Egress and Accessible Egress Planning

by Kimberly Paarlberg, RA, ICC Senior Staff Architect

A new way of thinking about emergency evacuation is going to provide additional benefits for persons with mobility impairments.

Code Change E22-04/05 eliminated the exception for areas of refuge at elevators and stairways in sprinklered buildings from the 2006 *International Building Code* (IBC) based on concern that adequate levels of safety were not being provided for persons who could not use stairways to evacuate during an emergency. Looking back, one could say that E22-04/05 sparked a lot of attention—and justifiably so, because it raised important issues. In any event, twenty code change proposals addressing accessible means of egress were considered during the 2006/2007 code development cycle and twelve more were considered in the 2007/2008 cycle.

As a result, the 2009 IBC will include many new provisions related to egress. The first thing users will notice is that the exceptions for areas of refuge in sprinklered buildings is back in the code (Sections 1007.3 and 1007.4). This may prompt some to react: "Hey, you aren't considering the safety of persons with disabilities!" However, this needs to be viewed as part of the complete egress plan, not just a single piece of the puzzle.

The exception for areas of refuge in sprinklered buildings has been in the codes and the *Americans with Disabilities Act Accessibility Guidelines* ever since we began considering how to get people with disabilities in and out of buildings. The exception is not the problem—what is needed is better evacuation planning for persons who may need assistance in evacuation. Organizations including the American Society of Mechanical Engineers (ASME), the National Institute of Standards and Technology (NIST), the U.S. General Services Administration, and ICC along with firefighters and elevator manufacturers have been working on a new approach to occupant evacuation and firefighter access. The key elements are better information, communication, fire department access for firefighting and assisted rescue, and more evacuation options for taller buildings.

Evacuation Strategies

Three basic evacuation strategies are considered: defending in place, phased evacuation and full evacuation. As a general rule, egress requirements increase as the height of a building increases. For some buildings, a single response for all scenarios is appropriate. For others, the proper approach will depend on the type of incident and perhaps the type of occupancy and size of the building.

Whatever the case, *International Fire Code* Sections 404 and 405 require most facilities to have fire and safety evacuation plans. These plans must be approved by the fire code official, reviewed on at least an annual basis, practiced during fire drills and include provisions for evacuating occupants in need of assistance.

Defend in Place

Defend in place strategies are commonly used where the evacuation of occupants may not be the ideal first response, such as hospitals, nursing homes and jails.

In the case of fire in a hospital or nursing home, evacuation to the outside of the building and into rain or freezing temperatures could potentially be extremely hazardous to the health of patients/residents. Depending on where the fire occurs, it is often preferable for patients/residents to either remain in place or be moved to a different compartment where they can be protected from smoke and fumes. For jails, in the interest of protecting detainees as well as the public, planned evacuations can be to other smoke compartments within the same building or evacuation to outside, fenced yard areas providing refuge a safe distance from the building.

The presence of trained staff, containment of smoke and sprinkler protection makes the use of horizontal exits a good option for these types of facilities.

Phased Evacuations

Phased evacuations may take place when fire events occur in tall buildings. Fire departments will typically evacuate the floor where a fire is located along with the two floors above and two floors below, and lead the occupants to a floor from which they can safely discharge from the building. If firefighters can control the fire, further evacuation may not be necessary. In fact, remaining occupants may not even be immediately aware that a fire event occurred.

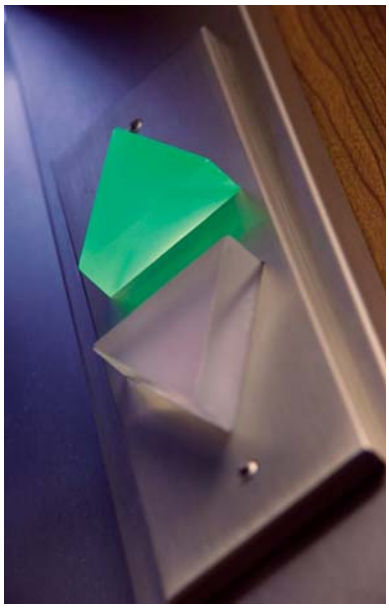
Full Evacuation

Full building evacuations may be necessary due to a range of incidents including natural hazards such as tornadoes, hurricanes, snow or ice storms, floods, and earthquakes; technological events such as power outages, vehicle impacts, gas leaks, fires and explosions; and deliberate events such as civil disturbance, bomb threats or acts of terrorism.

During a full evacuation, all occupants exit or are assisted in exiting the building—ideally within less than half the duration of the fire-resistance rating of the exit enclosures.

The Ups and Downs of Elevator Access

Although ASME A17.1, *Safety Code for Elevators and Escalators*, requires signs at elevators which read: "In case of fire, use stairways," elevators do not automatically stop working when fire alarms or sprinklers are activated. Elevators go into fire department recall when smoke is detected in elevator lobbies or when fire department personnel recall them (IBC Section 3003.2). In sprinklered buildings, fire alarm panels indicate the locations of fires so that firefighters can get to affected areas and the occupants most impacted sooner. Following is a brief description of requirements as buildings get taller.



