



## **How Do You Save Your Family, Your Employees, Your Guests, Yourself, in a High-Rise Emergency Event?**

When the twin towers of the World Trade Center were attacked and burning, many television viewers gazed in shock as people jumped through windows to escape the smoke and fire only to face a certain death. The jumpers represented more than 10 percent of the people who died in the disaster! While it is not likely that such a traumatic experience will happen again, the panic created by a fire in a tall building is not unusual and may happen anytime.

There are more than 112,528 high-rise buildings 12 floors and higher in the world. In the US, there are over 18,942 tall buildings and over 8,000 fires in these buildings each year. While most of them are small and easily extinguished, there are others where the experience is no less traumatic than the case of the World Trade Center.

Modern fire departments have aluminum, hydraulic-lift aerial ladders with a maximum length of 130 ft, which means they can reach vertically not more than 80 ft from the ground. Hydraulically elevated platforms, called snorkel units, can reach vertically up to 150 ft but, when available, can rescue only a few people at a time. In October 2004, 6 people died in a relatively small Chicago fire when they were trapped by smoke on an upper floor.

Fires are not the only hazards that may call for evacuation of high-rise buildings. Despite various security measures that have been initiated during the past year, buildings are still vulnerable to terrorist attacks including explosives, as well as biological and chemical agents that can be spread in the lobby. Earthquakes sometimes cause the bottom floors to collapse trapping people above in anticipation of after-shocks.

### **No sure way out**

In high-rise buildings, the stairways are the only emergency means of escape. Even if there are multiple stairways, they are often close together so that damage to one is likely to affect the other. It is also notable that many apartments in buildings, built in New York City since 1960's, have only a single exit. When fire, smoke, fumes or debris block the exit, there is no other way out.

The lack of adequate egress is a significant problem whose magnitude is now beginning to be appreciated. In New York City alone, about one million people live above the seventh floor and cannot be reached by fire ladders. About 1.5 million people work in offices above the 10th floor.

### **Proposed solutions**

Since 9/11, various task forces in New York City and elsewhere have been tackling the problem of rescuing large numbers of people from high-rise buildings.

Often dominated by architects, the principal focus of these action groups has been on enlarging existing staircases and providing duplicate staircases. However, this may not always work. In Hong Kong, where multiple staircases are the rule, a 1995 fire in a ten-story building blocked all the exits by smoke before all the occupants had left the building. Fortunately, unlike many buildings in the United States, they had access to the roof from which they could be rescued...Unfortunately, not all of them.

Recommendations have been made to remove the antennas and other equipment from the roofs of tall buildings so as to make them safe for helicopter landing. Los Angeles now requires that all new high-rise buildings have a heliport. Another proposal is to establish refuge floors, as used in Hong Kong, where people can await rescue. These are expensive solutions that few landlords are ready to implement.

## **Other means to escape**

The search for escape solutions that do not require major structural changes has been going on for years. Since 9/11, a score of proposals have gained attention:

**Helicopter.** A rooftop heliport located a safe distance from antennas, mechanical installations and other hazards will allow landings to effect rescue. When smoke, flames or dangerous updrafts prevent landings, a basket can be lowered to hoist evacuees to safety. However, not every building can have a heliport and evacuees, especially the disabled, cannot always get to the roof. Besides, the helicopter pilot needs to be trained in a technique known as "vertical reference flying". Consequently, this is not a practical method for mass evacuation.

**Parachutes-**Several companies are offering parachutes, similar to the extreme sport of Base-jumping, while this approach will work only if the jumper is athletic, experienced and high enough, such as on the 20th floor or above, and at least six companies are selling escape parachutes. Because of crosswinds, obstacles such as flagpoles, and the need for considerable training, this method is considered highly hazardous. It is highly irresponsible to sell these parachutes to people without adequate training.

