

Fires in Buildings Under Construction

A roundtable discussion convened by the International Code Council, the National Association of Home Builders and the National Multifamily Housing Council.

Alan Perdue, roundtable moderator

Executive Director, the Safer Buildings Coalition



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Dear Members and Stakeholders:

As the developer of model codes for the construction industry, and a service provider to public and private stakeholders, the International Code Council (ICC) believes its responsibilities include engaging our Members and stakeholders in conversation about emerging safety issues.

ICC began a series of roundtables to do just that. The roundtables brought together multi-disciplinary stakeholders who discussed topics of interest and their relevance. Topics included fires in buildings under construction, the code adoption cycle, those without indoor plumbing in the U.S. and how the ranks of experienced code officials will be seriously impacted by retirement.

We are pleased to release this report from the July 31 Roundtable on Construction Site Fires. ICC, along with the National Association of Home Builders (NAHB) and the National Multifamily Housing Council (NMHC), cosponsored the roundtable.

Reports about construction site fires have repeatedly been in the news over the past several months. Numerous fires caused millions of dollars in property damage and injury. Alan Perdue, Executive Director of the Safer Buildings Coalition, moderated the roundtable. Participants included fire and building code officials, construction industry associations, insurance industry representatives and other stakeholders with expertise on the specific issue.

Participants identified best practices and programs along with available training programs aimed at ensuring fire safety at building construction sites. They also created a list of recommendations aimed at preventing or mitigating construction site fire hazards.

The report of the roundtable follows and offers ideas to mitigate this challenge in the built environment.

A handwritten signature in black ink, appearing to read "Dom Sims", with a stylized flourish at the end.

Dominic Sims, CBO
Chief Executive Officer

A handwritten signature in black ink, appearing to read "Stephen D. Jones", with a stylized flourish at the end.

Stephen D. Jones, CBO
Immediate Past President
ICC Board of Directors

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EXECUTIVE SUMMARY

On July 31, 2014, the **International Code Council (ICC)**, the **National Association of Home Builders (NAHB)**, and the **National Multifamily Housing Council (NMHC)** convened a roundtable of experts at ICC's Governmental Affairs Office in Washington, D.C. to discuss the issue of fires in buildings under construction.

The participants identified best practices and programs along with currently available training programs aimed at ensuring fire safety at building construction sites. These included programs created by **New York City**, **NAHB**, **AWC**, **NMHC** and **NASFM** that showed success in eliminating or greatly reducing fires and other safety hazards during construction.

Recommendations of this Roundtable included improving the enforcement of current construction site requirements in model codes and standards through a joint effort of owners, contractors and code officials, most notably by ensuring required construction site fire safety plans are developed and implemented. Other recommendations included creation of a central web-based repository for available construction site safety educational and training resources; enhancing current training programs targeting all construction site workers and making a collaborative outreach effort to increase awareness of the construction site fire issue and the available codes, training and programs that are available to prevent or mitigate construction site fire hazards.

BACKGROUND

A recent National Fire Protection Association (NFPA) report shows that over a five-year span, U.S. fire departments responded to at least 830 construction site fires that resulted in more than \$56 million in property damages. Another 400 fires were reported from properties undergoing renovations. At least 12 individuals and 70 firefighters were injured during these blazes.

Recently, there have been numerous fires in multi-story buildings under construction as reported in the media. (See Appendix 2 for a list of construction site fires reviewed for this roundtable).

Roundtable moderator Alan Perdue, Safer Buildings Coalition Executive Director, outlined the purpose for convening the roundtable, asked each participant to introduce themselves and to provide a brief overview of their background. Each provided their experiences and thoughts concerning recent fires in buildings under construction. From this discussion, common themes quickly began to emerge.

This white paper serves as the executive summary of this one-day roundtable discussion; which comprised 28 participant stakeholders from a diverse cross-section of local government, code and fire officials, builders, architects, insurers, nonprofit organizations and model code developers.

