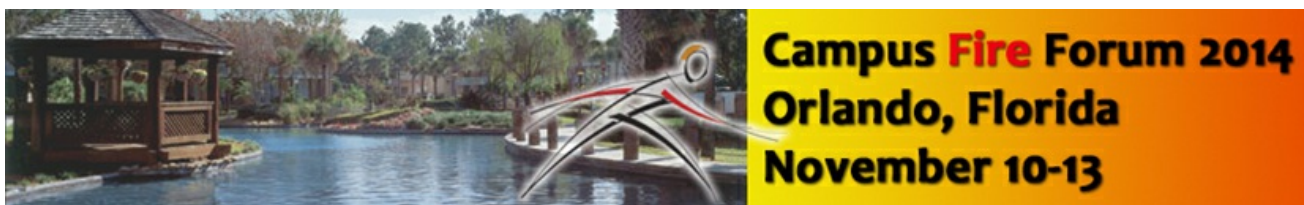


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Campus Fire Safety e-NewZone Monthly Newsletter ... October 2014, Volume 4, Issue 10

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And a special thanks to Keltron for Neck Wallets and to CSHEMA and The University of New Haven Fire Science Club

## CENTER ACTIVITIES IN OCTOBER

**The Center writes for the APPA Book of Knowledge ....** Thanks to The Center's Director Robert Ferrara and Member Jeff Isler of Montclair University for their efforts in writing a 29 page document for our non-profit partner, APPA. The document, "Fire Prevention on College and University Campuses" will be online to APPA members through their Member Library in the section called "The Book of Knowledge (BOK)". If you are an APPA Member you will be able to access the document that way. The Center will also make this document available to members in early 2015.



## Off-Campus, by Tim Knisely

### Halloween Safety

Halloween is just around the corner and in many college towns this night is one of the busiest of the year for police, fire and EMS responses. The off campus neighborhoods will be brimming with spooky and eye-catching sights as they head out to their many destinations. Halloween this year falls on a Friday and will likely have an increased number of participants increasing the risk that much more.... **MORE**



## The Inspector, by Phil Chandler

### Portable Fire Extinguishers

Managers of campus buildings need no reminders of the costs associated with portable fire extinguishers. They are costly to acquire and install; every building has loads. What's more, and this is the kicker, they are expensive to maintain. They require a monthly inspection and more comprehensive service every year, to say nothing of periodic hydro tests and replacement of those that just go missing ... **MORE**



## Training Opps

### Webinars ... We're putting our 2015 Schedule together ...

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### Fire Smart Campus Training Opportunities ...



The Center instructor(s) will come to your campus or town. Price varies depending upon location. **Contact us** for info.

### Chubb Loss Control University ...

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### Crowd Manager Training ...

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*C+S and more*

## Codes, Standards & More



### Oh the Weather Outside is Frightful- Making Winter Code Compliance Delightful

by Robert Solomon, PE

With apologies to Sammy Cahn and Jule Styne who composed this popular song in 1945 (in the middle of summer), it is not too early to be thinking about winter preparations for your campus buildings and property. We are not even through fall yet, but before you know it, colder temperatures and snow will be on our door step. By the time the first ever College Football Playoff Championship game takes place on January 15, 2015, both The Old Farmer's Almanac and The Farmer's Almanac predict that large areas of the US will have already experienced ... **MORE**



### SECTION 912, FIRE DEPARTMENT CONNECTIONS

912.1 Installation. Fire department connections shall be installed in accordance with the NFPA standard applicable to the system design and shall comply with Sections 912.2 through 912.6.

> An FDC is required as part of a water-based suppression system as the auxiliary water supply. These connections give the fire department the capability of supplying the necessary water ... **MORE**



MEMBER NEWS, MAJOR FIRE LOSS, FIRE INCIDENT NEWS & MASS

## NOTIFICATION INFO

### FIRE NEWS

- **Fire displaces more than 150 MSU dorm residents; no injuries** ... Oct 6
- **A Dozen Students Displaced After Off-Campus Fire - Fox 28** ... Oct 19

**MORE NEWS STORIES** .... Hundreds of related stories + ability to search through years of our news archives.

### Breaking News - Click here to Sign up!

The Center for Campus Fire Safety provides initial notification about fire fatalities that occur on a university or college campus, or that occurred within the town where the campus is located. This data is collected from news sources from around the country, and many times - around the world, and then emailed to you.