**Slides.** Similar to the chutes used in airplane evacuation, slides have been listed as an alternate means of egress in the building codes of several US cities. Such slides, however, may not be feasible above the height that is reachable by fire department ladders. An improved chute that was demonstrated on Good Morning America requires setting up the tube on the ground and trained personnel on hand during the emergency. Safe descent is not possible unless the bottom of the chute is held firmly or hooked on the anchor installed on the ground. Using a chute for each floor would make the set-up much more cumbersome. Another well-designed chute may be seen at <http://www.ames-1.com> and [www.twaron.com](http://www.twaron.com)

Flying [platforms](#). Such a machine would approach the building at any given floor and pick up passengers. Clearly, this is a very expensive solution and would only be available to a limited number of people. [Platforms](#) operated from the ground have also been considered.

External platforms. Such an external elevator slides on the side of a building and stored on the roof using it's on power generator in case of power failure. Designed for mass evacuation and operated by trained and authorized personnel as fire fighters using remote control system. May be seen at <http://www.escaperescue.com>

Wires. Another proposal requires wires stretched between buildings so that people can slide from one affected building to another. Clearly, this would cause a morass of wires across city streets. Furthermore, experience on drilling rigs, where such wires are sometimes used, shows that the descent requires considerable courage and may result in serious injury.

Tubes. A vertical tube of flexible material has been installed in some buildings in Asia and Europe. It can serve multiple floors, but unless it is located outside the building, it may be subject to the same hazards as stairways and elevators. Abrasions and minor injuries may be likely. May be seen at <http://www.escapeconsult.com>

Descenders. Similar to those used by mountaineers, firemen and the military, most descenders use a rope in conjunction with some type of a simple mechanism to control its movement. This method, known as rappelling, is not suited for escaping from high-rise buildings. The useful length of the rope is limited by its bulkiness and weight, and if the descent requires going through a fire area, the rope may burn and break. Most importantly, to descend at a sufficient speed requires a physically fit person and considerable training. Since this approach is not practical in its traditional form, several improvements have been introduced.

## **New approach using existing Technology**

Over the past 20 years, more than 2 dozen patents have been issued covering CDD's (Controlled Descent Devices) for escape. Typically, instead of a rope, they use a steel cable that is attached to a reel. The reel is anchored to a window or other egress point and, as the person descends, some sort of a brake is used to control the reel and thereby govern the descent speed. Typical techniques include centrifugal brakes, air fans and even hydraulic pistons. In some cases, the cable is rewound for the next person, in others detachable reels are used to facilitate the movement of personnel. The most recent example of such a system is "INFINITY" System (ResQLine), "RG 2" Self Rescue Device and "SPIDER" Escape Device

Even this group of technologies is not without problems. First of all, most descender systems require a bulky apparatus that has to be permanently bolted at the egress site. Even if each user gets his own reel, he needs to wait in line to descend. One of major problem is facing single escape exit choice, which limits the possibility of saving lives. In emergency situation such as fire and smoke, people are in panic and we have to present the best solution and the best way to

help these people. When the primary escape solutions and methods are not available, we have to use the secondary escape solution as the advantage able solution helping people to survive.

## The All- in- one solution

Ideally, each person living or working in a high-rise building should have access to a Rescue and Escape System that he can operate and effectively use when no other means of egress is available. Such a device should be simple enough so that an inexperienced person, even a child, can use it. If it turns out that the stairs are free, the Escape device will not be used. However, if there is a blockage, the person can look for the nearest egress point and use it for his escape.

In addition to descending at a safe fixed rate of speed, the user can choose the way out from available exit as window or balcony. The system operates independently, multiple operation, simplicity, safety, durability and confidently.

Can all of this be done? A team of experienced engineers and managers formerly associated undertook this challenge after 9/11. They came up with a unique solution that passed all the requirements and tests set for it. USPTO registered patent under the name of DoubleExit Rescue System. May be seen at <http://doubleexit.com>

Data from Emporis Building Statistics, January 2006

Data from USFA Fire statistics, January 2006

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