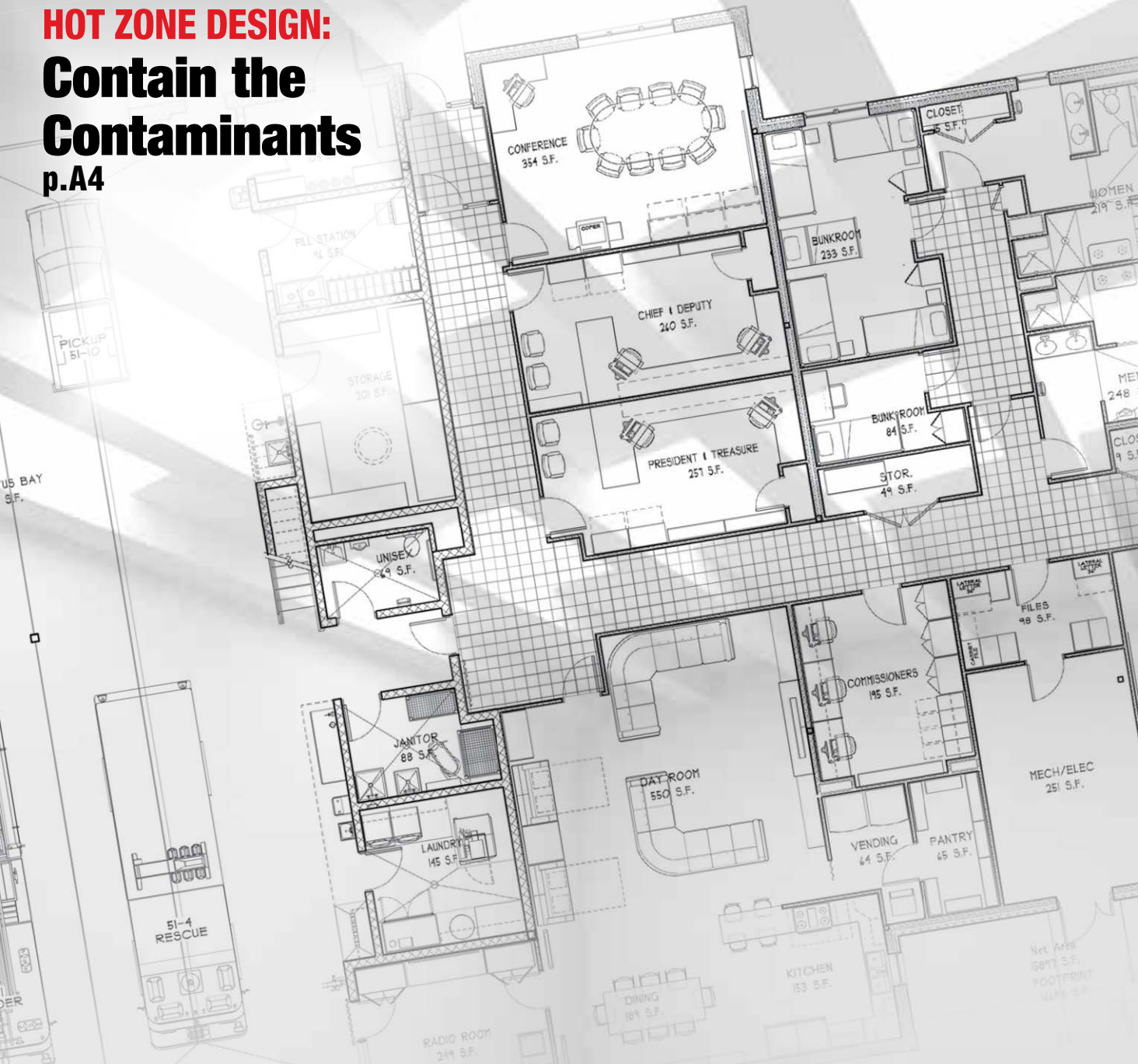


STATION DESIGN

HOT ZONE DESIGN:

Contain the Contaminants

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STATION DESIGN

A4

HOT ZONE Design

Contain the contaminants

By Paul R. Erickson, AIA, LEED AP

By working together during the design and construction phases, architects and fire departments can help reduce cancer among firefighters. While scientific studies connecting what firefighters do with their health consequences is still in their infancy, common-sense observations and actions can be made about exposure to carcinogens, transport of the cancer-causing agents back to the fire station and control measures to limit their impact.

A10

10 Tips for Selecting A Fire Station Site

Evaluating and acquiring property can be complex and lengthy

By Brian Harris, AIA, LEED AP BD+C, NCARB
and Forest Hooker, RA, LEED AP BD+C

Selecting the right piece of land for a new fire station is among the most important decisions to be made when designing a new facility. A station's location is a key element to providing effective service based on both current and future service demands driven by actual and projected hazards and risks.

A14

Best Practices in Fire Station Design

What to do and what not to do when designing a fire station

By Ed Ballam

When it comes to building fire stations, experts agree there are many do's and don'ts fire departments should take into consideration when designing their buildings. To help educate those in the fire service about best practices for building and designing fire stations, *Firehouse Magazine* asked experts in the field to share the lessons they learned.



ABOUT THE COVER:

In this special supplement, *Firehouse Magazine* presents best practices and technologies that fire departments must consider when designing and building a new fire station to meet the growing needs and demands of the fire service and the community.



HOT ZONE Design: Contain the Contaminants

How architects and fire departments can help reduce cancer among firefighters

Why is it that emergency service professionals are so respected by the public at large? Is it because these men and women put their own personal well-being at risk by running into burning buildings, by cleaning up hazardous materials spilled on the highway or by controlling chemical fires?