### MASS NOTIFICATION TECHNOLOGY IN THE NEWS

- New Measures Being Taken for Safety - Texas A&M International Bridge [ **Full article**
- Siemens' New Multi-Modal Mass Notification System Gets Message Out Quickly - [ **Full article**
- ELS in Huntsville wins big award for life-saving mass notification lighting system [ **Full Article**

### More MNS News and Articles

### MEMBER NEWS AND JOB OPPS

**Job Opps:** None this month. **Submit Member News or Job Opps**



### Iowa State University Celebrates Campus Fire Safety Month

Iowa State University held its 5<sup>th</sup> annual National Campus Fire Safety Month event on September 19<sup>th</sup>, 2014.

The event was co-hosted again this year by the Ames Fire Department. The fire department's participation is a critical factor to the success of this event. **MORE**



### Fires in Buildings Under Construction (Shared by ICC)

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

**New** - Website Snippet: Each month we'll point you to a special section of our new website and explain it!



## The Center's Resource Center

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We have the largest Campus Fire and Life Safety Resource Center online - and it is available to all. That's right, you do not have to be a member to take a stroll through our Library of Resources or to download any of the articles, tools or most of the video.

Simply visit: <http://www.campusfiresafety.org/Resources/Library.aspx>

You will find Tools: Flyers, Video, PowerPoint Presentations and more ... and if you want them customized with your logo or template, just let us know.

You'll also find useful Technology Articles: From detection to suppression to other fire safety technologies such as Mass Notification systems and more. You also be able to look back and NFPA 101 and some of the ICC Codes.

And you'll be able to access special articles concerning off-campus fire safety, inspections and comments by "The Inspector",

press releases, messages from our President and the executive committee ... and also articles or job opportunities submitted by our members.

All of this - and more is available to the public at no cost. Of course, we'd still like to have you as a member. Regular membership is \$40. annually and it provides additional access to free webinars and discounted training.



## Fire Fatality Statistics

The Center for Campus Fire Safety provides basic information about fire fatalities that occurred on a university or college campus, or that occurred within the town where the campus is located.

### Fire Fatality Statistics

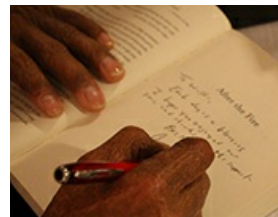


## Center Honory Lifetime Members ... (Shawn Simons and Alvaro Llanos)

### AFTER THE FIRE ... Bring the "After The Fire experience" to your campus.

Shawn and Al, Seton Hall burn survivors, are lifetime members of The Center for Campus Fire Safety and have been with us for several years now. Many of you have met them at our annual Forum(s). Learn more about their experience and their willingness to speak at your campus.

**MEET SHAWN & AL | PURCHASE AFTER THE FIRE VIDEO**



## About The Center for Campus Fire Safety

The Center is the Voice of over 4000 colleges and universities. As a nationwide non-profit, membership based, organization devoted to reducing the loss of life from fire at our nation's campuses, we offer an abundance of free resources to help fire and life safety officials working on college campuses and fire departments with responsibility for a college campus/university.

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# THE INSPECTOR

By Phil Chandler

October 2014

Managers of campus buildings need no reminders of the costs associated with portable fire extinguishers. They are costly to acquire and install; every building has loads. What's more, and this is the kicker, they are expensive to maintain. They require a monthly inspection and more comprehensive service every year, to say nothing of periodic hydro tests and replacement of those that just go missing. It's not beyond the realm of possibility for a research university to spend hundreds of thousands of dollars a year on portable fire extinguishers. That's a lot of dough—money that some would argue could buy a lot more life safety if spent elsewhere.

More than once I've heard fire safety professionals suggest that it would be fine with them if they were removed from campus buildings. They reason that the time it takes for an occupant to grab an extinguisher off a wall and mount an attack is time better spent on

evacuating. When the goal is "everyone graduates," all that matters when fire strikes is getting everyone safely out of the building, while leaving the rest to fate and the skill of the fire department. Who can argue with that premise? Property can be replaced—that's why colleges have insurance—but lives—how do we replace them?



However, the Inspector, while in total sympathy with this pro-life argument, feels that any fire safety plan that does not envision the appropriate use by occupants of portable fire extinguishers is shortsighted. The alert sophomore that takes a few extra moments to

knock down an incipient fire on the first floor may save the life of a sleepy senior on the floor above. "A stitch in time saves nine!" They don't call portable fire extinguishers the first-aid of firefighting for nothing.

