

discussion of construction
issues and techniques

Basic Fire Precautions during Construction of Large Buildings

By Dr. Kuma Sumathipala, P.Eng
and Chief Ronny Coleman

Dr. Kuma Sumathipala, P.Eng
(ksumathipala@awc.org),
is Director of Fire and Energy
Technologies with the American
Wood Council.

Chief Ronny Coleman is a retired
California State Fire Marshal with
fire protection consulting firm Fire
Force One. He can be reached at
ron@fireforceone.com.



The topic of fire precaution and safety during construction of large buildings is timely and relevant. The frequency and consequence of this type of fire is attracting attention in both public and private arenas. These types of fires may also impact nearby buildings, can interrupt neighborhood business operations, and can have longer-term effects on the surrounding community. Often they result in property damage, have the potential for worker and first responder casualties and injuries, and can have a longer-term effect on the reputation of companies involved. But most importantly, they can be prevented to a large degree by strict adherence to existing model codes and standards that have been written for just such purposes. These include requirements and references to standards that are almost universally accepted by local governments that oversee most construction in the United States.

To that end, the American Wood Council has joined with Fireforce One, a fire protection consulting firm, along with a coalition of stakeholder organizations involved in the construction of large buildings, to develop education and training

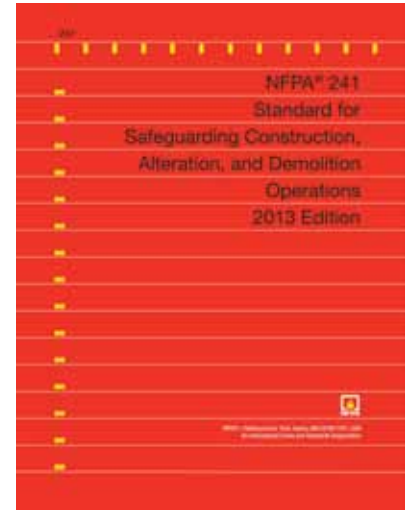
materials on how to reduce the frequency and severity of fires during construction. The project is expected to be completed in mid-2015 and will make available video and print materials that can be used by developers, builders, fire services, and the design community to enhance fire safety on the jobsite. This article provides an overview of the areas on which the education and training materials will focus.

Fire Safety Plan

In order to manage risks and hazards and reduce catastrophic events, there needs to be a plan and management model in place. In order to have an effective program there must also be a system of accountability.

Fire Protection Program

According to the Occupational, Safety, and Health Administration (OSHA) a building site must have a Fire Protection Program (FPP) incorporated into its Health and Safety Plan (29 CFR Part 1926 Subpart F). The Model building codes further require that an owner/developer implement a pre-fire plan for each new construction or renovation project site in coordination with the fire department. The program implemented is expected to incorporate the guidelines of NFPA 241 *Standard for Fire Safety during Construction, Demolition or Alteration of Buildings*.



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Site Fire Prevention Manager

A person with appropriate knowledge should be designated as the Fire Prevention Program Manager for the site, in accordance with NFPA 241. This manager will coordinate their activities with the overall Site Safety Manager. The Fire Prevention Program Manager is responsible for developing and implementing a written, comprehensive Site Fire Safety Plan (FSP).

Enforcement

Just like location is stressed for real estate, construction site fire safety emphasis must be on training and enforcement. The best Site Fire Safety Plan is ineffective unless training has been provided and the Plan is strictly enforced. Post-fire incident review often reveals that the very cause of a fire was explicitly addressed in the FSP but ignored.

Model Code

Every State in the U.S. has an adoption process for fire and building codes, and many jurisdictions use available model codes for this purpose. All of the principal U.S. model building and fire codes follow a similar path in setting requirements for buildings under construction.

Best Management Practice (BMP)

BMPs would require all people working on or visiting a construction site to be made aware of the importance of fire prevention and the content of the Fire Safety Plan, including what to do in the event of fire, emergency procedures, location of assembly points, and good housekeeping

practices. Appropriate training in relation to the use of portable firefighting equipment, safety precautions for those undertaking hazardous operations, and site-specific emergency procedures would be provided. Records are also kept of fire safety training and instructions given to site personnel and visitors.

Additional area-specific BMPs that are to be addressed in any Site Fire Safety Plan include :

- Housekeeping
- Hot Work
- Electrical Supplies and Equipment
- Smoking Activities
- Food Preparation
- Open Fires/Waste Fires and Temporary Heating Equipment
- Plant Equipment and Vehicles
- Stored and Waste Materials
- Storage of Combustible Building Materials
- Exposed Combustible Materials
- Flammable Liquids and Gases
- Waste/Garbage Chutes

Once a building is under construction, there are two primary agencies that have an interest in compliance. The local building official inspects for compliance with applicable codes. The other interested agency will be the fire department that may have ongoing enforcement responsibilities for completed buildings.

Interface with the Fire Department

Regular liaison with the fire department is important. The fire department needs to have full knowledge of a building site *before* a fire emergency occurs. This allows for a more effective response. Areas to be reviewed with fire authorities, and for which a number of National Fire Protection Association (NFPA) standards exist to provide guidance, include:

- Pre-Fire Planning
- Water Supplies
- Fire Department Access
- Emergency Procedures

Built-In Fire Protection Features

Better use can often be made of the additional fire protection that is built into a structure. Planning their use as part of construction staging will allow their installation and operation as soon as reasonably practicable. Components that fall into this category include:

Permanent Features

- Fire stairs, including fire-resistant walls
- Fire compartment boundaries, including fire doors, penetration seals and general protection of other openings



A coalition of stakeholder organizations involved in the construction of large buildings has joined together to develop education and training materials on how to reduce the frequency and severity of fires during construction.

