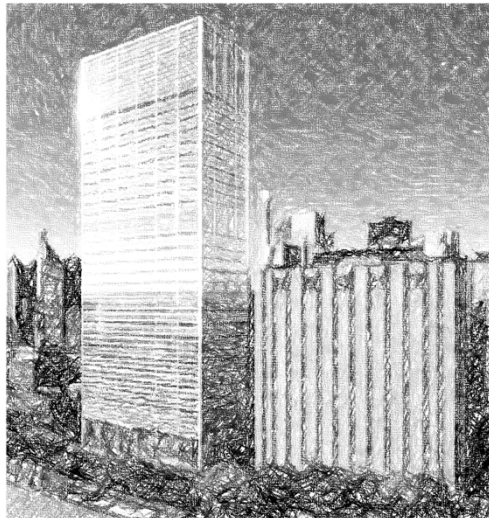
Emergency plans shall include the following:

- (1) Procedures for reporting of emergencies
- (2) Occupant and staff response to emergencies
- (3)\* Evacuation procedures appropriate to the building, its occupancy, emergencies, and hazards (see Section 4.3)
- (4) Appropriateness of the use of elevators
- (5) Design and conduct of fire drills
- (6) Type and coverage of building fire protection systems
- (7) Other items required by the authority having jurisdiction

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## Hospital Project-NYC

### OEO/OEE Questions and Needed Answers

**What?** (Identify all building components and system to be inspected/tested to verify OEO operations)

**Why?** (Reasons why certain building components and systems are being used to verify OEO operations during acceptance test, )

**When?** (At what stage of Construction can acceptance test take place?  
Ex. When Elevator and Fire Alarm System installations are fully complete)

**Who?** (Inspection Agency: DOB and/or FDNY, and Divisions/Units involved? Ex. Elevator Division, Fire Alarm Inspection Unit, others)

**How?** (Process and Procedure to be used by Inspection Agency to verify OEO operations during acceptance test)

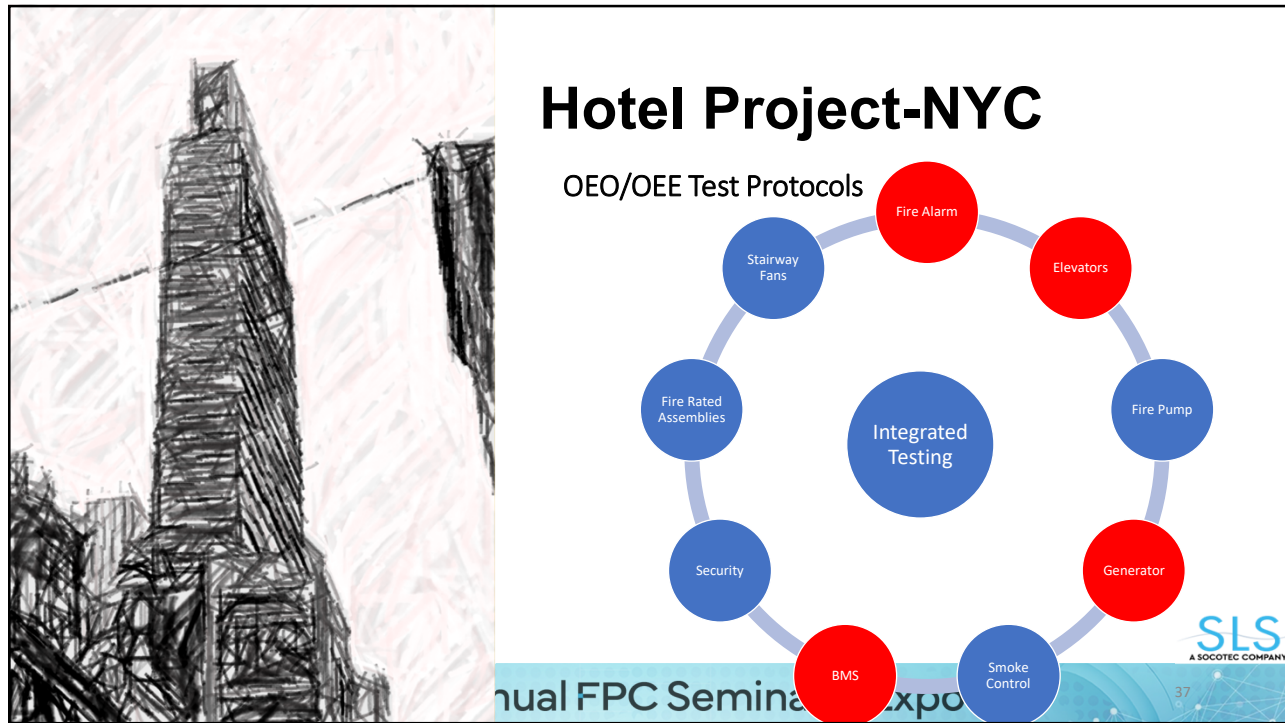


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## Is OEE Right for My Project?

Element	Factor
<ul style="list-style-type: none"> <li>• Building Height</li> <li>• Occupancy</li> <li>• Floor Plate</li> <li>• Floor layout</li> <li>• Revenue</li> <li>• Standpipe/Fire Pump Size</li> <li>• Life Cycle</li> </ul>	<ul style="list-style-type: none"> <li>• Over 420 feet</li> <li>• Anything-except R2</li> <li>• Smaller footprint-more likely</li> <li>• Access to exit stairs</li> <li>• “Lost” real estate space from stair</li> <li>• Third standpipe</li> <li>• ITM-FP systems, elevator equipment</li> </ul>

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Sometimes, Never.....

**It Really Does Depend**

**IN CASE OF FIRE  
USE STAIRS  
OR ELEVATORS  
OR BOTH**



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## DISCUSSION

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