The proper use of fire extinguishers is what we expect of all capable building occupants. Unlike so many in our society that have not had a discussion of fire since the stop, drop and roll days, we hope to raise a new generation on the campus that knows what to do when encountering fire. The use of portable fire extinguishers should be taught to all as part of a comprehensive fire safety strategy.

We need to teach R.A.C.E. to the entire campus community. **Relocate, Alarm, Contain and Extinguish.** Yes, **Extinguish**, not evacuate, as some would have it. Evacuation is implied by **Relocate. Extinguish** means put out incipient fires before they become



# THE INSPECTOR

By Phil Chandler

October 2014

big fires. It does not mean remain behind in rapidly deteriorating conditions to fight a room and contents fire. It does not mean to search for multiple extinguishers to mount a more extensive attack, nor does it mean neglecting the other components of R.A.C.E. Extinguish means that an individual comfortable in her knowledge, physical ability and confidence decides that it is in the best interests of everyone to ameliorate a dangerous condition and put out the fire. Yes, this is asking a lot of many, but it is not an unreasonable expectation when we make meaningful fire safety training available to all.

Building tenants pass fire extinguishers in the corridor every day and generally embrace the opportunity to become familiar with something that they see as there for their personal safety. It is for this reason that so many campus stakeholders ask for fire extinguisher training. It is

the job of campus fire safety professionals to channel this enthusiasm into something more than the simple mechanics of discharging an extinguisher.

We need to open with a discussion of how to prevent fires in the first place, followed by what to do when our prevention efforts come up short, including, but not limited to extinguishment. Knowledge of how to use an extinguisher should be presented as a tool, one of many in the toolbox.

More important than the nitty-gritty of extinguisher use, is the calculus used to determine fight or flight. This is critical: to know when extinguisher use is indicated and when it is not. Effective and safe use is dependent on a rapid assessment of conditions. As I caution all trainees, if you need to think about it, you best not grab an extinguisher. Better, just close the door and go. With a little training, we can remove

uncertainty from the equation.

Part of the decision process, and a critical one at that, is determining if the extinguisher at hand is the right one for the job. Not all extinguishers are created equal! Occupants must learn to decipher the icon panel on the front of every extinguisher before attempting extinguishment.

Unfortunately, some of the specially designed training props on the market neglect this important consideration, leaving the classification off altogether. I would for this reason always prefer using real extinguishers in training, even if not discharging them.

Developing the thought process leading up to selection and use of an extinguisher is every bit, if not more so, as important as teaching the actual mechanics of Pull, Aim, Squeeze and Sweep.

Likewise, I would forgo using a fire simulator altogether if its use



# THE INSPECTOR

By Phil Chandler

October 2014

required using an extinguisher other than the type occupants will encounter. Flames add excitement, but it makes no sense to train folks on a silver water can (because it can be refilled easily) when everyone on the campus is a red ABC. When the real deal happens, when every second counts, sudden confusion over whether or not the right extinguisher is in hand may cause needless delay. Let's keep it real.

Portable fire extinguishers are part of our environment. We have much invested in them; they are not going away. Why not leverage their presence to aid our efforts in increasing fire awareness everywhere on the campus. And who knows, we may just save a life or two.

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Philip Chandler is a long time firefighter and a fulltime government fire marshal working extensively in the college environment - from large

public university centers to small private colleges.

His primary responsibilities include code enforcement and education. Phil welcomes your comments, thoughts and opinions (whether in agreement or opposition) to his viewpoints. He may be reached at: <mailto:theinspector@campusfiresafety.org>

## Ask the Inspector

Now Members can log onto the Member Website and have an online discussion with "The Inspector".

Simply visit the [MEMBER LOGIN](#) section of our public website. Once logged in, look for the Town Hall Discussions and ask "The Inspector".

Note: The viewpoints expressed in The Inspector are those of the author alone. They are offered to initiate thought and debate, however, they do not necessarily represent the views or opinions of The Center for Campus Fire Safety, its officers, directors or its editorial staff.

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## OFF-CAMPUS

By Tim Knisely

October 2014

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### Halloween Safety:

Halloween is just around the corner and in many college towns this night is one of the busiest of the year for police, fire and EMS responses. The off-campus neighborhoods will be brimming with spooky and eye-catching sights as they head out to their many destinations.