Communication

Communication between occupants who need assistance and emergency responders is necessary in all multistory situations—even two-story buildings. In nonsprinklered buildings, signage and two-way communication systems must be in place where areas of refuge are provided at a stairway; in sprinklered buildings, directional signage for accessible means of egress and two-way communication systems must be provided at elevator lobbies (Section 1007.8). Because people tend to try to exit buildings through the areas they are most familiar with, the way they came in, this puts the communication system where it is most likely to be found and used. Two-way communication systems must be answerable twenty-four hours a day, seven days a week.

Buildings Five Stories or Taller

Elevators in buildings five stories or taller are required to have standby power to allow for assisted evacuation by emergency responders (Section 1007.2.1).

High-Rise Buildings

High-rise buildings are defined as buildings with occupied floors 75 feet or higher above the lowest level of fire department access (Section 202). High-rises must have elevator lobbies or pressurized elevator shafts so that smoke cannot migrate up through elevator shafts (Section 708.14). This helps keep both enclosed and unenclosed elevator lobbies safe areas for people to wait for assistance during an emergency. Fire command stations, also required in high-rises, must be connected to the two-way communication systems.

Fire Service Access Elevators

Buildings with occupied floors 120 feet or higher above the lowest level of fire department access are required to have fire service access elevators, which must have enclosed lobbies directly connected to enclosed exit stairways, standby power, separate shafts from adjacent elevators, protected cables and monitoring from fire command centers (Section 403.6.1). The extra protection afforded for these elevators is intended to increase the amount of time during which they can remain in operation during a fire event, thus allowing for better firefighting and assisted evacuation of people who cannot use stairways.

Occupant Evacuation Elevators

Along with individuals with permanent mobility impairments, people who are elderly, overweight, have asthma or heart conditions; pregnant women; those with even minor injuries like a sprained ankle; and people who are simply not in the best of shape may need help going down multiple flights of stairs. Studies indicate that as much as 6 percent of the population may need some type of assistance moving down stairways, and that percentage increases as building heights increase.

This at least partially accounts for the idea of using elevators for general occupant evacuation of tall buildings becoming more common—the Stratosphere Tower in Las Vegas, Nevada, is one example of a building that currently uses such a system. Research shows that once a building is forty stories in height or taller, using elevators to evacuate occupants is faster than using stairways and using elevators in conjunction with stairways speeds up evacuation even more.

Occupant evacuation elevators are not currently required by the IBC, but when provided they must meet certain specifications (Sections 406.2 and 3008). As long as the elevators can operate safely, they can be used by anyone to evacuate. This allows persons with disabilities

to self-evacuate a building in the same manner as everyone else. This is especially important for individuals who rely on their wheelchairs to carry communication and/or life support equipment. Actor Christopher Reeves's wheelchair, for example, included a ventilator without which he could only survive for a few minutes, and he and the chair had a combined weight of 660 pounds.

During a fire event, occupant evacuation elevators would be used to perform a phased evacuation. If a full building evacuation is issued, the elevators would start at the highest floor and use the same procedure to shuttle people directly to the ground floor. This effectively "zones" them to provide the quickest ride out of the building.

Fire department personnel can make educated judgments about the operation of occupant evacuation elevators from a building's fire command center, thanks to the protection and monitoring capabilities for the elevator shaft, car and lobbies, and may decide to allow the elevators to continue to operate per their preprogrammed directions even after a Phase I recall. Signage and status indicators in elevator lobbies will inform occupants if they can use the elevators for evacuation.

Alarm/voice communication system devices and two-way communication systems are required between fire command centers and lobbies that serve occupant evacuation elevators to allow direct communication with people waiting in those areas. The lobbies must be protected, sized for 25 percent of the population of the floor, and provide one wheelchair space for every fifty occupants. The result is four times the number of wheelchair spaces than required for areas of refuge.

The lobbies must also have direct connections to enclosed exit stairways. Providing occupant evacuation stairways will not reduce the number or width of required exit stairways. However, they are considered an alternative to the additional exit stairway now required in high-rise buildings more than 420 feet in height (Section 403.5.3).

Full Building Evacuation

Concerns over the possible need for full building evacuations have resulted in other changes in the 2009 IBC. Examples include the potential for wider corridors and stairways with the deletion of the sprinkler allowance in Table 1005.1, the introduction of photoluminescent stripes on stairs in high-rise buildings (Sections 403.5.4 and 1024) in addition to regular egress and lighting and emergency lighting requirements (Section 1006), and improved structural and fire resistance standards for high-rise buildings more than 420 feet in height (Section 403).

Conclusion

The increased height of buildings coupled with changing demographics and public concern about the safety of tall buildings have led to a call for a fundamental rethinking of emergency egress systems. Through considerable effort by ASME, NIST, the fire service and the elevator industry, the *International Codes* and referenced standards will now include requirements for occupant evacuation elevators. This will allow designers to take advantage of the latest advances in elevator technology and provide a safer environment for building occupants and emergency responders. In addition, persons with disabilities will have the option to self-evacuate in more situations and a better understanding of where to go if they do need assistance during an evacuation. ◆