COMMON CAUSES

The notable causes of fires in buildings under construction most commonly identified and discussed were:

- Hot-work related (e.g. welding, cutting or soldering).
- Careless smoking.
- Careless cooking.
- Deliberately set fires (arson/vandalism).

It was noted that thousands of multi-story, wood-framed buildings are constructed each year without incident, so the fire problem may not be as significant as media coverage may infer. While Type V (wood-frame) construction is vulnerable to fire given its natural propensity to burn, it is considered a safe building material when all the model code and fire protective measures required are in place. Other construction types—masonry, concrete or metal—are also vulnerable to fire damage during construction when model code and fire protection requirements are absent.

A number of suggested strategies and best practices to prevent or mitigate construction site fire causes is presented later in this summary.

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Participants discussed current model code requirements relating to construction site safety with a specific focus on fire prevention and safety. The general consensus was that current model codes and standards that exist for construction site safety adequately address construction site hazards. Specifically cited were Chapter 33 of the *International Building Code* (IBC) and *International Fire Code* (IFC), and NFPA 241 (Standard for Safeguarding Construction, Alteration and Demolition Operations), a standard referenced in the IFC as well as in the NFPA Building and Fire Codes. Roundtable participants felt these model codes and standards already contain adequate requirements aimed at preventing construction site fires from happening and/or mitigating the effects of an accidental fire ignition. However, it was also suggested that if additional information or future data identifies any gaps in the model codes, appropriate modifications should be introduced into the code development process.

The code requirements for buildings under construction or demolition are comprehensive and address many different hazards that are common to construction sites and building construction processes. Essential code requirements relating to construction site fire prevention and mitigation include:

- Approved water supply for firefighting operations and adequate fire apparatus access.
- Standpipes when buildings exceed four stories feet in height.
- Relegating smoking to safe areas outside the construction site.
- Banning cooking and open burning on construction sites.
- Properly located portable fire extinguishers.
- Requirements for permits to ensure safe hot work.
- Requirements for the use of temporary heating equipment.
- Requirements for the safe storage, use or handling of hazardous materials and combustible or flammable liquids.
- Requirement for a fire prevention program superintendent responsible to develop and maintain an approved pre-fire safety plan in cooperation with the fire chief.

In the construction site fires reviewed for this roundtable, it was the consensus of the participants that if the current requirements of the existing model codes were in place, many of the fires studied would have been prevented, or been minor events. If a fire watch and fire safety plan, including portable fire extinguishers were in place and used at several of the construction sites that experienced fires involving hot work, those fires would have either been extinguished or held in check until the fire department arrived.

There were no model code deficiencies or gaps identified by the roundtable participants.

The roundtable participants did identify several key issues concerning the administration and enforcement of the model construction safety requirements found in the I-Codes and NFPA 241.

- A lack of Building Department staff and resources to fully administer or enforce the adopted code provisions and standards for construction site safety.
- The need to better educate the construction workforce on fire safety issues and code requirements, especially with the economy coming out of the recession and with so many new members in the construction workforce.
- The need to provide worker training programs and construction site signage (i.e. No Smoking Signs) in multiple languages to ensure understanding and comprehension.
- The consensus of roundtable participants was the requirement for a fire safety plan or designation of a fire prevention program superintendent was not being consistently followed by industry or enforced by code officials.

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It was noted that construction site visits by code officials for periodic verification of code compliance is typically the responsibility of the Building Department. The Fire Code Official may be involved in the final acceptance testing of required fire protection systems (such as smoke alarms, carbon monoxide alarms and fire sprinkler systems), but these systems are typically completed and inspected in the final phase of construction. Roundtable participants expressed concern that local building inspectors may only be focused on a specific inspection such as foundation, framing, insulation, plumbing, mechanical or electrical, when visiting a construction site and may not have sufficient time to complete a thorough job site inspection to ensure compliance with all the construction site safety requirements.