Halloween this year falls on a Friday and will likely have an increased number of participants increasing the risk that much more.

The off-campus party is already full of risk due to the age of the housing stock, improperly designed for large occupant loads, disabled smoke alarms and the lack of automatic fire detection or suppression systems. Add the alcohol factor and the weekend Halloween party is ripe for disaster. One of the factors for the increased risk is the use of decorative materials

inside and outside of buildings, without any regard for the hazard that is being created. Inside decorations may include straw, plastic, cornstalks or crepe paper. Decorative lighting or candles are often mixed in with the decorations, and don't forget the poorly discarded cigarette. But, be especially mindful of the candle. Across all housing types, the careless use of candles is to blame for many of the fires we have seen in the past years. In fact, according to the NFPA™, of the 900 reported home fires each Halloween, 40% are started by a candle too close to the decorations. So not only does our risk increase in the campus community, so does the risk in all other neighborhoods we need to protect.

Some houses, especially fraternity houses may hold haunted houses or haunted mazes inside the house or basements and often start with

good intentions. I've seen these used initially for philanthropic or community events, and then the same theme is at play during the overcrowded party late into the night or for the entire weekend. Some of the designs are really creative and interesting to the untrained eye, but little thought is given to emergency escape or obstructions to the fire protection systems.

Unfortunately, many of the decorations used in these events are combustible or even flammable. These may include floor to ceiling wood frames wrapped in chicken wire and black plastic sheeting, spot lights, overloaded extension cords, dry leaves, straw, mulch and many other props to create the intended theme. Not only does this type of event place the attendees at risk, but it also creates additional risk for first responders as well as increases the workload in searching for the fire or trapped occupants.





## OFF-CAMPUS

By Tim Knisely

October 2014

If you have any ability to provide outreach to the student population, encourage them to use flame-resistant decorations or battery-powered candles both inside and out. Work with fraternity leadership to use flame-resistant decorations and to request guidance from the fire marshal before hosting any themed events or events open to the public. And, if you see someone wrapped in tissue paper dressed as a mummy - remind him or her not to smoke as the last one to do so ended up in the hospital.

### Tim Knisely

Tim Knisely is on the Board of Directors for The Center and the Senior Fire Inspector for the Centre Region Code Administration in State College, PA. In this position he manages the Existing Structures Division that administers the fire and property maintenance code in all existing commercial and residential rental properties, and coordinates the life safety education for the community including off-campus and Greek housing.

Tim has been active with The Center for Campus Fire Safety since its inception and served as treasurer from 2007 to 2010.

He is a frequent presenter at Campus Fire Forum, an instructor for the Fire-Wise Campus program and served as project manager for Campus Fire Data.



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Have a safe and happy Halloween!



## CAMPUS FIRE SAFETY CODE TALK

Campus Fire Safety e-NewZone

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### CAMPUS FIRE ZONE

OCTOBER 2014

*Oh the Weather Outside is Frightful-  
Making Winter Code Compliance Delightful*

Robert Solomon, PE

NFPA

With apologies to Sammy Cahn and Jule Styne who composed this popular song in 1945 (in the middle of summer), it is not too early to be thinking about winter preparations for your campus buildings and property. We are not even through fall yet, but before you know it, colder temperatures and snow will be on our door step. By the time the first ever College Football Playoff Championship game takes place on January 15, 2015, both *The Old Farmer's Almanac* and *The Farmer's Almanac* predict that large areas of the US will have already experienced below normal temperatures and measurable snow. Perhaps the polar vortex will take another trip south to visit the US.

So what things should you be preparing for this fall in anticipation of winter? On the fire safety side of the equation, there are lots of planning activities to be doing and lots of things to make your campus population aware of. Let's take a look at a few of these subjects that your winter preparations and plans should consider.

**FIRE DEPARTMENT VEHICLE ACCESS:** According to NFPA 1, *Fire Code*, emergency vehicle access to almost any building or structure is required. The code specifies myriad rules on dimensions, weight limits, grades and the like for the access roads, surfaces and bridges. A general code provision also mandates that the access road cannot be obstructed in any manner. NFPA 1 acknowledges that significant snowfall is an obvious hindrance to this rule. What plan do you have in place to send escort plow equipment out on fire and medical emergencies?

