

**WHITE
PAPER**



FIRE STATION DESIGN PROVIDING PUBLIC SAFETY AND CIVIC PRIDE

INTRODUCTION

At first glance, it may seem as though designing a fire station is an easy enough task. You take a couple of boxes, put them together, then park vehicles in one and house people in the other. In truth, that supposition is far from correct. Fire station design actually is a lot more intricate, with each component critical to the whole.

It also comes with a great deal of responsibility, both to the community the station serves and the First Responders who serve the community from that facility. Similar to a town hall or a library, fire stations are symbols of public safety and a source of civic pride for a community. In addition, it should be a tribute to those willing to risk their lives for others, giving them a “home away from home” that demonstrates respect for their profession and enables them to do their jobs efficiently and effectively. And all must be done within a municipal budget and amidst a web of regulatory requirements.

A GROWING NEED

Of the nation’s 50,000 or so fire stations, 21,230 (43 percent) are more than 40 years old, representing an 11 percent increase in aging infrastructure over the past 15 years.¹ Also, as noted by Todd Sweet of Sweet Sparkman Architecture and Interiors in Sarasota, Florida: “Any fire station more than five years old likely will not meet current building codes. This is important as these are essential facilities and need to withstand significant storm events.” In addition, population growth is requiring new building and the changing nature of fire services is demanding new uses of those buildings.

¹ New NFPA research report shows 43 percent of U.S. fire stations are 40+ years old, with an estimated total cost of \$70 to \$100 billion to replace, National Fire Protection Association press release, September 3, 2019, <https://www.nfpa.org/News-and-Research/Publications-and-media/Press-Room/News-releases/2019/Research-report-shows-43-percent-of-US-fire-stations-are-40-years-old>

² Q&A: The No. 1 issue in building a fire station? Location., Fire Chief Digital Edition, Summer 2017, <https://www.firerescue1.com/station-design/articles/qa-the-no-1-issue-in-building-a-fire-station-location-ZotTqjRIGIsdOst1u/>

“
What is the most important aspect of planning for a new fire station? Put it in the right location. That’s the No. 1 issue I’ve seen with [municipalities when] building fire stations – they go where land is cheapest. This is too strategic of a capital purpose to put it in the wrong location.
”



WHITE
PAPER



From the Firefighter Cancer Support Network's white paper, "Taking Action Against Cancer in the Fire Service": The design of fire stations, whether for new construction or renovation, must include such standard design features as state-of-the-art equipment and systems for adequate air flow, removal and capture of carcinogens and particulates, appropriate location and ventilation of storage rooms for contaminated PPE and other equipment, washer-extractor and gear-drying equipment, as well as clear separation of living quarters from the apparatus floor. In short, architects should be working to design cancer out of fire stations. Responsible elected and appointed officials should require this type of expertise when hiring design professionals for fire stations.⁵



MAJOR TRENDS DRIVING DESIGN

Times change, and so do fire stations. Each generation of design must accommodate new perspectives and actualities. Today, several trends are changing the way fire stations look and function and how they are to be built or retrofitted.

Women in the Fire Services

Today, some 11,000 women work as career firefighters and officers, with perhaps 40,000 in the volunteer, paid-on-call, part-time and seasonal sectors, according to Women in the Fire Service, Inc.,³ and concerted efforts are being made in jurisdictions nationwide to up those numbers. In addition, the Bureau of Labor Statistics reports that about a third of emergency medical services personnel are female, with outreach reportedly seeking to further improve gender (as well as racial) diversity. This movement of women into these professions has necessitated "gender-friendly" design in accommodations, with separate hygiene and sleeping facilities.

Fitness and Training

The inclusion of a fitness room in fire and emergency services facilities is now standard practice, according to the Federal Emergency Management Agency (FEMA).⁴ This phenomenon is an acknowledgement not only of the difficult physical challenges faced by responders but also the fact that many injuries and illnesses can be eliminated or minimized if individuals are physically fit. For instance, the agency reports, many of the sudden cardiac and stroke deaths occur in responders who are not physically fit. Thus, it is considered essential that these workers have access to strength, cardio and flexibility training.

Evolution of Services

The mission of the fire department when most U.S. stations were built was, of course, firefighting. Today, only 4 percent of runs made by fire departments actually involve fire, according to the NFPA, rendering them primarily emergency medical providers. Whether this shift involves cross-training of firefighters or separate units of responders, it brings up issues of storage and space allocation.

According to U.S. Fire Administration, factors to be considered include: special storage requirements (e.g., secure spaces for narcotics, refrigerated medical supplies); possible routine handling of medical gases (oxygen); possible segregation of station alerting system (fire vs. EMS); possible differences in shift length/separate quarters; and differences in vehicle requirements.

Today's fire departments are taking on growing roles in other areas, as well, including homeland security planning, community health and, in some cases, transportation planning,⁶ and these and other new functions must be incorporated in the overall design thinking.

