

The background of the entire cover is a light blue textured surface. On the left side, there are several interlocking wooden gears of various sizes. The gears are light-colored wood with visible grain and are arranged in a way that they appear to be meshing together. The largest gear is at the top left, and smaller ones are scattered below and to the right of it.

TALK OF THE

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The Engineering Issue



The State of America's Fire Stations

When is it Time to Upgrade or Rebuild?

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It has become abundantly clear that the status of the buildings that our emergency services personnel operate from are an infrastructure problem that our localities, counties, states, and country need to continue to focus on. Emergency responders continue to work in outdated facilities that lack state-of-the-art features, which increase response times and jeopardize firefighter safety and health.

According to a report from the 2019 NFPA, "US Fire Department

Profile"¹, 43 percent (around 21,000) of all fire stations across the country are 40 years or older. In 2001, only 32 percent of stations had reached that age, showing the growing number of stations reaching the end of their lifespan. Roughly 61 percent of these fire stations exist in communities that serve less than 10,000 people, indicating a larger problem in rural areas. There are many factors regarding the cost of replacing the 21,000 fire stations due to geographic location, size, building type, etc., but it is estimated that it would roughly take between \$70 billion and \$100 billion to upgrade these stations to today's standards.

This begs the question: how many

¹ <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/osRenovation-NeedsOfUSFireStations.pdf>

stations are 50, 60, or even 70 years old? A number of existing facilities are 70 years old or more. There are facilities still in use with features to maintain early 20th century steam engines and designs that were meant to support caring for horses including chutes designed to drop hay from lofts. The 20th century saw a lot of technological progress, and while these older stations have adapted along the way to adjust to more modern equipment and practices, there is often more that can be done, and sometimes a new station is the better option. Our nation has a lot of work ahead of us to update these facilities and support the individuals that work there. Outlined below are some items to take into consideration when planning to upgrade or replace your current facility.

Lack of Funding

The growing number of stations surpassing 40 years in service

indicates that communities are delaying updating their stations, potentially to push the cost down the road. While these communities may have saved the upfront cost of upgrading their facilities then, the cost continues to go up over time. The communities that did upgrade their facilities have benefited from reduced maintenance and operational costs, reduced bidding costs per square foot, better borrowing rates, and helping guard against increases due to inflation and the pandemic over the last two years.

Although there have been great strides in grant opportunities for funding various needs through Assistance to Firefighters Grants (AFG), grant funding for fire stations in general has been minimal. The most recent funding mechanism for potential fire station projects was the FY 2009 American Recovery and Reinvestment Act, which dedicated \$210 million to construct, renovate, and modify fire stations throughout the country. As the NFPA findings indicated, tens of billions of dollars are needed, making it easy to see that \$210 million did not go very far across 116 grants towards modernization nation-wide.

A bill introduced in June 2021 would, if passed, authorize a one-time \$1 billion appropriation to assist local fire and EMS agencies to modify, upgrade, or build new fire stations and/or training facilities. Bill H.R. 3728 is still in the introductory phases, but departments and communities should watch the legislation and be ready if it becomes law. The goal is typically to have these funds reach the economy quickly, so projects that are ready to go are often more likely to receive funding than those that aren't, another reason that it is advisable for communities to plan ahead.

Size of Apparatus

In the last 50 years, firefighting

equipment has increased in size, presenting issues for the stations designed with horse-drawn steam engines in mind. As the need for more commercial shipping grew over time and highways and bridge height and weight limitations were changed, the vehicles that supported that need grew as well. As those vehicles grew, apparatus

in fire stations have kept pace.

Although federal vehicle height limits don't exist outside of interstate systems, state standards fall between 13'6" and 14'6" in height and 102" in width. Fire Stations and their apparatus bays that were designed more than 40 years ago supported the smaller apparatus that were available back



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then regarding their size, turning radiuses and utility connections. While modern, more advanced apparatus are designed to larger specifications, departments with older stations are being forced to order custom-built equipment that fit into their existing stations. As with any bespoke piece of equipment, costs are increased in these situations and equipment sizing can sometimes dictate its ability to effectively respond in an emergency when clearance issues exist. Apparatus bays now are designed to accommodate equipment maintenance requirements, while also providing the fastest response times. While departments make it work, making the best of the current facility makes it more difficult for the department to be efficient in their position.