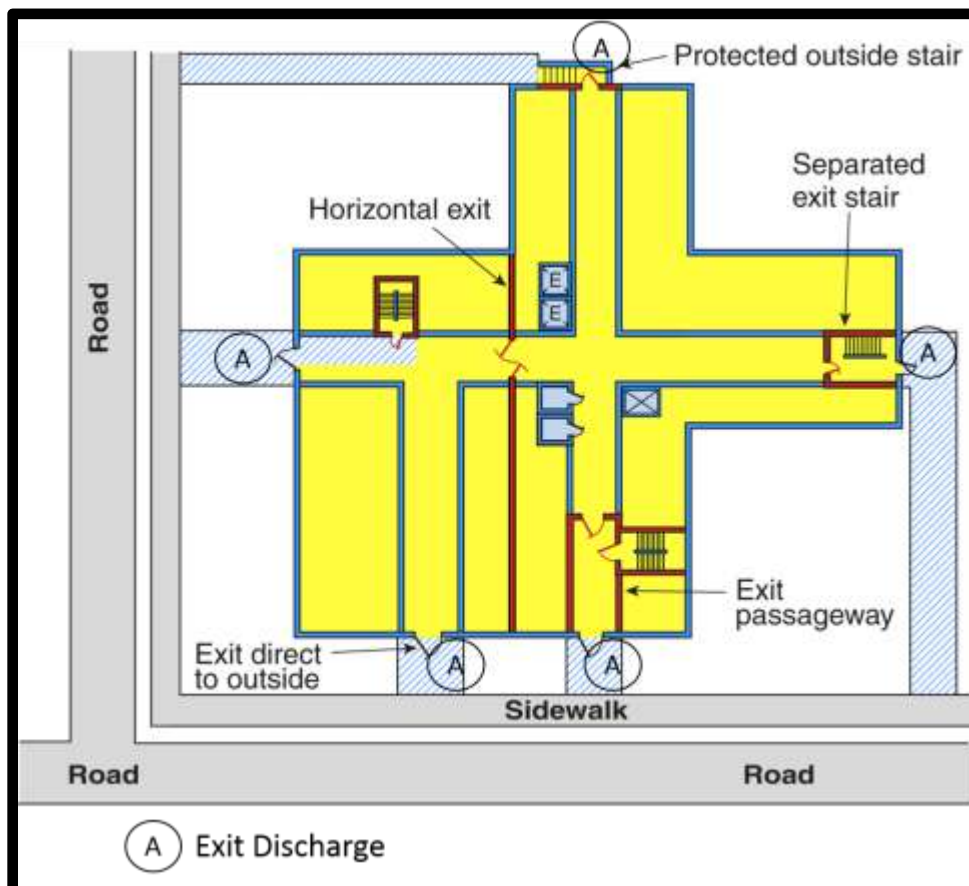


## CAMPUS FIRE SAFETY CODE TALK

Campus Fire Safety e-NewZone

**NFPA 1: A.18.2.4.** However, it should be understood that a severe snowstorm can make these roads temporarily inaccessible. In many parts of the country, the annual snowfall is of such magnitude that alternative arrangements such as temporary roads over the snow accumulation could be necessary.

**EGRESS FACILITIES:** NFPA 1 as well as NFPA 101, *Life Safety Code* provide comprehensive rules for how the means of egress is designed and laid out in a building. A key area that can be snow and ice sensitive is the exit discharge. The exit discharge is defined as: That portion of a means of egress between the termination of an exit and a public way. [See Figure 1] This component of the means of egress will normally begin at an exterior exit door and extend some distance away from the building. It may be to a sidewalk, a parking lot or some similar open space.



**FIGURE 1: Exit Discharge as Defined by NFPA 101**



## CAMPUS FIRE SAFETY CODE TALK

Campus Fire Safety e-NewZone

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NFPA 101 also requires the means of egress to be available under all circumstances.

**NFPA 101: 7.1.10 Means of Egress Reliability.**

**7.1.10.1\* General.** Means of egress shall be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency.

The code does not grant waivers or exceptions when snow has accumulated nor does it limit this rule to the area immediately in front of the exterior exit door. Walkway's and the like leading away from the building are part of the defined exit discharge and need to allow for unfettered access to the areas previously mentioned. [See Figure 2]

Any exterior or outside stairs or exterior bridges that also serve as a horizontal exit should ideally be covered from the elements. If they are not, they must be included in your snow removal plan.