Are they admired because they are always on call, 24 hours a day, to be there to help a loved one suffering a heart attack or to extricate a trapped victim in an upended vehicle on the highway?

Of course, the answer is yes to all of the above reasons and more. Yet, what is the cost paid by our emergency service professionals for the essential role they play in the well-being of our communities?

THE RISK

The human price of fire and rescue service is being increasingly recognized and voiced in studies that go beyond budget

reports and staffing plans. Emergency service professionals are classified by the insurance industry as high hazard and demonstrate an alarmingly high incidence of heart attack, high blood pressure and cancer. According to work done by Cindy Ell, president of the International Firefighter Cancer Foundation, when compared to the general population, firefighters demonstrate:

- 100% higher risk of developing testicular cancer
- 50% higher risk for multiple myeloma, an incurable bone cancer
- 50% higher risk for non-Hodgkin's lymphoma

- 28% higher risk of prostate cancer
- Increases in brain, colon and thyroid cancers and malignant melanoma
- Increases in breast cancer

While scientific studies connecting what firefighters do with their health consequences is still in their infancy, common-sense observations and actions can be made about exposure to carcinogens, transport of the cancer-causing agents back to the fire station and control measures to limit their impact. Recognizing sources and developing strategies to isolate carcinogens represents an important first step to improving the long-term health of our firefighters.



PAUL R. ERICKSON, AIA, LEED AP, is senior principal and co-founder of LeMay Erickson Willcox Architects in Reston, VA. In 2005, LeMay Erickson Willcox Architects received the highest honor bestowed by the Virginia Society AIA, the T. David Fitz-Gibbon Architecture Firm Award, recognizing two decades of consistently distinguished architecture and professional leadership. A graduate of the University of Virginia, Erickson has practiced in the greater Washington, DC metropolitan area and mid-Atlantic states for over 35 years. During that time, he has built a national reputation in public safety design with over 70 public safety buildings,

including new and renovated fire stations, and numerous training and public safety centers. An active member in industry and community organizations, Erickson has written numerous articles for industry publications and is a featured speaker at national fire and rescue conferences. In 2007, he received the Distinguished Leadership and Service Award of the AIA Northern Virginia Chapter. Erickson has received 36 awards for design excellence, including 15 for fire and rescue, and considers honorary membership in the Nokesville and Dale City volunteer fire departments among his greatest professional recognitions.

ILLUSTRATION 1



THE SOURCE

Cancer-causing agents include chemicals like benzene, formaldehyde, butadiene, toluene, acrylonitrile, isocyanates and others. Many of these are encountered in emergency response to incidents, particularly those involving smoke. Regardless of the type of fire (structural, nonstructural, electrical or training), if smoke is involved, carcinogens are present. And anything brought into physical contact with the smoke, or surfaces that have been exposed to the smoke, become transporters of those carcinogens. That means that all gear, all tools and equipment, all apparatus and all vehicles exposed to smoke collect and transport carcinogens from each incident back to the station.

As the 24/7 living and working quarters for a professional crew, the typical fire and rescue station is staffed continuously throughout the year. As such, fire stations are virtually unique; very few other building types reflect this requirement for continuous and occupied operation.

The traditional view of the neighborhood fire station is the base from which emergency services are delivered, which is still an accurate view. However, in the face of the health information above, that view is not enough. An expanded view and understanding of a fire station must be developed by both the design professionals and department leaders to address the role of the same fire station as a receiving and distribution depot for cancer-causing chemicals.

THE RESPONSE

Illustrations 1 and 2 represent the traditional viewpoint for a well-designed, highly functional and efficient fire and rescue station. The plans for this new HQ Fire and Rescue Station for Willingboro, NJ, are color coded to demonstrate the functional adjacencies of various program components of the station. The organization of the building is easily understandable in the zoning of similar spaces within the building, the distribu-

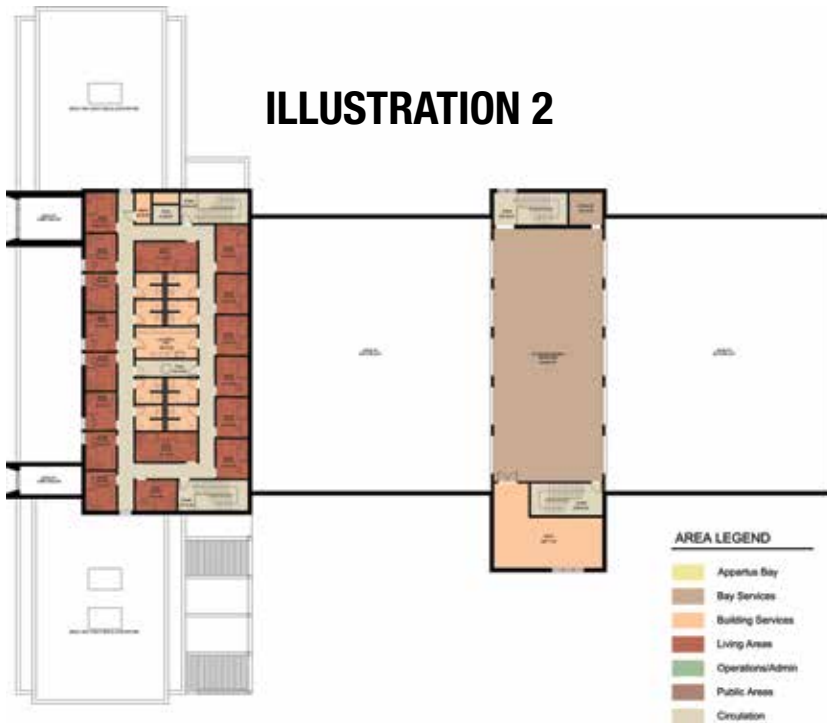
tion of shared functions, the organization of different users around separate entries, the placement of public spaces near entrances and corresponding placement of private spaces in more secluded or protected locations within the building.

