



The Case for Supplemental Evacuation

Taking the lessons learned from 9/11 and ongoing attacks against hotels and other buildings, America's leading Fire Safety body, the National Fire Protection Association, NFPA, issued new Life Safety Codes approving the use of "Supplemental Evacuation" (S/E) technology to assist civilians exiting high rise buildings in an emergency.

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Two years earlier, the American Society for Testing & Materials (ASTM) issued a strict set of performance and reliability Standards for External Evacuation systems designed for use in the NFPA approved Supplemental Evacuation role. Combined, the new Codes and Standards represent the first comprehensive framework for the regulation and development of new technology for high rise rescue and self-evacuation.

The concept of Supplemental Evacuation is based on equipping buildings or designated areas with emergency rescue and escape systems that responders or building occupants can use to evacuate external to the structure. This is not intended to replace existing code mandated exits

or stairwells but rather to offer an alternative means of egress when traditional escape routes are blocked or unsafe. Exceptions to this include the sick, injured or impaired for whom this new technology should be considered a primary means of egress.

To encourage the use of this new technology, the NFPA also approved the use of S/E resources in mandatory Evacuation Plans that many buildings over 6 floors are required to file with local authorities.

In this article we will focus on recent developments in high rise rescue and evacuation technology made possible by the new Codes as well as innovative Responder and civilian applications for these new tools.

Responder budgetary considerations – Increasing pressure on government budgets means the funding for high ticket items such as Aerial Trucks is in short supply. Recent high rise fires and bombings in Jakarta produced complaints from local Responders and others about a lack of funds available for new equipment. Given the relatively low number of high rise rescue operations in the course of a year, the per capita cost of serving this specialized sector is disproportionately high. In the long term, the widespread use of S/E would transfer some of the costs incurred by the fire department related to high rise rescue operations over to the building owners and tenants themselves who benefit from these specialized services.

Minimizing evacuation hazards

Human factors – For years emergency planners have doubted the public's ability to respond calmly and properly in a crisis. This perception is validated historically by examples of group panic with fatal consequences. The S/E concept changes that calculus once and for all. The unpredictable and

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often erratic behavior of emergency evacuees flows from uncertainty and fear of the outcome. The mere presence of S/E resources, like lifeboats on a ship, will have a calming influence, reduce stress and convert a problematic process to a more orderly procedure.

Special needs victims – A prime mover in the development of new S/E techniques is the requirement to accommodate special needs victims of any physical condition, age or impairment. People in wheelchairs, the sight impaired, the injured and infirmed are at highest risk in any critical incident and the most difficult to evacuate down stairwells. Hospitals and senior citizens buildings in particular would benefit from this protection.

Clearing the stairwells – An important tactical advantage to evacuating people outside the building is a reduction or elimination of evacuee traffic in the stairwells, leaving them clear for Responder use. Civilians routinely suffer unnecessary smoke inhalation, falls and other injuries descending stairwells in an emergency. The presence of special needs victims complicates the process further.

Building evacuation strategy

Pre-planning for supplemental evacuation – The pre-planning concept is not new but expanding it to include S/E capability elevates the strategy to a new level. Creating and carrying out reliable evacuation plans will be greatly enhanced with the inclusion of high tech S/E systems at designated "Evacuation Stations" located strategically throughout the building. Just as passengers on a

cruise ship receive lifeboat assignments, each office, apartment or other unit would receive a designated evacuation station nearby for use if needed.

Localized rescue and evacuation – The typical high rise fire is contained to localized areas in the structure. In many cases only the occupants directly above and next to the source are at immediate risk and in need of attention. S/E pre-plans for that contingency by locating escape stations on each floor thereby assuring everyone of timely access.

Shelter in place (SIP) – A strategy preferred by some fire departments is to have civilians outside the danger zone stay in place and wait to be instructed by arriving Responders or designated individuals. Unless there is Imminent Danger to Life or Health, SIP may be the best policy. The theory certainly fits well in the S/E model which advises people to avoid the stairs and remain in their space or designated shelter until or unless they have to escape.

Safe rooms and refuge areas – Many buildings have adopted the Safe Room and Refuge Area concept providing occupants with a hardened or protective environment to seek shelter in during an emergency. Such locations are ideal for deploying S/E systems.

Total building evacuation – The Supplemental Evacuation concept anticipates occasional mass evacuations and meets the need with multiple evacuation stations strategically located throughout the structure and close coordination with local Responders to conduct rescue operations as needed.

Responder coordination

The new technology under development for S/E will enable Responders and civilians to work together in a coordinated fashion during an emergency. Buildings equipped with S/E resources will enable Responders to do their jobs faster, more safely and with less expense and manpower. Some new S/E systems under development will feature a direct communications link between Responders and personnel in the building occupants manning the escape stations to enable close cooperation.