**FIGURE 2: Someone Has To Do It-Clearing the Exit Discharge**





C+S and more

## CAMPUS FIRE SAFETY CODE TALK

Campus Fire Safety e-NewZone

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**HYDRANT CLEARING AND MARKING:** Make sure your snow removal plan includes a “wellness” visit to the fire hydrants. NFPA 1 requires that access to hydrants be readily available. NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water Based Fire Protection Systems* has a specific provision requiring hydrants to be kept free and clear of ice and snow. Some campus jurisdictions may enforce the provision from NFPA 1 that requires use of an approved flag or similar device attached to the hydrant. While helpful during any night time operation, the flag can also help the approaching apparatus driver to spot the hydrant that may be surrounded by properly cleared snow. [See Figure 3]

**FIGURE 3:**  
Cleared  
Hydrant with  
Flag





## CAMPUS FIRE SAFETY CODE TALK

### Campus Fire Safety e-NewZone

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Related provisions from NFPA 25 also require access to outside valves and fire department connections to be available at all times.

**SNOW REMOVAL-THE BIG PICTURE:** As you know, NFPA prides itself on its robust code development procedures that are approved by the American National Standards Institute-ANSI. ANSI organizations engage in and develop standards on nearly every topic imaginable-and some you wouldn't think of. You guessed it, there is standard for snow removal. Developed by the Accredited Snow Contractors Association, ASCA, ANSI/ASCA A1000-2014: *System Requirements for Snow and Ice Management Services* offers the best practice techniques for this sometimes laborious task. The ASCA document, just like the fire, life safety and building codes we use, offers a set of "when" and "how to" provisions, some of which address the needs of the enforced fire code. These include:

Do not bury or plow snow onto a fire hydrant, post indicator valve, or fire hookup along the building wall.

Do not block building doorways or emergency exits.

A preseason meeting with the facilities personnel who keep campus roads and walkways clear of snow can get everyone on the same page so the fire protection systems and features, and the pathways leading away from buildings are maintained in a useable manner.

**SPACE HEATERS:** These devices are normally used to supplement the centralized building heating system. They are not a substitute for central systems. Gas fired space heaters have extensive restrictions on where they can be used and are regulated by NFPA 54, *National Fuel Gas Code*. The more readily available and popular space heater is referred to as a portable electric heater. The university policy on use of such portable heaters in classrooms, faculty offices and dormitories should be reviewed. NFPA's Fire Analysis and Research Divisions tells us that heating equipment was involved in 3% of dormitory fires, 16% of property damage, and 23% of injuries. NFPA 1 offers several requirements for use of the equipment as follows:



## CAMPUS FIRE SAFETY CODE TALK

Campus Fire Safety e-NewZone

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### NFPA 1: 11.5.3 Portable Electric Heater.

**11.5.3.1** The AHJ shall be permitted to prohibit use of portable electric heaters in occupancies or situations where such use or operation would present an undue danger to life or property.

**11.5.3.2** Portable electric heaters shall be designed and located so that they cannot be easily overturned.

**11.5.3.3** All portable electric heaters shall be listed.

A [Heating Safety Tip Sheet](#) from NFPA can also be provided to the campus student population.

This month's article has touched on just a few of the cold weather elements that can challenge the fire protection systems and features that NFPA codes address. It is by no means a comprehensive list but it should serve as a prompt for campus fire marshals and administrators to have proactive plans in place as the winter season approaches. Once your winter plan has been reviewed and updated as necessary, you can sit back and *let it snow, let it snow, let it snow*.

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## ICC CODE CORNER

### 2012 IFC Code & Commentary

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#### SECTION 912

##### FIRE DEPARTMENT CONNECTIONS

912.1 Installation. Fire department connections shall be installed in accordance with the NFPA standard applicable to the system design and shall comply with Sections 912.2 through 912.6.

◆ An FDC is required as part of a water-based suppression system as the auxiliary water supply. These connections give the fire department the capability of supplying the necessary water to the automatic sprinkler or standpipe system at a sufficient pressure without pressurizing the underground supply. The FDC also serves as an alternative source of

water should a valve in the primary water supply be closed. A fire department connection does not, however, constitute an automatic water source. See Figure 903.3.1.1 for a typical FDC arrangement on a wet pipe sprinkler system.