One of the design's underlying philosophies is to provide direct and unobstructed paths of travel into the apparatus bays; all corridors flow efficiently with minimal turns towards the bays. On the second floor, the design creates privacy with individual bunkrooms encircling a shared core of private toilets and laundry room. Again, multiple paths of response to the bays are direct with two stairs and a sliding pole to the level below.

Illustrations 3 and 4 represent a completely different way to view the same design. This strategy focuses on controlling the entry and handling of carcinogen-contaminated personnel and equipment in the building. This strategy employs the idea of creating and then managing three levels of exposure to contaminants: HOT

STATION DESIGN

ILLUSTRATION 2



Zone (red) for high hazard, TRANSITION Zone (yellow) for moderate hazard and COLD Zone (green) for low hazard.

The color-coded plans for the same fire station now clearly demonstrate a different organization strategy. Central to the success of the strategy, all spaces exposed to carcinogens are grouped in one concentrated area of the building, the HOT Zone. Likewise, all living and working spaces intended for extended occupancy and use by the station's personnel are grouped together in a distinctly separate area of the building, the COLD Zone. The area of contact between the two zones, the interface, is designed to be as limited and simple as possible, in this case, a single straight common wall. Personnel movement between the two zones is focused by limiting circulation to three strategically placed corridors forming the TRANSITION Zone.

IMPLEMENTING HOT ZONE DESIGN THINKING

In order to optimize the ability to address the arrival of carcinogens in the building, and prevent the inadvertent migra-

tion of contaminated materials within the structure, design thinking and departmental protocols must work together. Strategies include the following:

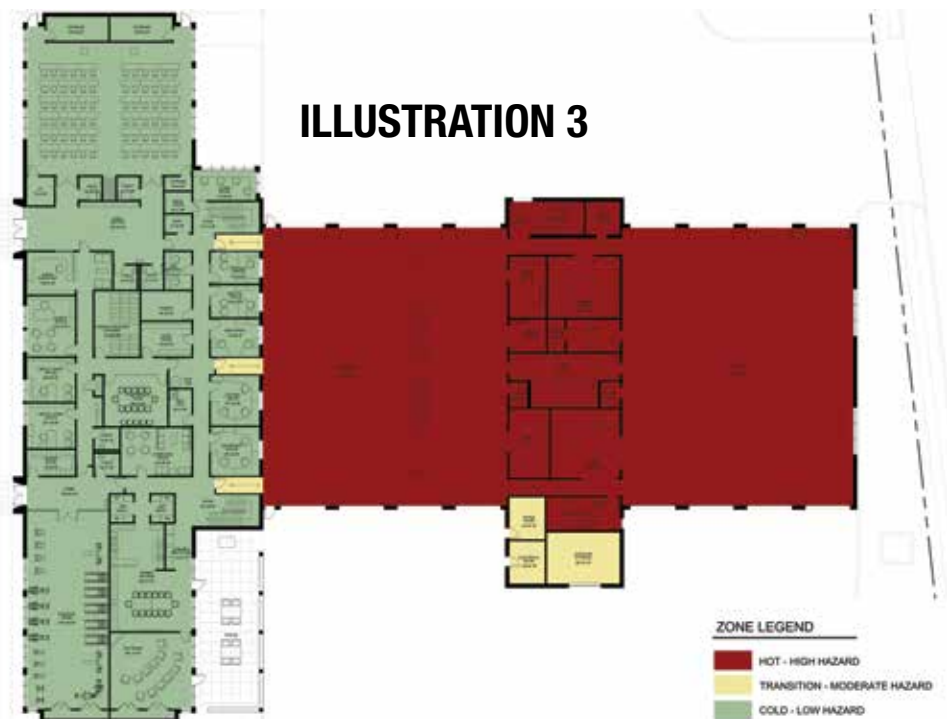
- **Contain the contaminants.** All spaces that house apparatus, tools, equipment or personal protective equipment (PPE) used in emergency responses belong in the HOT Zone. All decontamination areas and wash-down pro-

cedures should occur in the HOT Zone in readily accessible, easy-to-use and easy-to-clean spaces.

Other spaces consolidated in this zone include apparatus bays, apparatus equipment storage, EMS storage, workroom, self-contained breathing apparatus (SCBA) storage rooms, PPE storage room, decontamination area with commercial laundry and extractor, dedicated janitor closet and cleaning supply storage, hose storage, dedicated toilet and training mezzanine.