³ About Women in Fire, Women in the Fire Service, Inc., <https://www.womeninfire.org/about-us/>

⁴ Safety and Health Considerations for the Design of Fire and Emergency Medical Services Stations, FEMA, May 2018, https://www.usfa.fema.gov/downloads/pdf/publications/design_of_fire_ems_stations.pdf

⁵ Ibid

⁶ Your Image of a Firehouse Is Probably Wrong, governing.com, April 10, 2017, <https://www.governing.com/topics/transportation-infrastructure/gov-firehouses-redesigned.html>

Station-Related Illness

Station-related illnesses are widespread, with chemical, biological and environmental exposure contributing to cardiovascular, cardiopulmonary and respiratory diseases – including cancer, the leading illness in U.S. fire stations.⁷ Fire and EMS personnel are constantly exposed to carcinogens at the scene of a fire. They also bring particulates back with them to join those already in the station, including polycyclic aromatic hydrocarbons, polybrominated diphenyl ethers and polychlorinated biphenyls. Diesel exhaust, an Occupational Safety and Health Administration-confirmed carcinogen, also has been said to be a causative factor in the high rates of cancer. Not surprisingly, more and more states are passing presumptive laws in an attempt to stem the increasing rate of cancer in the fire services.

PUTTING IT ALL TOGETHER

Lives depend on a well-designed fire station. Planning the design of this facility requires that many components are thought through carefully. Some of these fundamental items include a stations' particular service area, equipment and apparatus, day-to-day operations and needs for staff.

And, throughout, it's a matter of resilience in buildings that must withstand the tests of time and natural forces. When a natural disaster strikes, it is critical that fire stations remain standing, capable of meeting community needs with minimal interruption in service. Some stations are adding safe rooms for additional protection of individuals. This resilience extends beyond the unusual; it incorporates how well the structure can stand up over time to weather-related and other environmental challenges of its specific location.

For those and other considerations, said Sweet, it's a matter of asking the right questions and knowing what to do with the answers. For instance:

- ▶ **Life Safety:** Does the layout provide the best solution for dispatching personnel and EMS staff safety and quickly to calls?
- ▶ **Operational Efficiency:** What are the most efficient and inefficient aspects of the current facilities? What are its storage needs? Focus on correcting what does not work and maintaining what does.
- ▶ **Technology Integration:** How to incorporate antenna and or satellite radio systems building security (cameras, card readers, logging of visitors etc.), as well as apparatus exhaust systems, alerting systems, telephone and data hubs.
- ▶ **Daily Operations:** A lot goes on in a day – and night at the station. From optimal gear access in case of emergency to report writing to bunk arrangement, every potential activity must be accommodated.
- ▶ **Acoustics:** What rooms require special acoustic treatment? Consider proper adjacency of rooms requiring acoustic separation.
- ▶ **Disaster Response and EOC Rollover:** Does the facility require standalone or partial operations during hurricanes or other natural disasters? What are the back-up requirements (duration and scope of operation) for running on emergency standby power during this time?
- ▶ **Parking and Vehicular Circulation:** Are there adequate parking facilities for staff changeover? Is there training at the facility requiring additional overflow parking? Does the site / design allow for safe ingress/egress of apparatus from and to the building?

⁷ Safety and Health Considerations for the Design of Fire and Emergency Medical Services Stations, FEMA, May 2018, https://www.usfa.fema.gov/downloads/pdf/publications/design_of_fire_ems_stations.pdf

WHITE PAPER

- ▶ **Cost control:** Are there project procurement procedures, such as owner-provided construction management, that can assist in cost control?
- ▶ **Future Space Needs:** Consider expansion of staff, service areas and timing for such expansion. Consider the amount of land available.
- ▶ **Cold Zone vs. Transition Zone vs. Hot Zone:** Provide separate areas for decontamination so firefighters can properly decontaminate themselves upon return to the station without bringing potential carcinogens into the living quarters.

The list, of course, goes on.

CONCLUSION

Building or retrofitting a fire station comes with a great deal of responsibility. The many practicalities and mandates inherent in such a project must be balanced with aesthetics and features that bring pride to the community, promote service excellence and create a pleasant, livable, safe “home away from home” for personnel.

That’s a tall order when dependent on government budgets, Sweet explained. “It’s about finding the sweet spot,” he continued. “We always want it to be about the best possible use of available funds. We love the challenge and the opportunity to create an iconic building for a community.”

SWEET SPARKMAN ARCHITECTURE AND INTERIORS

Sweet Sparkman Architecture and Interiors is a multi-disciplinary architecture and planning firm specializing in community-oriented projects and high-end residential, as well as interior design. Since its beginning in 2002, the award-winning firm has designed and permitted more than 20 fire facilities. For more information, visit www.sweetsparkman.com or call 941.952.0084.