

Built To Train: FDNY's State-Of-The-Art Facility

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With a simple push of a button, fires were ignited and the new Fire Department of New York (FDNY) state-of-the-art burn building opened for training; And not a moment too soon. The City of New York urgently needed new firefighters to bolster the burdened fire department post-September 2001. The double-sized class of 300 new recruits was due in-service in just weeks.

Live fire training in the new burn building was vital to the probationary firefighters' preparation. The "probies" attacked intense computer-controlled fires continuously for 12 hours a day. In just two weeks, nearly 1,000 evolutions were safely staged and the first class of 2002 at the Academy graduated on time.

In addition to fire suppression, the building provided confidence in basic firefighting skills including forcible entry, search and rescue, and roof ventilation. Although the fires can singe flesh and the smoke can obscure vision, the situation is controllable and repeatable-ideal for teaching fire-ground skills and tactics.



The success of the new burn building at the Fire Training Academy is the result of years of experience combined with thoughtful planning and good execution. While training may vary among cities and towns, a thoughtfully designed burn building can be an invaluable tool for achieving training objectives.

THE NEED FOR A NEW BURN BUILDING

As in many fire training organizations, our need for a new burn building developed slowly over time. The previous burn building, while still functional, was rather worn from years of continuous use since 1975, when it was used to burn Class "A" material. It was later outfitted with propane-fueled fire trainers. More importantly, it was not configured to properly support the Academy's current training programs. Training in the burn building focused solely on fire suppression. Scenarios were limited. There was no way to ventilate a roof, force open a door, or recon-figure walls in a room. A new burn building was included in the first phase of a major facility upgrade.

The new burn building allows the whole fire response scenario to be practiced simultaneously in one drill: forcible entry, laddering, ventilation, advancing hoselines, fire suppression, search and rescue, and thermal imaging. For probationary firefighters, the building provides repeatable fire training that is progressively more challenging.

However, the building is realistic and demanding enough to train the 11,000 in-service firefighters. Training for in-service personnel reinforces critical standard operating procedures (SOPs).

THE DEVELOPMENT PROCESS

The process of developing a burn building is a once-in-a-career opportunity. The task can be somewhat bewildering at first. There are many factors to consider. However, approaching the design and development systematically can simplify the process. Here are some tips:

Identify training objectives based on standard operating procedures. This is an obvious, but important, place to start. The burn building, after all, is a tool to teach skills and to practice SOPs. Also, identify types of common structure fire situations in your jurisdiction. Structure fires in New York City are vastly different from structure fires in rural Kansas. Are single-story house fires more common than four-story apartment fires in your area? Are residential fires more common than industrial fires? The burn building should reflect the community and its particular fire hazards.

Visit existing training centers. These are excellent references. Talk with the center's training instructors to discover their likes and dislikes about their burn building. How can their burn building be improved? Do they have any unique training props? Most departments will welcome a visit and are eager to contribute their experiences. In the end, sharing this knowledge benefits firefighter safety.

Follow National Fire Protection Association published documents, including NFPA 1402, Guide to Building Fire Service Training Centers, and NFPA 1403, Standard on Live Fire Training Evolutions. Our training officers consulted these documents from the start of the project and were determined to follow all recommendations and standards. These documents offer common-sense safety practices, such as including two egress doors for every burn room. The resulting burn building incorporates all of the NFPA safety practices without limiting the training experience.

Incorporate features that facilitate lessons. This is the culminating step to making the burn building serve your training needs. Where possible, incorporate flexible or dual-use features. In our building, the front entrance replicates a commercial store fire, the back entrance a warehouse fire. Movable wall panels can divide a room to change the fire scenario. The focus is on providing the students with the ability to practice the skills they need to extinguish a fire, not to make the building resemble any particular structure.

Professional firms with experience in developing burn buildings can assist with this step. Much like drawing on the experience of other training academies; draw on the experience of architects and vendors to incorporate training features and avoid unforeseen mistakes. They can advise on ways to make the training building more user-friendly and durable. We worked with Symtron to design our facility.

Establish a "point person" to coordinate all communications among training officers, architects, construction contractors, and vendors. Having a responsible, detail-oriented point person avoids miscommunications and keeps the project running smoothly. In our case, Captain Nick Gaudiosi of Ladder Company 7 was assigned to the project. His ability and training background kept the constant design changes focused on realistic fire training.

CONSIDER ALL OPTIONS

We considered all possible means of conducting live fire training. Despite years of live fire training experience, we took a fresh look at all our options. Burns involving Class "A" or "B" materials, wood pallets or straw, and kerosene fuel did not meet our training needs. Major influencing factors for ruling these out were the time-consuming and messy setup and cleanup of the fuel and ashes such burns involved and the need to decontaminate turnout gear. Further, the environmental effects -air pollution and possible soil and water contamination- were undesirable.