- **Separate occupants from contaminants.** This consists, essentially, of creating a healthy living and working environment by consolidating all occupied spaces in the COLD Zone. Functional adjacencies can be optimized and circulation arranged to serve individual functions without concern for contamination within this safe portion of the building. Program areas for this zone include all administrative spaces, offices, workrooms, library/study, meeting rooms and associated storage spaces. Additionally, all public spaces like lobbies, community rooms and public toilets are included. Finally, all living and sleeping spaces like the day room, dining room, kitchen, exercise room, bunkrooms, lockers, toilets, laundry and ded-

ILLUSTRATION 3



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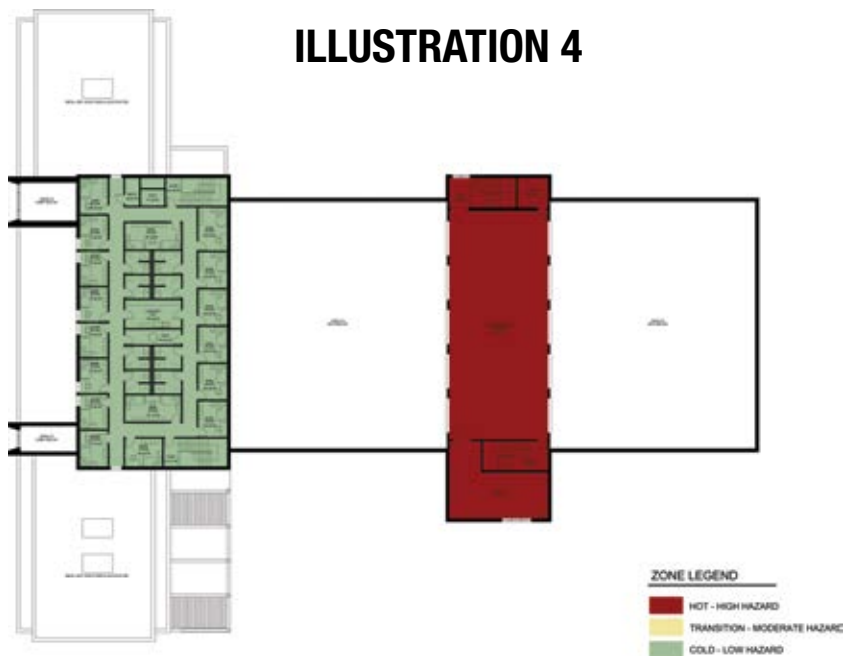
icated janitor closet are included.

- **Focus on the highest hazards.** Wash down and cleaning of apparatus, equipment and PPE returning from an incident is standard industry practice and essential to the control of contaminated materials. Departmental protocols should require decon processes as standard best practices upon return from every incident. However, is the station designed to make these processes self-evident and easy to execute? Further, are these spaces located in the building in a way that reduces the likelihood of spreading the contaminants?

In the illustration, the decon room is located in the intermediate bar of support spaces conveniently serving all eight apparatus bays from a central, visually apparent and readily accessible location. It is outfitted with an eyewash and shower area, a large two-compartment stainless-steel sink with sideboards and foot-pedal controls for equipment washing and large commercial washers and extractor for gear and bay-related items.

The PPE storage room is likewise located in this central bar and provides ready access with pass-through circulation to each wing of apparatus bays. Because the PPE represents a primary point of exposure to carcinogens in the field which are then regularly off-gassed by the gear back in the station, best practices dictate that the gear is concentrated and stored in an enclosed room that is served by a dedicated mechanical system with non-recirculating air supply and direct exhaust.

Common practices of storing the gear in open racks in the apparatus bays should be eliminated. Not only does that practice increase the exposure of the gear to further degradation by UV exposure and increased contamination by apparatus exhaust, but it also allows the off-gassing of carcinogens into an open work environment, possibly including migration of the vapors into the living quarters. In the illustrated design, the enclosed PPE storage room will be exhausted directly to the roof. Additionally, the room is located remotely from the living quarters of the COLD Zone to further reduce



the likelihood of transfer of contaminants within the station, including the possibility that the exhausted air from the room will be captured and recirculated by the air intake systems of the mechanical units serving the living quarters.

Control crossover between zones. To limit the exposure to contaminants within the HOT Zone, reasons and opportunities for personnel movement between the HOT and COLD Zones should be controlled. This emphasizes separation and generates an element of autonomy or self-sufficiency for each zone. For example, including a dedicated full toilet with shower in the HOT Zone area eliminates the need for a crew member to leave the apparatus bays and enter the living quarters to use the toilets found there. This reduction in crossover visits directly reduces the frequency and opportunities for a crew member to inadvertently carry contaminants into the living quarters of the COLD Zone.

Further extension of this concept leads to creating separate laundries for personal and professional uses. The personal laundry located in the COLD Zone keeps personal clothing and articles within the zone while the professional laundry located in the HOT Zone provides washing/cleaning ability for items that are kept in that zone. Other possibilities to limit crossover include separate janitor closets in each zone (keeps

housekeeping efforts from being, ironically, the vehicle of cross contamination) as well as providing appropriately sized storage rooms for supplies that are used in each zone.

Inadvertent air-based crossover can also be managed by isolating the contaminants with separate mechanical systems for HOT and COLD Zones. Never let any single heating, ventilating and air conditioning (HVAC) system serve both zones.

Pay attention to transitions. The passages, doors and corridors between the HOT and COLD Zones should become an area of decontamination with hand sinks, hand sanitizers and recessed walk-off floor mats. The HOT Zone side should be provided with clear signage directing personnel to wash or sanitize hands before entering and prohibiting any PPE/gear from the area. Further, the mechanical systems should be designed to provide positive air pressure from the COLD to the HOT Zone.

THE RESULTS

While scientific studies have yet to be conducted to quantify results, the common-sense approaches of HOT Zone Design offer the possibility to dramatically reduce the incidence of cancer within the firefighting community for generations to come. Is there a goal more worthy? ■

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STATION DESIGN

By Brian Harris and Forest Hooker

10 TIPS

For Selecting A Fire Station Site

Evaluating and acquiring property for a future fire station can be a complex and lengthy process



A new fire station's location is a key element to providing effective service based on current and future service demands. Photo by Janet Wilmoth



BRIAN HARRIS, AIA, LEED AP BD+C, NCARB, is a principal with TCA Architecture Planning Inc., national consultants on emergency facilities since 1960, having been involved in the planning and design of more than 200 projects. With over 150 projects to his credit (including fire stations, public safety buildings, training facilities, maintenance facilities, EOC and 911 centers), Harris pioneered the first LEED-certified fire station, training facility and highest-rated energy-efficient Platinum facility in the U.S.

