

NFPA FACT SHEET ON BUILDING EVACUATIONS
FOLLOWING THE CATASTROPHIC COLLAPSE OF THE WORLD TRADE
CENTER TOWERS ON 9/11/01, NATIONAL FIRE PROTECTION ASSOCIATION
(NFPA) OFFERS THE FOLLOWING ANSWERS.

What are the key elements of emergency preparedness?

- Early warning (typically through an alarm or voice communication system)
- Adequate means of egress (exit routes)
- Occupant familiarity with the plan through knowledge and practice.

Is high-rise building evacuation different from other buildings? YES

Evacuating multiple floors of a high-rise building creates the cumulative effect of requiring great numbers of people to travel great vertical distances on stairs. In the 1993 bombing of the World Trade Center, for example, we learned that in some cases it took as long as 6-8 hours for occupants to successfully exit the buildings. The physical demands made on high-rise occupants exiting in stairwells can exceed their capabilities. The fire and life safety systems installed in high-rise buildings today, including automatic fire sprinkler protection, are designed to control a fire and therefore lessen the need to evacuate all occupants. [Not all buildings at MIT are retrofitted with all of these new fire safety features. Therefore, MIT EH&S Safety Program recommends that everyone evacuate as soon as the alarm sounds.] Remember, these building systems are designed to control a challenging fire; not one caused by a commercial airliner crashing into the building.

Under what circumstances may I use the elevator safely? NEVER

It is never appropriate to use the elevator during a fire or similar building emergency, even in a two-story building. When a fire occurs, elevators are designed to be recalled to a designated floor, normally the lobby. In unusual circumstances, an elevator malfunction may cause the elevator to travel to the fire floor itself, thus exposing occupants to the fire. If people are in the elevator and there is smoke in the elevator shaft, they will be exposed to that smoke.

Am I better off going up to the roof and waiting to be rescued there? NO

Using helicopters for roof rescue is an extraordinarily dangerous procedure for the occupants, the pilots and firefighters. The large thermal currents, generated by the heat from severe fires, can cause the helicopter to be buffeted up or down, making it hard to control. The resulting down thrust from the helicopter rotor can force smoke and super heated air on to personnel.

How are emergency instructions tailored to the actual emergency event and communicated to building occupants?

High-rise building fire alarm systems are required to have emergency voice communication. [Not all buildings at MIT are retrofitted with all of these new safety features. Therefore, MIT EH&S Safety Program recommends that everyone evacuate as soon as the alarm sounds.]

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If I stay and then the situation becomes untenable and I am trapped, should I break a window? NO

If you are trapped in a high-rise building, try to locate an area where you can close the door and seal the cracks to keep smoke out. Use a telephone to call the fire department and report your exact location in the building. [At MIT, dial 100 or 617-253-1212] Try to be patient. Emergency rescue of high-rise building occupants can take a long time. You can signal your position to rescue personnel from a window using a light-colored cloth, but it is not advisable to break a window. If you can open the window slightly, it is generally safe to do so to allow fresh air in, but be prepared to close it if smoke comes in. A broken window cannot be adjusted to block smoke from pouring in. Finally, falling glass from a broken window can sever fire hoses and severely injure rescue and suppression personnel below. It is very dangerous to use a window for escape from anything higher than the second floor.

Will the systems work in a terrorist attack?

Prior to the events of September 11th, a suicide pilot of a jetliner was not a credible or foreseeable building design hazard. Society has not demanded of its public officials that they enact laws that would require the expenditure of almost unlimited amounts of money to protect against all foreseeable and unforeseeable hazards. In reality, there may simply be no physical way to provide such protection, even with unlimited funds. Existing safety systems do continue to work under normal fire conditions. Current building evacuation or relocation procedures consider the need to move occupants from harm's way with a fire that grows at a very predictable way at a rate that is typical to the anticipated fire hazard in the building.

If the neighboring high-rise building is on fire, should my building evacuate? Not during a typical fire.

You should remain vigilant and determine if there is any change in conditions that could result in your building being threatened by the adjacent fire. In such cases, emergency personnel have adequate time to order evacuations of other buildings.