Ultimately, we chose to continue using a computer-controlled, propane-fueled fire training system. Gas-fueled training offered several important advantages. The fire trainer provides complete and safe control of fire scenarios: Fires can be initiated, paused, and extinguished at the touch of a button. This level of safety and control is especially vital when training new firefighters. If a trainee is doing something grossly incorrect, the instructor has the ability to pause the fire and provide guidance.

In addition, the efficiency of setup and cleanup allows the Academy to train up to 400 students per day. As many as 24 fire evolutions can be run in just two hours. Clean burning propane fuel and benign smoke-generation systems are added environmental benefits, since we are located amid a major metropolitan area.

BUILDING FEATURES

The resulting multipurpose burn building meets FDNY's specific training objectives. Detailed below are some of its training features:

Hidden fires. Hidden fires above false ceilings (in cocklofts) can be particularly dangerous if not approached properly. Fire can extend overhead and entrap a firefighter deep within a structure. The commercial storefront burn room has a unique cockloft fire effect. Trainees must check for fire by "poking" through ceiling panels as they advance into the room. If fire is detected, trainees must confront the ceiling fire while attacking the main fire. This reinforces an important SOP that ensures firefighters do not become trapped by fire that has spread over their heads to behind their positions. This tool also helps train for hidden fires as required by NFPA 1001, *Standard for Fire Fighter Professional Qualifications*.

Basement simulation. For safety, you should avoid burn rooms below grade per NFPA 1402 guidelines. To simulate a basement fire, the burn building incorporates an outdoor, second-floor terrace (actually the roof of the commercial store). An indoor stairway from the roof leads down to the simulated basement (the first floor of the building).

Office desk fire with reconfigurable cubicles. Cubicle walls in the second-floor office burn room make getting to the fire a challenge every time. The configuration of the room can be varied so that students do not memorize the layout. Instructors often use the office/desk fire scenario to teach search line training.

Bedroom fire with flashover/rollover effect. The burn building incorporates a bedroom fire typical of a residence or hotel. The bed and the wall behind it catch fire. The instructor can trigger a flashover/rollover effect as an important and dramatic reminder to students to cool ceiling gases.

Fire extension. Heat and flames can spread from the bedroom through an opening in the ceiling, further complicating activities on the second floor.

Ventilation Props. Sacrificial 4- X 8-foot plywood inserts affixed to the flat roof are cut away using power saws. A six-foot pike pole is then used to breach the simulated "ceiling" below. The ceiling is actually hinged steel panels held in place with a thin wood dowel. Blows from the pike pole eventually cause the wood dowel to break and the ceiling to give way. Replaceable wood rafters add additional realism while preventing an accidental fall into the building. The ventilation props are positioned above the burn rooms. After successfully breaking through the roof, students experience heat and smoke billowing from the vent hole. A skylight prop fabricated from steel is another useful ventilation prop. Students lift the hinged skylight to ventilate that portion of the structure. At the conclusion of the exercise, the instructors can easily reset the ventilation props by replacing the wood pieces and swinging the hinged steel panels back into position.

Outdoor automobile fire. An automobile fire was incorporated just outside the burn building. The automobile resembles a two-door coupe when approached from one side and a four-door sedan from the other side. It has four separate fires –an engine fire, passenger compartment fire, trunk fire, and fuel spill fire that can be ignited and extinguished on command.

Other uses for the building. We can use the burn building for scenarios other than fire suppression training. Spring-loaded door props permit realistic forcible entry practice without destroying the door or jamb. The building's loading dock area is used for hazmat response. The outdoor automobile fire is used to train firefighters in the SOPS of intentional or accidental radiological response.

A well-designed burn building is an invaluable tool for training new and veteran firefighters in a variety of fire response scenarios. Many of the training objectives and burn building features presented here may be unique to the City of New York. However, our approach to developing a burn building can benefit firefighters in communities of varying size and training requirements. A systematic approach, combined with creativity, will result in a facility that will promote firefighter safety for years to come.

Live Fire Training at the FDNY Training Academy Location

17-acre facility on Randall's Island, central to the five boroughs of New York City

Live-Fire Burn Building

Two-story masonry building; 6,000 square feet.

Indoor Fire Training

Propane-fueled, computer-controlled fires.

- Storage fire
- Cockloft ceiling fire • Office fire
- Bedroom fire with flashover effect
- Fire extension
- Simulated smoke generation

Outdoor Fire Training

Propane-fueled automobile fire trainer.

- Engine fire
- Passenger compartment fire
- Trunk fire
- Fuel spill fire

"Probie" Training

600 to 1,200 new recruits annually. Typical class of 300 trains for 12 weeks, including two weeks (12-hour days) for live-fire training. Fires can be programmed to spread from room to room automatically. At the touch of a button, fires can be extinguished and smoke and heat ventilated from the training room. The building is designed to train multiple firefighters in an efficient manner. Students rotate and experience every firefighting position.

In-Service Firefighter Training

Three live-fire training sessions per day.

Training of other, fire departments and agencies, as capacity allows.

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