FOREST HOOKER, RA, LEED AP BD+C, is an associate with TCA Architecture Planning Inc. Fire facility design is a primary focus of his architectural career. Having worked on 20-plus facilities over his 18 years of experience, Hooker has a keen understanding of fire station design and construction. Hooker is a published author and speaker on fire facility design. He has won multiple awards for his fire station projects, most recently the Station Style 2011 Bronze award for Northshore Fire Station 51 in Kenmore, WA.

Selecting the right piece of land for a new fire station is among the most important decisions to be made when designing a new facility. A station's location is a key element to providing effective service based on both current and future service demands driven by actual and projected hazards and risks.

Beyond the geographical location, more immediate contextual features affect the suitability of a site, such as access to arterials, traffic, terrain, available utilities and the general density and character of the targeted surroundings. Evaluating and acquiring property for a future fire station can be a complex and lengthy process.

AS YOU BEGIN THE PROCESS

For those embarking on the process, here are some helpful tips:

1 **Talk with others who have worked through the process.**

Your peers and colleagues with recent experience with the site-acquisition process are among your best resources. Tour recently built facilities and find out what did and didn't work during the site selection process.

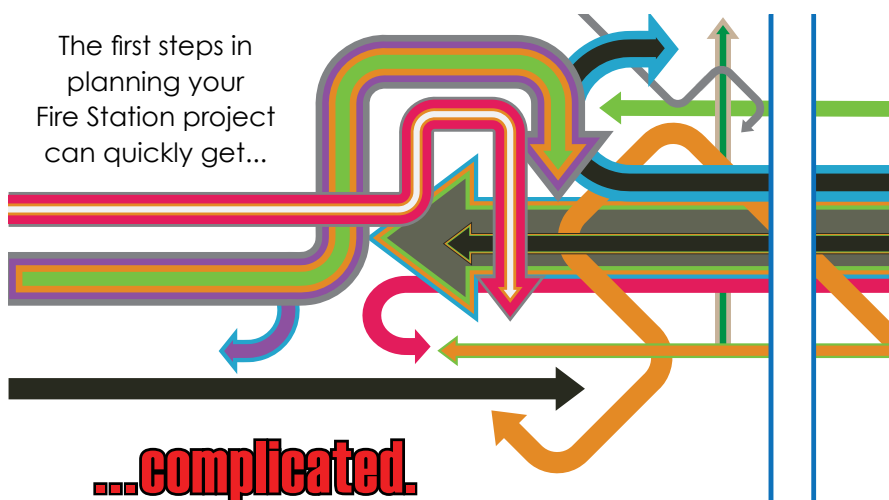
2 **Assemble the right team.**

Start with assembling the internal team and assign clear decision-making roles and responsibilities. Consideration should also be given to establishing a community oversight committee. Typically, a team of professionals will need to be hired to assist in navigating site selection. This team may include architects, real-estate/land acquisition specialists, legal counsel, response-modeling consultants, geotechnical engineers, environmental engineers, traffic planners and community outreach consultants.

3 **Understand your response needs.**

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10 TIPS For Selecting A Fire Station Site

1. Talk with others who have worked through the process.
2. Assemble the right team.
3. Understand your response needs.
4. Know a site's constraints.
5. Test prospective sites.
6. Evaluate multiple sites.
7. Use an evaluation matrix.
8. Assess acquisition options.
9. Understand the neighborhood.
10. Do not underestimate the time, effort and costs.

circumstances, the mapping of current and future values, hazards, risks and protection can be done, which will help in defining a target site location. This effort should include economic and growth projections.

In short, the goal is to identify what there is to protect and how best to protect it based on current and future available resources. Always keep in mind that this is a dynamic relationship often based on multiple facilities/resources and your standard of coverage and deployment plan.

4 Know a site's constraints.
What can be built on a site is governed by many factors, including land-use and building codes, easements, utility availability, transportation department requirements and environmental and geological hazards. Determine and understand a given site's constraints and encumbrances early in the evaluation process.

5 Test prospective sites.
To evaluate a site, you need to understand what will be built on the site. A fully developed set of construction documents is not needed; however, determining the anticipated maximum building footprint for the station and other site improvement needs is necessary to evaluate whether a piece of property can be feasibly developed. An architect can help with a series of "test-to-fit" studies that will eliminate unviable sites and identify sites that warrant further due diligence.

6 Evaluate multiple sites.
Look at multiple sites and keep options open. A process that moves from the macro to the micro level will cull the list of candidate sites and is an efficient use of due diligence dollars. For example, an initial list of prospective properties may include sites that test well against response modeling criteria; this list can then be narrowed by eliminating sites that are too small or ill-configured, then further narrowed by eliminating sites that are not feasible due to constraints (see Tip 4).

Once a short list has been established, dollars can be invested in more costly evaluations such as testing the suitability of soils and investigating environmental considerations. If a potential site is not shortlisted, document why. More often than not, someone down the road will ask the question. Make clear, defensible decisions that are well documented.