What happens when the emergency is not typical?

Safety is everyone's business so we all must take a certain amount of personal responsibility. A good guideline to follow is **RED**:

React: Take any indication of smoke, fire or other threat seriously.

Evaluate: Judge the level of the threat by confirming evidence, conditions and available information.

Decide: There are only two choices.

- 1) **Follow your plan and immediately leave the building.**
[Recommended by MIT EH&S Safety Program]
- 2) Follow your plan and stay where you are or descend to the designated level below the fire floor and prepare to take protective/defensive action.

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Finally, ascending to the roof may prove a waste of valuable time, as it may be impossible for a helicopter to approach the roof. Most building designs incorporate numerous features that direct occupants to the street or grade level for evacuation purposes.

Trained emergency personnel assess the emergency and broadcast a variety of specific messages to the occupants. The occupants believed to be in the greatest potential danger are instructed to use the exit stairs to begin their descent. Occupants of other floors might be instructed to stay where they are and await further instruction. In these cases, only occupants on the fire floor and the floors immediately above and below typically receive the announcement through the system. Should the scale of the emergency increase, the announcements can be revised to include additional floors, or the entire building if necessary.

Standard operating procedures, verbal instructions and even past experience may not be adequate or appropriate in dealing with extraordinary events.

Following the catastrophic collapse of the World Trade Center towers on September 11th, NFPA has received numerous questions relating to the evacuation/relocation of occupants in high-rise building emergencies. NFPA offers the following answers for those who are interested in this topic.

Is there a requirement for building owners/operators to hold regular emergency drills for occupants?

Although not mandated for all buildings, NFPA 101, Life Safety Code, requires that workplaces, healthcare facilities, educational institutions and other occupancies provide evacuation/relocation plan information and routinely schedule and hold drills when practicable.

What are the key elements of emergency preparedness?

Early warning (typically through an alarm or voice communication system), adequate means of egress (exit routes) and occupant familiarity with the plan through knowledge and practice.

Is high-rise building evacuation different from other buildings?

Evacuating multiple floors of a high-rise building creates the cumulative effect of requiring great numbers of people to travel great vertical distances on stairs. In the 1993 bombing of the World Trade Center, for example, we learned that in some cases it took as long as 6-8 hours for occupants to successfully exit the buildings. The physical demands made on high-rise occupants exiting in stairwells can exceed their capabilities.

The fire and life safety systems installed in high-rise buildings today, including automatic fire sprinkler protection, are designed to control a fire and therefore lessen the need to evacuate all occupants. In a typical scenario, the occupants of the fire floor and the floors immediately above and below it should immediately use the exit stairs to descend to a

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floor level that is at least several floors below the fire floor, and await further instruction from safety officials. Remember, these building systems are designed to control a challenging fire; not one caused by a commercial airliner crashing into the building.

Under what circumstances may I use the elevator safely?

It is never appropriate to use the elevator during a fire or similar building emergency, even in a two-story building. When a fire occurs, elevators are designed to be recalled to a designated floor, normally the lobby. In unusual circumstances, an elevator malfunction may cause the elevator to travel to the fire floor itself, thus exposing occupants to the fire. Elevator shafts may also allow some smoke to enter the shaft and migrate toward the roof of the building. If they are in the elevator and there is smoke in the elevator shaft, they will be exposed to that smoke. Any vertical shaft in a building can allow smoke to quickly rise to the top of the building.

If exiting down stairs takes so long, am I better off going up to the roof and waiting to be rescued there?

No. Using helicopters for roof rescue is an extraordinarily dangerous procedure for the occupants, the pilots and firefighters who may be in or around the building. In severe fires, the large thermal currents, generated by the heat from the fire, can cause the helicopter to be buffeted up or down, making it hard to control. The resulting down thrust from the helicopter rotor can force smoke and super heated air on top of fire suppression personnel. Finally, ascending to the roof may prove a waste of valuable time, as it may be impossible for a helicopter to approach the roof. Most building designs incorporate numerous features that direct occupants to the street or grade level for evacuation purposes.