This discussion also addressed the question of who is ultimately responsible for ensuring overall construction site safety, including fire prevention and mitigation of hazards associated with the construction processes. The consensus of roundtable participants was that the responsibility is best addressed by a cooperative effort that includes:

- Property/building owners
- General contractors
- Local code officials (both building and fire)
- Insurance providers

The consensus of roundtable participants was that property/building owners, contractors, code officials and insurance companies all had unique, yet complementary, roles in ensuring comprehensive construction site safety and security. Even when buildings under construction are insured, fires or construction site accidents can result in injuries and costly property damage. There are direct and indirect costs shared by owners and the community.

A final note to this discussion was the identification of a need for construction site security on nights and weekends when the construction site is absent of any workers. Appropriate after-hours site security can mitigate theft, vandalism and/or arson.

IDENTIFICATION OF BEST PRACTICES

To address the identified common causes of construction site fires, stakeholder concerns and potential gaps in code administration and compliance, roundtable participants shared best practices currently being used.

Participants discussed a program developed by New York City (NYC). This program requires a **Construction Site Safety Manager** for certain construction or demolition sites. The Safety Manager must complete training based on a curriculum co-developed with the New York City Fire Department (FDNY) and obtain a Certificate of Fitness issued by the FDNY demonstrating competency through a vigorous testing process.

The National Association of State Fire Marshals (NASFM) reported they are in the final stages of development of a commercial construction site fire safety program, based in part on the program utilized in NYC. This program will be made available as a free resource to all.

Representatives from the American Wood Council and the Multi-Family Housing Council explained the job site safety training programs they have developed and are available through their associations.

The National Association of Home Builders (NAHB) explained its **NAHB/Builders Mutual Safety Award for Excellence (SAFE) Program** that recognizes the achievements of builders and trade contractors who develop and implement high-quality construction safety programs.

It was reported that at least one insurance company has been encouraging builders to develop and submit a construction site safety plan as part of the building permit process.

After a review of the programs noted above, roundtable participants were divided into three groups to develop additional recommendations based on the discussion. Below are recommendations that came out of group discussions that met with the general consensus of all participants in the roundtable:

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- Review existing worker training programs to ensure these programs cover the essential requirements found in the model I-Codes, NFPA codes and standards and OSHA regulations pertaining to construction site hazards.
- Training should be offered in several languages, as necessitated by the local workforce.
- Train workers on appropriate actions to take should a construction site fire occur.
- Create delivery channels for these training programs that include on-line and classroom training; job site safety meetings; guides and checklists and, where appropriate, testing and certification to ensure competency in essential construction site safety measures and requirements.
- Create a central web-based repository for current information, research, best practices, training programs, etc. Link available resources and training programs from around the country in a single repository so that all stakeholders can have access to available programs, resources and best practices.
- Improve the “communication outreach” about available education and training programs for the construction industry, including multi-lingual (as required by the local work force) education materials, signage and guides that explain the technical language of IBC Chapter 33 and NFPA 241 in an easy to understand format.
- Use “messaging” similar to what firefighters use in the “Everyone Goes Home” campaign to drive home the importance of construction site safety to everyone who works on or visits the construction site.
- Leverage the resources of national associations and organizations to promulgate the construction site safety messaging to as large an audience as possible to include workers and code officials.
- Improve administration/enforcement of current code requirements, such as a zero-tolerance policy for smoking and cooking, and strictly following all safety precautions for any hot work operations on the job site.
- Have Building Departments that issue construction permits require fire safety plans be submitted and reviewed by the fire chief before issuing a construction permit.
- As part of the construction site safety training, create a “generic” model fire safety plan template to facilitate the use and consistency of these plans.
- Create better security barriers around construction sites; use video surveillance and GPS on security guards’ phones to ensure the security of the site in the off-hours.
- Above all, make sure the messaging is consistent across all industries and fields.