7 Use an evaluation matrix.
A weighted evaluation matrix is a useful tool in identifying the right site. The matrix involves listing and scoring the key qualities of prospective sites. The totaling of scores demonstrates a site's comparative suitability and strengths based on departmental and community priorities.

8 Assess acquisition options.
Beyond acquiring land available on the open market or negotiating a sale with a private owner, government entities have additional acquisition

options, including condemnation (by eminent domain) or it may be that local government land is available for use. All options should be evaluated and specific consideration should be given to the option of exercising condemnation; e.g., fully understand the political dimension.

9 Understand the neighborhood.
"The only thing harder than moving a fire station out of a neighborhood is to build a fire station in a neighborhood" is a fire service truism. Evaluate the community concerns of a prospective site's neighborhood. Community outreach efforts are well worth the effort and demonstrating the fire service's good will may positively impact the community's receptiveness. Make sure the neighbors understand all of the benefits that come along with adding a fire station to their neighborhood.

10 Do not underestimate the time, effort and costs.
Acquiring a site can be a lengthy and complex process. Costs may be affected by market volatility. Multiple properties may need to be investigated before finding the best fit.

Build contingencies into schedules and budgets to handle protracted timelines and unanticipated costs. Conservative planning will help you weather the bumps and surprises that are not uncommon when endeavoring to find land for a new fire station. ■

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Best Practices In Fire Station Design

Fire department project managers offer advice on what to do and what not to do when designing a fire station

When it comes to building fire stations, experts agree there are many do's and don'ts that fire departments should take into consideration when designing their buildings. Fire departments should never install anything that takes a lot of maintenance or is difficult and time-consuming to clean.

For instance, fire departments should always buy the best-quality appliances for the kitchen and not skimp on the countertops. And with a high degree of unanimity, fire departments should “go green” wherever and whenever possible.

To help educate those in the fire service about best practices for building and designing fire stations, *Firehouse® Magazine* interviewed experts in the field and is sharing their thoughts. For this article, *Firehouse®* spoke with Louis Baker, a city-employed architect with the City of Las Vegas, NV, who has designed many new stations for Las Vegas Fire & Rescue; Chief Alan Benson of The Woodlands Township, TX, Fire Department, who was part of the team that designed a grand-prize-winning fire headquarters for his community; and Johnny Fong, an architect who is also a fire engineer and operator with the Reno, NV, Fire Department, who is a several-time judge for a prestigious station design awards competition.

MAINTAIN CONTROL

First up to discuss his particular point of view on station design is Louis Baker.



Las Vegas, NV, Fire & Rescue Station 107, which was constructed in the Sun City Summerlin senior citizen community, is Leadership & Energy Efficiency Design (LEED) Silver certified.

Photo courtesy of LVFR

Baker is employed as an architect for the City of Las Vegas in its architectural services department. In his capacity, he has helped design and build several award-winning fire stations as well as renovate and maintain several others.

“I take care of new construction of fire stations from cradle to grave,” said Baker, who works with Public Works employees to develop designs. “We do de-

signs in house. It allows a little more control so we can get exactly what we want.” Baker understands that not every department has that luxury, but it is something he recommends when possible.

Over the years, Baker has been involved in the design and construction of 15 new stations and many more remodeling projects. While fire stations may be complex buildings, Baker ad-

vocates they be designed as simply as possible to keep costs down. Keeping the roof lines simple will not only keep initial costs down, it will make maintenance easier and more affordable, Baker said.

Roof slopes are important in Las Vegas, Baker said. "If we can get a slope on it, it works out best for us," he said, noting that his department prefers metal roofs or single-ply membranes. In all cases, he recommends very high-quality roofing material as that is not a place where communities should skimp.

Baker also advocates using quality, durable materials and components in the kitchen. He said departments should avoid using plastic laminates on kitchen surfaces and recommends stainless steel instead. Even granite doesn't stand up as well as stainless steel in the kitchen, experience has taught Baker.

There had been a trend to make sleeping quarters more homey by using carpeting, but that is over, Baker said, noting that with all the emergency medical calls being run by fire departments these days, communities have to be worried about things like methicillin-resistant staphylococcus aureus (MRSA) and other viruses. Carpeting is too difficult to keep clean and safe. And, on top of that, carpeting stains no matter how careful station occupants are and whatever is dragged in is difficult to remove. Instead, the trend for almost any floor surface in fire stations is heading toward gray-mottled, large-size porcelain tiles with non-porous epoxy grout.

"Vinyl composites are out," Baker said, adding the life cycle for that type of flooring is too short and it's not durable and requires waxing to look good. The porcelain tiles require only damp mopping to look good and keep clean, Baker said.

Baker said his city builds its fire stations to achieve at least a Silver level of certification for Leadership in Energy & Environmental Design (LEED). One station achieved a Gold certification and moving forward, Vegas has made it a goal to be awarded Gold certification for future fire stations.

One innovative way in which Las Vegas works for better LEED certification is using natural gas-fired, four-cylinder engines to power the buildings' heating, ventilation and air conditioning (HVAC) units. The units have separate natural gas meters with more favorable rates that are variable on demand, which saves the city money in the long run.

Building controls are web based and can be controlled and monitored remotely to ensure efficiency and to alert staff when something isn't working properly. It's a practice Baker said will be used on all future buildings.

To continue with the energy-efficient design, Baker said the exterior walls of Las Vegas fire stations feature foam insulated poured concrete. The concept is like coffee in an insulated Styrofoam cup. Light Emitting Diode (LED) lights, both inside and for exterior lighting, help keep electric costs down and the LEED rating up, Baker said.

