

should include better training and self-preparation of occupants, an effectively implemented system of floor wardens and building safety personnel, and needed improvements to standards. Occupant preparedness should include:

- a. Improved training and drills for building occupants to ensure that they know evacuation procedures for a variety of emergency scenarios (e.g., including evacuation and shelter in place), are familiar with the egress route, and are sufficiently aware of what is necessary if evacuation is required with minimal notice (e.g., footwear consistent with the distance to be traveled, a flashlight/glow stick for pathway illumination, and dust masks).
- b. Building owners and managers should educate tenants on the life safety systems present in their building(s), provide training materials explaining egress routes and stairwell and elevator information, and develop educational programs explaining the most appropriate responses in emergency situations. It is further recommended that the owners and managers of office buildings implement the necessary systems for collecting and storing the training history of each building occupant.
- c. Improved training and drills that routinely inform building occupants that roof rescue is not (or is) presently feasible as a standard evacuation option, that they should evacuate down the stairs in any full-building evacuation unless explicitly instructed otherwise by on-site incident commanders, and that elevators can be used if they are still in service and haven't been recalled or stopped.
- d. Improved codes, laws, and regulations that do not restrict or impede building occupants during evacuation drills from familiarizing themselves with the detailed layout of alternate egress routes for a full building evacuation.³⁷

Affected Standard: ICC/ANSI A117-1. *Model Building and Fire Codes:* The standard should be adopted in model building and fire codes by mandatory reference to, or incorporation of, the latest edition of the standard. *Affected Organizations:* NFPA, NIBS, NCSBCS, BOMA, and CTBUH.

Recommendation 17. NIST recommends that tall buildings be designed to accommodate timely full building evacuation of occupants when required in building-specific or large-scale emergencies such as widespread power outages, major earthquakes, tornadoes, hurricanes without sufficient advanced warning, fires, explosions, and terrorist attack. Building size, population, function, and iconic status should be taken into account in designing the egress system. Stairwell capacity and stair discharge door width³⁸ should be adequate to accommodate counterflow due to emergency access by responders.

- a. Improved egress analysis models, design methodology, and supporting data should be developed to achieve a target evacuation performance (e.g., time for full building evacuation³⁹) for the design building population by considering the building and egress system designs and human factors such as occupant size, mobility status, stairwell tenability conditions, visibility, and congestion.

³⁷ New York City Local Law 5 prohibits *requiring* occupants to practice stairwell evacuation during drills.

³⁸ Egress capacity should be based on an all-hazards approach that considers the number and width of stairs (and doors) as well as the possible use of scissor stairs credited as a single stair.

³⁹ Use of egress models is required to estimate the egress capacity for a range of different evacuation strategies, including full building evacuation. NIST found that the average surviving occupant in the WTC towers descended stairwells at about half the slowest speed previously measured for non-emergency evacuations.