- Fire-protective materials to structural steel and fire-preventative coverings over combustibles construction
- Automatic fire sprinkler systems and other automatic suppression systems, where usable
- Automatic detection and alarm systems

Temporary Systems

- Temporary detection and automatic alarms
 - Manual pull-stations
 - Emergency telephones strategically located
- ### Means of Egress
- Adequate paths of travel to fire exits
 - Regularly checked for obstructions
 - Clearly signed
- ### Fire Extinguishers
- Appropriately sized and widely available at all times
 - Additional extinguishers for fire watch personnel
 - Always at hot works locations
 - Maintained and regularly inspected
 - All staff fully trained in their use
- ### Hydrants and Hose Reels

- Fully operational as soon as possible
- ### Standpipe Risers

- Installed and commissioned progressively with construction
- Locations well marked
- All staff fully trained in their use

Temporary Systems

The construction process often results in a need for temporary installations. These are

defined as those that will be removed before finalization and occupancy of the project. Temporary systems may include building, exiting, and heating systems.

Such temporary systems are needed, but must never be placed in locations where they compromise the ability to maintain fire safety. The planning process should include and plan for any temporary system, with monitoring of such systems included in oversight and implementation of the fire plan.

Site Security

Security is required on a construction site for many purposes. It includes preventing theft, vandalism, and reducing liability. Notably, preventing arson is one of the most difficult tasks faced at building sites. Depending upon the size and physical configuration of a building, guard services may be required to maintain levels of safety. Additional details are available in NFPA 601, *Standard for Security Services in Fire Loss Prevention*.

Fire Reporting

When an emergency occurs, time is of the essence. Emergency responders need to be notified immediately, even for events considered small. Research indicates that it is not uncommon for these types of fires to become catastrophic in size before the fire department is even notified or arrives on scene.

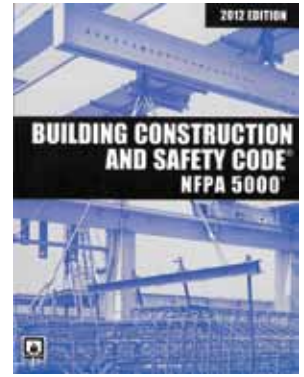
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Alternative Solutions

The *International Building Code*, *International Fire Code*, and *NFPA 5000 Building Construction and Safety Code* allow alternative materials, designs, and methods of construction and equipment to be used. However, where such systems are used, care must be taken to ensure they are recognized and addressed in the FSP.

Construction within Occupied Buildings

Final punch-out, renovation, and maintenance activities are often undertaken after buildings have received their certificate of occupancy and may even be occupied. This often presents unique challenges to ensuring fire and life safety during such processes. As with new buildings, the planning phase is critical to ensure that acceptable safety levels are maintained during final construction tasks, renovation, and maintenance. Principal contractors should take the lead in preparing a site Fire Safety Plan for these conditions, but representatives from among those working on the premises and the building owner should also be involved in developing an appropriate and responsive FSP.



The International Building Code and International Fire Code, both published by the International Code Council, and NFPA 5000 Building Construction and Safety Code allow alternative materials, designs, and methods of construction and equipment to be used.

Conclusion

National fire organizations, including the U.S. Fire Administration and NFPA have been monitoring losses in construction fires in large buildings for decades. The trend and pattern of these fires is significant, as it shows that a greater percentage result in large financial losses compared to fires in completed, occupied buildings. Research that looked into the causes and outcomes of these fires repeatedly point to construction site accountability and enforcement of existing fire and building codes as primary

reasons for such losses, indicating a strong need to improve in these areas.

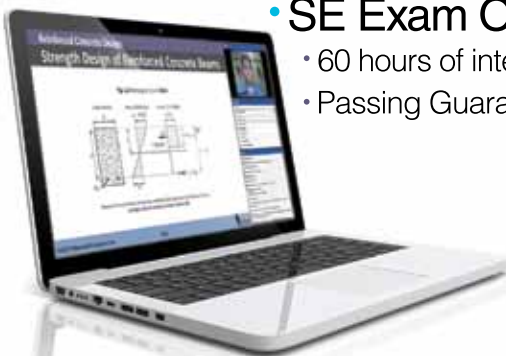
The joint American Wood Council/Fireforce One project, along with a very engaged group of affected stakeholders, was created to specifically address this need. Later this year, the project will be providing very specific print and video materials, training, and guidance for adoption and implementation to the construction, fire, and design communities. We hope the result will be a highly enhanced awareness of the problem, and a resulting reduction in construction site fire losses. ■

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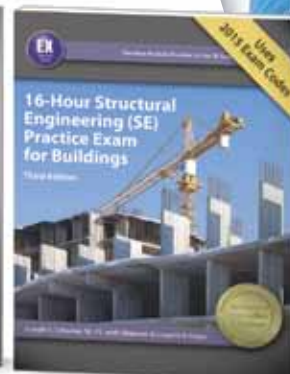
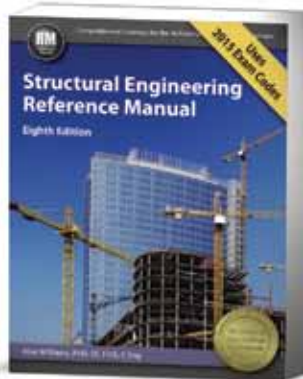


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