When it comes to the apparatus bay floor, Baker said Las Vegas used to prefer epoxy-coated floors, but the city found they didn't hold up as well as one might expect and were very expensive, additionally, any time the floors needed to be "dug up" for plumbing or other reasons, it was difficult to re-epoxy the affected area. Instead, Las Vegas went to smooth-troweled

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concrete floors with a sealer. Baker said it's easy to maintain and is not ridiculously expensive.

For the walls within the apparatus bay, Baker said they are masonry with drywall. For additional protection from moisture and water from truck washing, aluminum tread plate is installed on all wall four feet up from the floor. Silicon is used to completely seal out moisture. "It works very well for us," Baker said.

There are a variety of amenities Baker would recommend for any fire station that make life a little easier, cleaner and safer for the occupants. Some of those include opening windows in the fitness room for air circulation and a large, high-quality, stainless-steel washer with a steam cycle and dryer for Class B uniforms so firefighter don't have to take potentially contaminated clothing home for cleaning.

Even the sleeping quarters, or dorms, are a little different than found in other stations, Baker said. Firefighters are provided separate dorms and a three-tier locker system for security of personal belongings. The city has also gotten away from gang showers and bathroom facilities, opting for private spaces with locking doors. "Gang facilities don't really work fundamentally," Baker said.

When it comes to sleeping, Baker ensures personnel get as much as possible with the least amount of interruption. Alerts for alarms are effective without being startling and red light is used for illumination for easier adjustment to the light and not interrupting the sleep of others who don't need to respond.

Even though power needs have been reduced, the department decided to go with large generators for emergency power, Baker said, noting the decision was to have the fire stations fully operational. "We want at least the fire stations fully functional," Baker said. "We can be the host buildings." He added there's sufficient fuel in tanks to have the stations operate for days.

Another novel power source is solar covers over the parking area. Being in a hot, sunny climate, it was important to have areas for private vehicles to be shaded. That cover area is a perfect place for solar panels and some stations generate up to 30% to 40% of the stations' electrical needs, Baker said.

And Las Vegas has begun installing three-by-four-foot LED display signs on fire stations for public service announcements. It's something Baker said he hasn't seen much of in fire departments. The idea is to provide the public with information they might need about an open house, or a meeting or event. The displays can also illuminate the date and time. And better still, the public information officer can change the signs wirelessly through web connects.

Baker said the department is thinking about applying for grant money to put the public service boards up throughout the city. "It raises our profile a bit and gives us a way to communicate with the public we serve," Baker said.

CHOOSE QUALITY COMPONENTS

Johnny Fong, a firefighter/engineer with the Reno Fire Department, is also an architect and has been a judge of many station design competitions. He's also helped his depart-

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STATION DESIGN

ment build new stations.

Like Baker, Fong says fire departments should use the best-quality items and materials possible. Not only do they perform better and last longer, they save money over the years.

“You’ll always want things that are easy to clean and hold up well,” Fong said. “It’s better to spend a little more up front than to try to go cheap.”

That philosophy is no more important than in the kitchen, Fong said.

“The kitchen is the one place you really don’t want to go cheap,” Fong said. “Firefighters are notoriously hard on appliances and the kitchen is the place where just about everything happens. Shift changes happen there too. You just don’t want to go cheap on the kitchen.”

When it comes to kitchens, Fong says it’s a good idea to provide each shift with its own food pantry and refrigerator. “Nothing can divide a firehouse more than one shift eating another’s food,” Fong said. “Firefighters get possessive about their food.”

Individual sleeping quarters is also more than just a good idea.

“Having individual dorms solves a lot of issues,” Fong said, noting that



Las Vegas Fire & Rescue designs its fire stations with simple roof lines to keep initial costs down and make maintenance easier and more affordable. The department prefers metal roofs or single-ply membranes. Photo courtesy of LVFR

more women are joining the fire service every year. Snoring and other sleep-impairing behaviors are another issue that is eliminated with individual dorms.

Fong says another good practice is having closet areas that are accessible not only from the dorm area, but from the closets as well. That avoids having different shifts interfering with sleep or resting by others who need access to their personal belongings.

Fong is also a proponent of “green” stations and understands it takes some effort to get decision-makers who want to save money during their elected terms to be sufficiently progressive to spend more upfront for the green equipment.

“Spending a little more now will save a lot more later,” Fong said.

Fong also says fire departments have responsibilities to lead by example. For instance, he said fire stations should have sprinkler systems installed. There’s no reason not to do it, he added, with the exception of money and that’s not good enough for a fire department.

“We know sprinklers save lives,” Fong says. “So, if you’re going to require sprinklers, you better put them in your fire station. You don’t want fire departments to be hypocritical.”

As an architect who happens to also be an apparatus engineer, Fong says departments need to be very thoughtful when it comes to the apparatus bay area design.

“If you can’t get the apparatus out safely, you’re out of business,” Fong says.

That’s why he is an advocate for drive-through bays, with doors on both ends of the apparatus area. That eliminates the requirement that apparatus back up into the stations.

One of the biggest reasons more fire departments do not have drive-through apparatus bays, Fong believes, is because of a lack of storage in the building. Reserve apparatus and equipment are often stored in the back of fire stations. To avoid that problem, Fong suggests an extra apparatus bay be constructed for reserve apparatus and equipment. It will also pay off if the station ever expands with more apparatus. There will already be built-in capacity for additional equipment.

“You should always plan for expansion,” Fong says.

Fong says departments should al-



The Woodlands Township, TX, Fire Department designed and built an open-concept kitchen and day room area that is a focal point of the station’s interior. The kitchen area is open and large, with a breakfast bar and is integrated with the dayroom, becoming a congregating area for firefighters. Photo courtesy of The Woodlands Township FD

ways also deal with exhaust emission from the apparatus as part of the station design.

