

Evacuation Plan For



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- The ability to contain and control the fire is increasingly dependent on the construction of the building and the ability of sprinkler and/or stand-pipe systems to deliver water to the fire area.
- Ventilation can be much more complicated and critical in high-rises than in other types of structures. Vertical ventilation is often limited to stairways or lifts shafts, both of which may also have to be used to evacuate occupants. Horizontal ventilation, by breaking out windows, presents the risk of falling glass to those outside the building. The stack effect causes smoke to rise rapidly through the vertical passages and accumulate on upper floors.

Realistically, the evacuation from high rise buildings in a major emergency can only be effectively executed if there is an evacuation plan approved by the fire department to evacuate as many people as possible, as quickly and safely as possible prior to the arrival of the firefighters. The lack of plans and procedures for evacuation can lead to confusion among the occupants in the event of a large-scale evacuation.

FACILITIES FOR AIDING BUILDING EVACUATION

Evacuation preparedness activities are needed when mitigation measures have not prevented disasters or cannot prevent them. The preparedness phase develops plans to save lives and minimize casualties. Preparedness measures also attempts to tackle the perceived difficulties and problems of building evacuation and to assess the need to provide adequate facilities to enhance evacuation response operation.

For example, a person who has to decide how to get out of a burning building is likely to be under significant psychological and even physical stress if he/she cannot locate the escape routes when power blackout. For an escape

THE THREAT OF FIRE or other emergencies in high-rise buildings pose deadly fire challenges to fire department. The large numbers of persons in commercial high rise buildings, the nature of the occupancy and typical building geometry that is considered by many fire professionals presents an unacceptable risk. In reality, the fire department does not have capabilities to do much of anything above the fire floors that is beyond the reach of their super aerial ladder fire trucks. So, if a fire breaks out in a building taller than that, the consequences depend entirely on the in-built safety mechanisms. One of the in-built safety mechanisms is developing an evacuation plan.

WHAT IS A HIGH BUILDING?

Most Building Code defines high buildings as those buildings with building height that are beyond the reach of the local aerial ladder fire truck. Generally, buildings of seven storeys or more in building height are considered as high buildings.

While high rise buildings are designed to be fire safe and are protected by the passive and active fire protection system, yet, high rise fire-fighting generally require more complicated operational approaches than most structure fires. It's a manpower-intensive operation. Tasks that are normally considered routine for most fire departments, such as locating and attacking the fire, evacuating occupants, and performing ventilation can become very difficult in high rises. Operations are affected by several specific challenges:

- Access to floor levels that are beyond the reach of aerial apparatus is generally limited to the interior stairways. The use of lifts is usually restricted or prohibited because of safety concerns. If the lifts are out, that meant carrying gear up and down flights of stairs and walking into a cement-walled apartment that heated up like "a furnace", and firefighters literally have to carry people who can't walk down the stairways. Rooftop helicopter rescue is dangerous.
- Hundreds or even thousands of occupants may be exposed to the products of combustion while they are evacuating or unable to descend past a fire on a lower floor. Their exits may be limited to two narrow stairways, which are also the only access for firefighters coming up to assist with evacuation and to fight the fire.

High Rise Building

route to be effective and efficient, it is important that from anywhere in the building occupants have sight of a sign, or series of signs, which leads them to a place of safety even in complete darkness. Signs and stairways should be clearly identifiable and that each floor access is clearly numbered, and also indicating the nearest crossover floors, if certain floors are not accessible. The visibility of escape route signs will assist firefighters and other rescue teams to evacuate occupied areas during emergency situations.

Some of the facilities for aiding building evacuation that are available in the market that the author has knowledge of when writing this article are:

- An audible and visual fire alarm system is to warn people of an emergency and provide a general-purpose evacuation warning.
- An adequate communication system (e.g., public address system, intercom system, and lifts telephone system) is to minimize heavy congestion on stairways by directing evacuees to move to a less congested staircase, and to quickly rescue those trapped inside the lifts.
- Fire vents that open automatically in the event of a fire, maximize fire containment and life safety and minimize damage and material loss. The vents help to improve visibility inside the building to help occupants escape the fire and reduce the risk of smoke inhalation.
- Creating better and safer protected stairwell design, such as: increasing number of exits, the width of doors, width of stairs, add on anti-slip nosing on steps of stairs, improved emergency lighting and signs, and smoke control in stairways.
- The exterior fire escape stairs provide alternative egress for occupants and can also provide firefighters with access to, and escape routes from, upper floor of the fire building, when interior stairs are sometimes untenable or inadequate.