The requirements for the FDC depend on the type of sprinkler system installed and whether a standpipe system is installed. NFPA 13 and 13R, for example, include design considerations for FDCs that are an auxiliary water supply source for automatic sprinkler systems; NFPA 14 is the design standard to use for FDCs serving standpipe systems. Threads for FDCs to sprinkler systems,

standpipes, yard hydrants or any other fire hose connection must be approved (NFPA 1963 may be utilized as part of the approval or as otherwise approved) and be compatible with the connections used by the local fire department (see commentary, Sections 903.3.6 and 905.1).

912.2 Location. With respect to hydrants, driveways, buildings and landscaping, fire department connections shall be so located that fire apparatus and hose connected to supply the system will not obstruct access to the buildings for other fire apparatus. The location of fire department connections shall be approved by the fire chief.





## ICC CODE CORNER

### 2012 IFC Code & Commentary

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◆ This section specifies that the FDC must be located so that vehicles and hose lines will not interfere with access to the building for the use of other fire department apparatus. The location of potential connected hose lines to the FDC and hydrants must be preplanned with the fire department. Many fire departments have a policy restricting the distance that a FDC may be from a fire hydrant. Some also have policies that indicate the maximum distance from the nearest point of fire department vehicle access (often, the curb). Since fireground operations are based on local operational procedures, it is only reasonable that the fire chief of the jurisdiction

have approval authority over the location of and access to the FDC.

Landscaping can also be a hindrance to fire department operations. Even where the FDC is visible, the extensive use of landscaping may make access difficult.

Landscaping also changes over time. What may not have been an obstruction when it was planted can sometimes grow into an obstruction over time.

912.2.1 Visible location. Fire department connections shall be located on the street side of buildings, fully visible and recognizable from the street or nearest point of fire department vehicle access or as otherwise approved by the fire

chief.

◆ FDCs must be readily visible and easily accessed. A local policy constituting what is readily visible and accessible needs to be established. While the intent is clearly understandable, its application can vary widely. A precise policy is the best way to avoid ambiguous directives that result in inconsistent and arbitrary enforcement. Usually, the policy will address issues such as location on the outside of the building and proximity to fire hydrants.

Landscaping is often used to hide the FDCs from the public. This can greatly hamper the efforts of the fire department in staging



## ICC CODE CORNER

### 2012 IFC Code & Commentary

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operations and supplying water to the fire protection systems. Landscaping must be designed so that it does not obstruct the visibility of the FDC. Since fireground operations are based on local operational procedures, it is only reasonable that the fire chief of the jurisdiction have final approval authority over the visibility of and access to the FDC.

**912.2.2 Existing buildings.** On existing buildings, wherever the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an approved sign mounted on the street front or on the side of the

building. Such sign shall have the letters “FDC” at least 6 inches (152 mm) high and words in letters at least 2 inches (51 mm) high or an arrow to indicate the location.

All such signs shall be subject to the approval of the fire code official.

♦ The section acknowledges that FDCs on existing buildings may not always be readily visible from the street or nearest point of fire department vehicle access. In those instances, the location of the connection must be clearly marked with signage. The FDC may be located on the side of the building or in an alley, not visible to arriving fire-fighting forces. A sign is necessary so that those

driving the arriving apparatus know where to maneuver the vehicle to get close to the FDC.

#### **912.3 Access.**

Immediate access to fire department connections shall be maintained at all times and without obstruction by fences, bushes, trees, walls or any other fixed or moveable object. Access to fire department connections shall be approved by the fire chief.

**Exception:** Fences, where provided with an access gate equipped with a sign complying with the legend requirements of Section 912.4 and a means of emergency operation.

The gate and the means of emergency operation shall be approved by



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the fire chief and maintained operational at all times.

♦ The FDC must be readily accessible to fire fighters and allow fire-fighting personnel an adequate area to maneuver a hose for the connection.

Landscaping design must not block a clear view of the FDC from arriving fire department vehicles. Depending on the type of landscaping materials, an active maintenance program may be necessary to maintain ready access over time. This section also recognizes that the obstructing objects regulated here can be either fixed or movable (such as outdoor furnishings, shopping cart queue areas, etc.). Note that no specific

dimension is given as was the case in previous editions of the code.

This performance language avoids previous misinterpretations that the code intended to allow obstructions to FDC access as long as they were kept 3 feet (914 mm) away. Since fireground operations are based on local operational procedures, it is only reasonable that the fire chief of the jurisdiction have final approval authority over the access to the FDC.

The exception recognizes the practical fact that sometimes, security or other considerations make installation of a fence around a building necessary as long as the

fence meets the stated criteria. The sign requirement intends to provide a visual location cue to approaching fire apparatus where the height of the fence may obscure the visibility of the FDC.