When a building elects to adapt the S/E solution, the decision would be made in concert with local Responders. Joint training exercises with Responders and building occupants using the equipment in mock emergencies will create a managed and orderly Evacuation Plan; again comparable to lifeboat drills on a ship.

Pre-positioned assets (PPA) – In a Responder Coordination driven model, the S/E systems deployed in a building would be considered Pre-Positioned Assets providing arriving Responders with the resources to conduct an orderly evacuation if needed. The operative words are "if needed" as the very presence of Supplemental Evacuation capability affords Responders the luxury of "sheltering in place" while they assess the threat level.

Redistributing manpower – The use of SE would allow a gradual shift away from traditional Standard Operational Procedures (SOP) which directs arriving Responders to focus on rescue and evacuation to a more choreographed and organized process designed to save lives and minimize property damage. Responders arriving at a building equipped with Supplemental Evacuation

resources will be able to focus more manpower on suppression and containment or other incident control procedures and less on rescue operations.

The combination of Supplemental Evacuation and Responder Coordination will lend structure and discipline to a traditionally chaotic environment. With the stairwells clear and those building occupants in harms way evacuating from designated safe rooms, refuge areas or escape stations, Responders will be able to concentrate on fire fighting and saving the building.

Property damage reduction – A less apparent but critical benefit of the S/E concept is the projected reduction in property damage made possible by the additional manpower available to put out the fire. Every minute a building burns costs the stakeholders and insurance companies money. Underwriters should consider the mandatory use of S/E in high risk, upscale buildings that could prevent a million dollar loss from becoming a ten million dollar loss.

New technology capabilities

Robotics – Picture a future where iconic high rises are equipped with intelligent robotic systems designed to automatically transport the tenants to safety in an emergency. That future is closer than you might think as work is underway now in America to develop and perfect this revolutionary capability.

Powered systems – With the passage of the new NFPA Codes, powered systems using electric, hydraulic, pneumatic and other advanced technologies are now approved for use. The next generation of powered Robotic and Semi-Automated systems will completely redefine our ideas about high rise rescue and escape.

Advances in batteries, super-capacitors, regenerative power systems and other microprocessor controlled technologies make powered rescue systems possible. New lightweight, high power Lithium Iron Phosphate batteries offer ten years life spans and superior charge retention for maximum reliability.

Backup power – NFPA Codes approving the use of powered rescue devices also require backup power sources. While new design systems offer long life internal power supplies, auxiliary options will include generators in the building, on the roof, or on the ground; mobile power packs provided by systems manufacturers or power from the ground via extension cables.

Remote control, communications and automation – The recent approval of powered rescue systems opens up new applications in remote control, networking, communications, automation, robotics and other high tech features allowing Responders or building personnel to control S/E systems remotely from the ground or elsewhere in the structure. In operational terms this would enable Responders to issue remote commands to Supplemental Evacuation machinery in the building to deploy, lower lines to the ground, establish communications with people in the building and other functions.

Lifting capability and man rated hoisting – Some new generation S/E designs feature a powered lifting capability for transporting SCBA, hoses, litters and other firefighting equipment to the upper floors effortlessly; once again saving manpower for other operations.

Other new Supplemental Evacuation systems under development will offer Responders a man-rated lifting capacity for transporting High Angle Rescue Teams or medical personnel and their gear to the upper floors automatically where they arrive fresh and with enough air to operate as long as needed.

Point to point rescue and elevator shafts – Another important operational feature of new S/E systems is their point to point transport capability within a structure. Traditional escape systems are designed to evacuate users to the ground. New generation systems can lower people trapped above a fire to a safe level below and discharge them. This cuts rescue times substantially and again saves manpower. An optimum location for conducting point to point evacuation in buildings without windows, balconies or other external access points is an elevator shaft; provided the shafts are clear of smoke and not structurally compromised.

Self rescue application – Armed attacks, bombings and other violent acts pose an even greater threat to civilians in high rises because help from the outside will be slow arriving. Recent Incidents in Islamabad, Mumbai and Jakarta demonstrate the need for civilian self-rescue capability in high profile hotels that are potential targets for attack. In such situations Responder access to the building is often restricted or prohibited completely in the early stages leaving occupants inside the building to fend for themselves.

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Personal and private protection – On a smaller but no less deadly scale, businesses or high profile individuals who may be targeted by criminals, enemies or other threats can use Supplemental Evacuation equipment to escape the immediate threat by exiting the building.

Conclusion

The NFPA and ASTM spent years developing this new approach to high rise emergency management. The use of Supplemental Evacuation in high rise safety planning will enable new synergies between technology, Responder capabilities and civilian financial resources.

We hope this information will educate safety planners, Responder groups, building stakeholders, tenant bodies, insurance companies and others about the benefits of Supplemental Evacuation. We implore and encourage the brave and heroic members of the Asian Responder community to play a constructive role in implementing this new life saving protocol.

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For more information on the Advanced Evacuation Solutions systems that supplement building evacuation planning, visit our website: www.adevac.com