Should my building have any type of exterior escape device?

Items such as escape chutes and controlled descent devices are permitted by the Life Safety Code to provide escape routes in special structures, such as some towers and special manufacturing environments. They are not permitted, nor recommended by U.S.-based codes for commercial and public buildings. Such devices do not come close to the level of protection provided by the other code-mandated features.

How are emergency instructions tailored to the actual emergency event and communicated to building occupants?

High-rise building fire alarm systems are required to have emergency voice communication. Trained emergency personnel assess the emergency and broadcast a variety of specific messages to the occupants. The occupants believed to be in the greatest potential danger are instructed to use the exit stairs to begin their descent. Occupants of other floors might be instructed to stay where they are and await further instruction. In these cases, only occupants on the fire floor and the floors immediately above and below typically receive the announcement through the system. Should the scale of the emergency increase, the announcements can be revised to include additional floors, or the entire building if necessary.

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If I stay and then the situation becomes untenable and I am trapped, should I break a window? Should I jump?

If you are trapped in a high-rise building, try to locate yourself in an area where you can close the door and seal the cracks to keep smoke out. Use a telephone to call the fire department and report your exact location in the building. [At MIT, dial 100 or 617-253-1212] Try to be patient. Emergency rescue of high-rise building occupants can take a long time. You can signal your position to rescue personnel from a window using a light-colored cloth, but it is not advisable to break a window. If you can open the window slightly, it is generally safe to do so to allow fresh air in, but be prepared to close it if smoke comes in. A broken window cannot be adjusted to block smoke from pouring in. Finally, falling glass from a broken window can sever fire hoses and severely injure rescue and suppression personnel below. It is very dangerous to use a window for escape from anything higher than the second floor.

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How can I judge if my building's evacuation plan is adequate for any emergency?

It is highly likely that the procedures are adequate. In our society, we plan on events that are likely to happen in a building or structure. In large part, evacuation procedures are geared toward an unintentional fire occurring in a building. Often times, these procedures are also robust enough to contemplate deliberately set or incendiary fires as well. Your building's evacuation procedures should make clear to you and all occupants the actions you are to take, and when to take them. In addition, every occupancy should post evacuation plans/routes and stage emergency response drills at least once a year. Buildings are required to periodically test fire safety systems as well.

What procedures are applied to people in a wheelchair or with other disabilities that affect mobility?

Able-bodied as well as disabled occupants must be covered under any written procedures. If your floor has to be evacuated, you should plan to horizontally relocate to a refuge area. In buildings with automatic fire sprinkler protection, this may simply be to an adjacent compartment or office space. In other cases, your building may be provided with areas of refuge. These spaces may be located as stand-alone, barriered compartments on the floor, or they may consist of oversized landings in stairwells. Regardless of which feature you have, your plan includes waiting in one of the designated spaces until fire department personnel can remove you. Often times, these spaces are provided with a two-

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way communication device so you can give rescue personnel your location. Your work environment may also supplement this procedure with a "buddy" system. In this case, you need to anticipate situations where the "buddy" may not be available in an emergency. In every case, and regardless of one's abilities, if you have any questions about your building's plan or how you fit into it, you should ask your employer for detailed information and request a role for those with disabilities in crafting the plan.

If the neighboring high-rise is on fire, should my building evacuate?

Not during a typical fire. You should remain vigilant and determine if there is any change in conditions that could result in your building being threatened by the adjacent fire. In such cases, emergency personnel have adequate time to order evacuations of other buildings.

What happens when the event is not typical?

Safety is everyone's business so we all must take a certain amount of personal responsibility. Standard operating procedures, verbal instructions and even past experience may not be adequate or appropriate in dealing with extraordinary events. A good guideline to follow is based on the acronym, RED: React: Take any indication of smoke, fire or other threat seriously. Evaluate: Judge the level of the threat by confirming evidence, conditions and available information. Decide: There are only two choices, both difficult. 1) Follow your plan and immediately leave the building. 2) Follow your plan and stay where you are or descend to the designated level below the fire floor and prepare to take protective/defensive action.