

PROTECTING THE PSAP

... and Everything in It!

By Susan C. Gantt, AIA, LEED AP

The ability to manage your work environment and continue operations under extreme conditions requires that you have a safe and controlled facility which supports the PSAP emergency communications mission. Today, more than ever, it is essential that the physical environment be designed to withstand significant weather and man-made events. These include the destructive forces of a hurricane, tornado, flood, earthquake, fire or act of terrorism. That requires housing staff and equipment in facilities designed to standards which allow for structural integrity and systems redundancy regardless of what's happening outside of the facility.

We are talking about the security and strength of building exteriors, from walls, roof, doors, windows, vents and air intake louvers to the redundancy of electrical, fiber, mechanical, water and sanitary systems. When something goes down, another set of system components must replace performance within seconds. Your comfort within the facility and your ability to continue to perform your essential mission depend on the location of your PSAP containing these protective elements, to the degree required to mitigate the threats in your area.

As many PSAPs are located within facilities older than 20 years, it may be time to confirm the integrity of facilities and upgrade where possible. Today's building codes and standards now reference higher levels of performance, as experience and failures have informed the public safety and building communities of what is required to maintain appropriate survivability and operational levels.

Communications administrative staff, working with city and county facilities managers, should periodically perform assessments of all facilities used to provide emergency communications.

EXTERIOR ENVELOPE MATERIALS

The exterior envelope of the building needs to incorporate materials such as reinforced, filled concrete masonry or steel plate over metal or wood stud framing. Windows and storefront or curtain wall glazing need to meet the testing designations referenced in the Building Code, Chapter 16, Structural Design. There are also options to apply steel shutters over windows that cannot meet the impact requirements of the code. Window placement should be designed to allow for daylight, views and program functions in appropriate areas. Generally, equipment and storage rooms should be enclosed in solid concrete walls without windows.

Glazing in windows or storefront systems should have low reflectance. Laminated



High wind & impact resistant glazing system at building entry. Boone County, Mo. Emergency Communications Center.

insulated Low-E impact resistant glazing for survivability and energy efficiency should be considered. Doors are another element that need to be evaluated in terms of operational function, structural integrity and aesthetic appearance. Doors are designed to work with the door frame, door hardware and in some cases, door access control systems.

Ventilation louvers also need to be reviewed for their structural integrity and their appropriate air flow. The capability of louvers to withstand direct wind pressure and be automatically closed when the wind speed develops into a high wind event is also important. This requires coordination between wind sensors, the HVAC system and internal controls. Typical spaces that would utilize exterior louvers are kitchen and

kitchen equipment, mechanical rooms and mechanical system fresh air intake points, compressor equipment, work rooms and areas containing gas-fired heating elements.

The roof structure can consist of steel or concrete deck on steel joists. Roofing systems need to be specified to meet stringent uplift factors. The roofing system includes the roof covering and the structural elements below that system. "Single ply" systems, layered modified bituminous systems, standing seam metal roofing systems and shingle systems can all be used, as long as their attachment method allows the roofing material to resist wind-driven negative and positive structural forces.

Due to the building type and its public prominence, there should be no exposed roof top equipment. Where antennae structures need to be mounted on the building, a vertical wall surface and steel structure should be provided that the antennae can be secured to. All equipment should be ground-mounted behind protective enclosures in secure staff areas, in order to enhance survivability, security and ease of maintenance.

These design features are intended to create a survivable, sustainable emergency communications facility. Below are some of the codes, standards and guidance publications used to evaluate and design facilities to resist the destructive climatic and man-made forces around us.

SURVIVABLE DESIGN STANDARDS

Due to the essential public safety nature of emergency communications centers and the need to maintain continuous operations during natural and manmade events, the structural system and building enclosure materials need to resist forces beyond the typical rain storm. Both the International Building Code (2015 Edition) and the Florida Building Code (5th Edition 2014) categorize these facilities as Risk Category IV, Essential Facilities. The wind speeds and debris impacts are considerably higher than the average residence and office building risk category. All doors, windows and vents must be tested to the International Code Council ICC-500 testing standards or to another building code recognized testing protocol.

The National Fire Prevention Association publishes the following standards for emergency communications centers and other public safety emergency response facilities:

- NFPA 75: Standard for the Fire Protection of Information Technology Equipment
- NFPA 297: Guide on Principles and Practices for Communications Systems
- NFPA 1201: Standard for Providing Emergency Services to the Public
- NFPA 1221: Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems

Federal Emergency Management Agency Guidelines can also assist in best practice guidance when renovating and design for new facilities:

- FEMA 426: Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings
- FEMA 543: Design Guide for Improving Critical Facility Safety from Flooding and High Winds
- FEMA 361: Design and Construction Guidance for Community Safe Rooms

American Society of Civil Engineers Standards include: (Note that ASCE 7-5 was referenced by the Building Codes, so portions are mandatory):

- ASCE 7-10: Minimum Design Loads for Buildings and Other Structures (current edition is ASCE 7-10)
- ASCE 24-05: Flood Resistant Design and Construction
- Unified Facility Criteria (UFC): Security Engineering Facilities Planning Manual (DoD) This is used for Emergency Communication and Operations Centers design for stand-off distance criteria only

ASTM (American Society for Testing and Materials) Standards Reference:

- ASTM E-1996: This is used for the design of impact resistance for exterior walls, roof, windows, doors, louvers, etc. ●

Susan Gant, AIA, LEED AP, is a registered architect with Architects Design Group, specializing in the design of public safety facilities throughout the United States. She also holds a general contractor's license and has been accredited as a LEED AP by the U.S. Green Building Council. During her 34-year career she has completed numerous projects for public sector clients. Her work with public clients includes master planning, strategic planning and programming, and design of a wide variety of building types including cultural, municipal, law enforcement, public safety, emergency operations centers, communications/dispatch, traffic management and fire facilities.



Survivable port entry & mounting system for rooftop antennae array. Boone County, Mo. Emergency Communications Center.



Wall mounted port entry & antennae mounting beam. Sunrise, Fla. Public Safety Building.



Grounding and wall mounted port entry & antennae mounting beams. Sunrise, Fla. Public Safety Building.



Side view of survivable port entry & mounting system for rooftop antennae array. Note roof membrane walk pad protection. Boone County, Mo. Emergency Communications Center.