When asked for final thoughts, participants stressed that one entity alone cannot effectively prevent or mitigate construction site fires. The message that resounded is the need for representatives from each stakeholder group to work collaboratively to prevent construction site fires or mitigate the consequences of an accidental fire ignition during construction.

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APPENDIX 1

LIST OF PARTICIPANTS

Moderator: Alan Perdue, Safer Buildings Coalition Executive Director

Sean DeCrane – Cleveland, OH, International Association of Fire Fighters (IAFF)

Timothy Diehl – City of Rockville

Rob Drexler – Fire Marshal, Town of Greece (NY), ICC Board of Directors

Sam Francis – American Wood Council

Bill Galloway – International Fire Marshals Association (IFMA)

Dwayne Garriss – State Fire Marshal of GA, ICC Board of Directors

Sydonia Garrett – Howard County

Miles Haber – Monument Construction

Jay Hall – Portland Cement

Jonathan Humble – American Iron and Steel Institute

David Janiszewski – Travelers Insurance

Marshall Klein – National Multifamily Housing Council (NMHC)

Steve Lohr – Montgomery County

Rob Matuga – National Association of Home Builders (NAHB)

Rick Morris – VP, Avalon Bay

Robert Neale – National Fire Academy

Ron Nickson – National Multifamily Housing Council (NMHC)

Mark Nowak – Steel Framing Industry

Steve Orłowski – National Association of Home Builders (NAHB)

Joel Pickering – Lend-Lease Construction

Pete Piringier – Montgomery County Fire & Rescue

Jeff Shapiro – National Multifamily Housing Council (NMHC)

Robert Solomon – National Fire Protection Association (NFPA)

Keith Stakes – NIST

Kuma Sumathipala – American Wood Council

Peter Wilcox – Travelers Insurance

Chris Williams – ABC

Adolf Zubia – International Association of Fire Chiefs/Chairman, Fire and Life Safety Section

ICC STAFF:

Tom Frost – Senior Vice President of Tech Services

Sara C. Yerkes – Senior Vice President of Government Relations

Bruce E. Johnson – Vice President of Government Relations (Fire Service Activities)

Robert Sale – Government Relations Representative

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APPENDIX 2

NEW ARTICLE LINKS* TO RECENT CONSTRUCTION SITE FIRES

Montrose, Texas_1

Montrose, Texas_2

Montrose, Texas_3

Montrose, Texas_4

Montrose, Texas_5

Montrose, Texas_6

Irving, Texas

San Francisco, California_1

San Francisco, California_2

San Francisco, California_3

San Francisco, California_4

San Francisco, California_5

Anaheim, California_1

Anaheim, California_2

Anaheim, California_3

San Diego, California_1

San Diego, California_2

Newport Beach, California

Rockville, Maryland_1

Rockville, Maryland_2

Salt Lake City Utah_1

Salt Lake City Utah_2

Grand Island, Nebraska

Hardwick, Vermont

Teton County, Idaho

Burlington, Mass.

Tribeca NYC, N.Y.

Brier Creek, N.C.

Las Vegas, Nevada

Mercer, Wash.

West Union, Iowa

Hamilton, New Jersey

Chicago, Illinois

Branson, Missouri

Hamden, Maine

Grand Island, Nebraska

Seattle, Wash.

Waltham, Mass.

Vancouver, Wash.

Goleta, Calif.

Benton Township, Mich.

McLean, Virginia

Beverly, Mass.

Sherman Oaks, Calif.

Royalwood, Canada

Richmond Hill, Toronto, Canada

Regina, Canada

Pouch Cove, Newfoundland, Canada

Ottawa, Canada

Edmonton, Canada

Fort McMurray, Edmonton, Canada_1

Fort McMurray, Edmonton, Canada_2

Sofia, Bulgaria

London, England

Rainford, England

Richmond, England

Jolimont, Australia

Box Hill, Australia

Petaling Jaya Malaysia

Xiangyang, Hubei Province China

Rawalpindi, Pakistan

Mumbai, India

**Links were active when this report was published.*