Firefighter Staffing

Studies show that overall volunteerism across the country has fallen from 30 percent in 2003 to 25 percent in 2015; these decreases are in line with the reduced amount of volunteer firefighters. According to the 2019 NFPA report, there were an estimated 1,080,000 firefighters in the United States in 2019. However, it is estimated that in the past 30 years, the number of volunteer firefighters in the United States dropped by 11 percent, while the number of career firefighters has grown by 50 percent.

The issues with volunteer firefighting have hit communities hard and will only continue to occur as those volunteers that serve the departments age out. Fifty percent of all firefighters, volunteer and career, are between 30 and 49 years old. This is also alarming in communities serving fewer than 2,500 people, which had the highest percentage of firefighters aged 50 and older according to the NFPA report. If these trends continue, communities will need career



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firefighters to protect the people they serve.

With a career-based model, modifications to stations must occur to support any staff that would ultimately be needed there. Communities with volunteer departments are already starting to plan for these scenarios when building new stations by completing the shell of these areas now in lieu of additions that would occur later. While the future can't be predicted, thinking about how the community could look 10 to 20 years from now is an important step in planning any new facility.

Firefighter Gender Equity

According to the 2019 NFPA report "Renovation Needs of the US Fire Service"², the first paid female firefighter in the United

2 <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/osfdprofile.pdf>

States began her employment in 1973. Considering the age of stations discussed here, many were constructed before women joined their departments. The report estimates that over 88,800 firefighters were female at the time of its publication, comprising 8 percent of the nation's firefighters. Of those 88,800, roughly 4 percent were career firefighters, and 10 percent of all volunteers were female.

Many existing fire stations across the nation need renovations to accommodate female firefighters. Men's and women's locker rooms are being replaced with bathrooms and showers dedicated for single-use occupants. Likewise, larger rooms with multiple bunks have been replaced with individual dorm rooms ensuring separation of genders and privacy for relaxation after intense and stressful events.

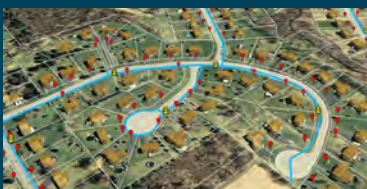
The proper planning and thinking how a station's personnel will look

down the road is important and will continue to be a priority as more women join the career workforce. Planning for changes that will need to occur to your facility so that capital project funds can be allocated in the years to come should be a priority.

Decontamination Processes

Over the past decade, there has been a noticeable increase of cancer diagnoses for firefighters. To help keep firefighters and their families healthy, fire departments have instituted safety measures for cleaning personnel and equipment to the best of their ability.

This has been implemented in new construction throughout the country, however, there is still work to be done in existing facilities. Personnel decontamination processes in new designs separate the fire station into hot and cold zones that help contain the spread of cancer-causing



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contaminates. This process includes decontaminating trucks, gear, and people. Restricting contaminants to the hot zones and having staff transition to the cold zones helps to ensure that they are free of contaminants after responding to an emergency. Firefighters do a great job of taking care of others, but aren't always as good at taking care of themselves. Implementing these features into new and existing stations should be considered in any department to give firefighters the best chance to decontaminate appropriately to feel safe doing the job they signed up for.

In Closing

These are only a few of the considerations that would be helpful when evaluating whether to update an existing station or to build a new one. The many other items to think about including energy efficiency, design features to help combat sleep disorders,

physical fitness and training facilities within the station. As you read this, if you know your town fire station is nearing 40 or even 50,

60 etc. years old, now is the time to start to plan. There are steps to take to ensure we are protecting those that protect us every day. □

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