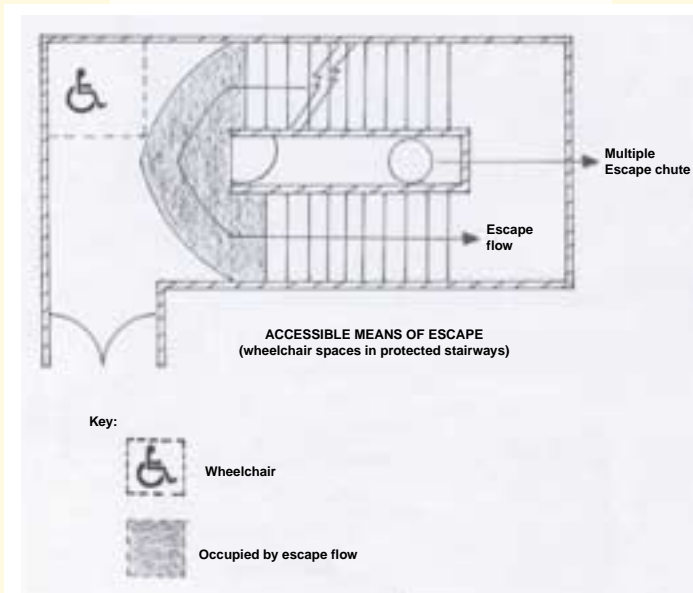
- Emergency escape lighting, signage and safety way-guidance system, all electrically powered components with back-up power capable of being activated as directional information in the event of a power outage.
- The use of photoluminescence emergency signage and way-finding systems intended to aid in evacuation from buildings in all risk situations where smoke is present and in the event of failure of both the power and back-up power to the lighting and illuminated exit signs. The photoluminescence egress system recommends these markings to be included throughout every stairwell, including around all landing peri-

meters, along the full length of every handrail, on each step, and around all obstacles to egress.

- Personal 'escape smoke hood' can protect user for safe escape from smoke and fume during fire evacuation.
- Portable and lightweight evacuating chairs enable trained helpers to move people with physical handicaps down a flight of stairs much easily that might not otherwise be possible.
- Ramps can be helpful for wheelchair users in negotiating one or two steps.
- Only use the special designed 'evacuation-lift' that is approved for use in fire evacuation by the fire department.

- Only use escape chute that is accessible and usable by the greatest number of people, regardless of their capabilities, and is approved for permit safe evacuation in fire situations by fire research-testing institute. If deployed strategically inside or on the exterior walls of high building, allow people trapped in higher elevations to bypass impassable floors or blocked stairways to escape safely to the street, when building under fire (or damaged by explosions). This will give every person the ability of self-reliant escape.

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The provision of appropriate facilities for aiding evacuation provides better opportunity for a safer, quicker and orderly evacuation. More importantly, reduce building evacuation hazards and maximize the escape potential of people with disabilities of getting out alive.

DEVELOPING EVACUATION PLANS

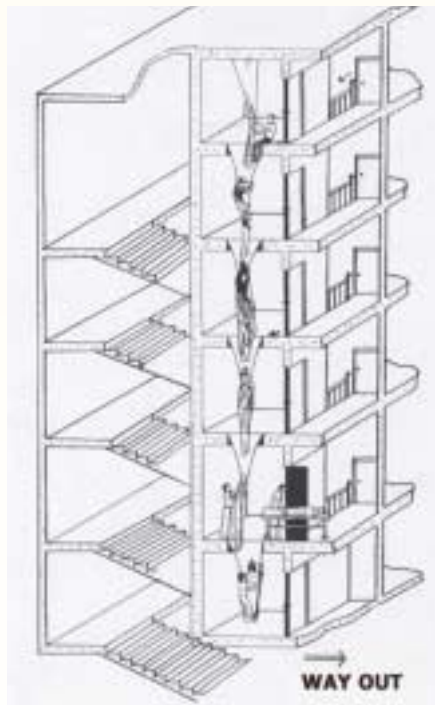
Evacuation plans in general have always been an important operating feature of a building. Given that buildings have differences in structure design, construction, fire-resistant qualities, height, floor layout, usage, occupancy load, each building presents unique problems in emergency evacuations. For this reason, the fire department acknowledges that there is not a single recipe for handling evacuations for any one building, but the key is communication between building operators and firefighters.

A typical requirement of evacuation plans must account for a range of events and be robust enough to take all types of occupants into consideration:

- Plans should include procedures for reporting emergencies that spell out occupant and staff response. For example, if people discover a fire, immediately activate red manual call point, leave the floor, and keep stairwell doors closed but unlocked at all times to preserve the safety of escape stairways.
- The building calling for an evacuation when there is a known event. Only properly trained building manager or the chief engineer is authorized to order an evacuation on occasion when they have to make a decision ahead of the fire department. They should have the assigned authority to order evacuation of a

given floor or several floors of the building to a refuge location prior to the arrival of the fire department. Additional floors, as well as total evacuation, may be evacuated at the direction of the local fire department.

- Plans for evacuation during 'bomb-threat' or 'non-fire' related emergencies should be controlled by joint decision of the police and fire department in consultation with building management and tenants' representatives.
- Plans should detail the type and coverage of a building's fire protection system and other items required by the authority having jurisdiction. If additional facilities such as equipment and escape devices that are



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available for aiding evacuation and rescue, it should also be included in the evacuation plan.