"I don't care how you do it, but you should address it," Fong says, acknowledging there are many ways to deal with the issue.

Air quality in the workout/fitness room is also important, Fong says, noting departments should provide adequate air circulation in such rooms. He adds it is critical that fitness rooms be placed where people will naturally be passing during normal business at the station, just in case something happens to an individual who may be using the facilities.

"Having a fitness room tucked way out back in a corner isn't such a good idea," Fong says, adding that if a medical emergency happened, it might take a long time to discover a person in distress.

As a station-design competition judge, Fong says he is always surprised to see the number of fire stations that are not compliant with the federal Americans With Disabilities Act law.

"Although that may mean adding another \$60,000 to \$80,000 to the budget to install a passenger elevator, fire stations are not exempt from accommodating the visually, hearing and physically impaired," Fong says. He added that it doesn't matter if a local building department says compliance isn't necessary because, as a federal mandate, they have no jurisdiction in the matter. "It's a federal law enforced by the Department of Justice," Fong said.

INVOLVE CONTRACTORS FROM START

In The Woodlands Township, the fire department does things a little differently when it comes to designing and building fire stations.

Alan Benson, the chief of The Woodlands Township Fire Department, says when his community built a new, award-winning Central Fire Station, which was dedicated in 2013, it did not use the standard sealed-bid process.

Instead, the community used an "alternative process," that had the general contractor right on board from the start, including the design phase, Benson says.

Benson says when the township was ready to build a new fire station, it sought out a construction management group with which the municipality's representatives were comfortable and included the company as the design and building plans were being developed.

"Making them a part of the team at the very beginning helps you get the very best price," Benson says, adding the township was given a guaranteed maximum price and anything that came in below that price was given back to the community.

The Woodlands Township Fire Department's Central Fire Station was the Gold Place station design winner in 2013 awarded by *Fire Chief* magazine, Benson said.

Benson says the Central Fire Station is a "pretty typical" two-company firehouse with emergency medical services units, fire administration, dispatching and emergency operations center.

"The station is going to be around for 50 years or more and we wanted to design it and build it for future expansion," Benson says, adding that his community "spent the money" and did everything the right way using the best materials and practices possible.

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STATION DESIGN

One of the biggest reasons for using the best materials is The Woodlands Township is in an area prone to hurricane strikes, Benson says, adding the community wanted the building to withstand storms and remain operational.

The Woodlands Township took a lot of effort to design and build an open concept kitchen and day room area that is a focal point of the station's interior.

The kitchen area is open and large, with a breakfast bar and is integrated with the dayroom, becoming a congregating area for all firefighters.

Firefighter comfort was a big part of the design for the new central station. There are 12 individual dorms for on-duty crews. There are also covered porches on each side of the building for firefighters to congregate and relax.

One side has a barbecue grilling area and the other has comfortable patio furniture.

Benson says the fire station also has a critically important mission to fill in the community. As it is only 80 miles from the coast in a hurricane prone area, emergency power is vitally important. That's why the station has a massive 450,000-watt generator and a 4,000-gallon fuel tank to keep it going for sustained periods of time. The station also has battery backup that will keep equipment running for up to three hours.

And, because of the hurricane threat, the department decided to do something a little different with the apparatus bay doors, Benson says. The department decided to install bi-fold doors rather than the traditional overhead doors.

Benson says the doors are visually appealing and can withstand a Category 3-rated storm. "They are very heavy, but they work so smoothly," Benson says. "And they look nice too."

Another attractive feature is an ornamental fire pole the station has in its front lobby, Benson says, noting it's a great public relations feature, melding the old-time traditional icon with the modern functional station.

"Whenever we had school groups in, the first things the kids asked were where the pole is and where is the dog," Benson says, adding the new station has the pole prominently displayed.

And, by happenstance, the department acquired the second requisite accessory, a 6-year-old Dalmatian named Riley.

"She has already learned to do 'stop drop and roll,'" Benson says, not-

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The Woodlands Township Fire Department's Central Fire Station is a two-company firehouse with fire apparatus, EMS units, fire administration, dispatching and an emergency operations center.
Photo courtesy of The Woodlands Township FD

ing that the mascot has great public relations value.

Benson says his department also wanted an appropriate memorial for the front of the station and sought to do something "that has never been done before."

Borrowing a page from the Las Vegas Strip, Benson says he and his firefighters came up with a water feature that has a constant flame symbolizing the last alarm. Natural gas is flowed up through the water and ignited, giving the impression that the fire is floating on the water.

Benson says it is important for fire departments to marry their wants and needs to come up with something that is workable for the community.

To achieve that, Benson says he included many people and different divisions within the department, including the information technology (IT) people right from the start.

In designing and constructing a 21st-century building, Benson says he knew bringing the IT team on board early would be important to make sure the building was fully function when it was dedicated and well into the future.

To make the building technologically accessible, WIFI is available throughout, including in a conference room that is available to the public.

Benson says he is very happy with the building and plans to incorporate many features in future projects. He also knows that no project is perfect and processes can always be improved upon.

He suggests fire departments determine what they want and include all interested parties early on in the project. Determining a budget is also among the most important first steps and then keeping on budget throughout will make for a better project in the end, Benson says.

"There is no such thing as a perfect construction project," Benson says. "There are always little things that can come up and bite you, but if you know what you want going in and pay a lot of attention to design and documentation, you'll get what your community needs." ■

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