- Comprehensive floor plans and diagrams for evacuation routes. Floor plans with detail reveal the number of people who work in a specific office and whether or not that office has someone with special needs. Such floor plans that are available to on scene commanders of the fire department would be an extraordinarily valuable tool for firefighters.
- Plans should include floor search to make sure that every person on a floor is aware of an emergency evacuation. The orderly movement of persons requires the utmost coordination of assigned emergency evacuation floor teams and central evacuation control. They must be encompassing, amenable to change, and applicable to a range of occupants with disabilities.
- Building control will determine the safest and most efficient means of evacuation, depending on the nature of the emergency and scope of damage. For examples, Plan-1 evacuation should be accomplished by means of stairwell and make way down; the use of lifts for 'bomb threat' emergency evacuation can also be considered, but never for fire and earthquake emergencies. Plan-2 if evacuees encounter smoke while descending one stairwell, evacuees can cross over to the alternate stairwell that lead to other floors or transfer corridors giving access to separate buildings. Plan-3 for alternative escape routes when particular circumstances warrant rerouting of occupants to bypass impassable floors or blocked stairways because of hazards, such as smoke, heat, and gasses in the evacuation route. Procedures should advise skyscraper occupants never to flee towards the roof in a fire emergency because hot gas and smoke rises. The only exception to this rule is if the building has made provision of escape chute at the rooftop as an alternative means of escape route to the street.
- Evacuation planning should take into the consideration of how people will realistically react in an emergency situation. Lives are often lost through the irrational behaviour of evacuees

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triggered by panic. Because of this, proper education of occupants on abiding to evacuation procedures and escape routes during regular drills hopes to eliminate panic when people are ignorant during an emergency evacuation.

Lastly, it is the building management's responsibility and duty of care to ensure that the building evacuation plans can evacuate as many occupants including the less fortunate prior to the arrival of the fire department. If the system fails, the firefighters will then have to come to do a search and rescue for those left behind. From time to time, an evacuation plan shall be reviewed and updated as required by the authority having jurisdiction.

EVACUATION DRILLS

The purpose of an evacuation drill is not a test for egress efficiency but enable building management to see how effective the plans and fire training have been conducted, identify problem areas and highlights things that should be better.

An evacuation drill programme should be established for periodic practice of 'progressive movement' and 'total movement' of occupants under varying conditions not restricted to fires. Chances for people with disability of getting out of high rise emergencies would be greater if evacuation plans is in place that included them, and that are regularly practiced by using both announced and unannounced drills for reviewing procedures. Combine training with drills allows occupants to become familiar with the emergency procedures, and that people with disabilities and activity limitations not be excused from participating. When drills are held, all occupants must know how to evacuate via routes that deviated from their normal paths and actually entered their designated stairwell. Such practices hope to eliminate panic when people are ignorant during an emergency evacuation. For building staff and fire wardens, they must practice their duties to ensure an orderly evacuation in case of fire, panic, or other emergency. They should also be taught how to use portable fire extinguishers, in-door fire-hoses, 'egress facilities' if any, such as evacuation chairs and the escape chutes properly.



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The myth of evacuation time taken to empty a tall building during a fire drill cannot be a determine factor of how long it will take to evacuate the structure under actual emergency situation. When the real emergency occurs, the speed of egress can vary greatly depending on many factors, including the number of occupants, their mobility, their reaction and behaviour, visibility and accessibility of escape routes, situational conditions and the distance they must travel. Will the building staff and fire wardens know what to do and perform their duties well? Are evacuation facilities in good working conditions to facilitate speedier evacuation?

CONCLUSION

Evacuation planning takes a 'total approach' at all levels: the individual, organizational, and building environmental. Preparedness in evacuation is a proactive and efficient state of readiness for a full-scale total building evacuation. Pre-planning, adequate communications capabilities, evacuation priorities and proper skill drills help eliminate mistakes and misunderstanding in co-ordination during actual emergency evacuation. Adequate training in the proper use of equipment and facilities for aiding evacuation should be incorporated as part of the evacuation drills.

Lives are not saved by codes; they are

saved because people will have decided, with the help of codes, to assume responsibility for their own safety. For example, fire escape stairwells are legal in many jurisdictions but cannot guarantee that everyone can walk down the stairs quickly without injuries during emergency evacuation. In the context of the fire code, it is not required to provide facilities in a building for escape or rescue purposes. But facilities such as escape chute could have save more lives in extreme emergencies if stakeholder chose to provide them to enable more people to get out quickly where they are not required by law.

Measuring the success of a preventive program is difficult. Nevertheless, prevention and proactive is the key objective, not reactive. A building's level of fire protection and preparedness for evacuation holds the highest level of importance for safety of the occupants and property within. Voluntary actions by stakeholders to enhance the level of safety and responsible actions taken by individuals to meet real threats have always been the best way to advance the cause of safety and preparedness for evacuation.