912.3.1 Locking fire department connection caps. The fire code official is authorized to require locking caps on fire department connections for water-based fire protection systems where the responding fire department carries appropriate key wrenches for removal.

♦ This section allows for the FDC caps to be equipped with locks as long as the fire departments that respond to that building or facility have the



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appropriate key wrenches. This avoids vandalism and affords a more functional FDC when needed. Locking caps, even more so than regular FDC caps, need proper maintenance so that they can be removed when required. Any time that an additional mechanical function is added to something that is exposed to the elements, it must be done with the understanding that the corrosive nature of the elements can place the FDC out of commission if the cap cannot be removed (see Figure 912.3.1).

**912.3.2 Clear space around connections.** A working space of not less than 36 inches (762 mm) in width, 36 inches

(914 mm) in depth and 78 inches (1981 mm) in height shall be provided and maintained in front of and to the sides of wallmounted fire department connections and around the circumference of free-standing fire department connections, except as otherwise required or approved by the fire chief.

◆ Care must be taken so that fences, utility poles, barricades and other obstructions do not prevent access to and use of FDCs. A clear space of 3 feet (914 mm) must be maintained in front of and to either side of wall-mounted FDCs [Figure 912.3.2(1)] and around free-standing FDCs [Figure 912.3.2(2)]

to allow easy hose connections to the fitting and efficient use of spanner wrenches and other tools needed by the apparatus engineer.

Though not specifically mentioned in this section, it is also important that FDCs be installed with the hose connections well above adjoining grade to accommodate the free turning of a spanner wrench when connecting hoses to the FDC.

**912.3.3 Physical protection.** Where fire department connections are subject to impact by a motor vehicle, vehicle impact protection shall be provided in accordance with Section 312.





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◆ Section 312 requires vehicle impact protection by placing steel posts filled with concrete around the FDC. Section 312 gives the specifications for the posts.

**912.4 Signs.** A metal sign with raised letters at least 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: AUTOMATIC SPRINKLERS or STANDPIPES or TEST CONNECTION or a combination thereof as applicable. Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building

served.

◆ The purpose of the sign is to provide the responding firefighters with the correct information on which portions of a building are served by the fire department connection. They identify the type of system or zone served by a given FDC.

Many buildings include multiple sets of fire department connections which are not interconnected, such as separate connections for the building sprinkler system and the dry standpipe system in open parking structures. Some buildings may have only a partial sprinkler



**Figure 912.3.1**  
**LOCKING FDC CAPS**  
(Photo courtesy of Knox Company)



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system, such as rehabilitated buildings where a sprinkler system is only installed on certain floors or a building that only has basement sprinklers in accordance with Section 903.2.11.

Signs may also distinguish FDCs from fire pump test headers. Usually, FDCs may be distinguished from fire pump test headers by the types of couplings provided. FDCs are customarily equipped with female couplings, while fire pump test headers usually have separately valved male couplings. Furthermore, fire pump test headers are equipped with one 1 1/2 -inch (64 mm) outlet for each 250 gallon per minute (gpm) (16 L/s) of rated

capacity.

Raised letters are required so that any repainting or fading of the colors on the sign will not affect its ability to be read. Each letter must be at least 1 inch (25 mm) in height so that the wording is clear. Often the wording may be abbreviated such that

“AUTOMATIC SPRINKLERS” reads as “AUTO. SPKR.” Existing signs may use language slightly different than that noted in the code. As long as the information is adequately communicated there should be no reason to require new signage to replace existing ones (see Figure 912.4).



**Figure 912.4**  
**FIRE DEPARTMENT CONNECTION WITH SIGN**



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912.5 Backflow protection. The potable water supply to automatic sprinkler and standpipe systems shall be protected against backflow as required by the International Plumbing Code.

◆ Section 608.16.4 of the IPC requires all connections to automatic sprinkler systems and standpipe systems to be equipped with a means to protect the potable water supply. The means of backflow protection can be either a double check-valve assembly or a reduced pressure-principle backflow preventer.

This, in general, assumes a FDC is required. For example, a limited-area sprinkler system off the domestic

supply does not necessarily require a FDC and would not require backflow protection.

912.6 Inspection, testing and maintenance. All fire department connections shall be periodically inspected, tested and maintained in accordance with NFPA 25.

◆ Because FDCs are components of a water-based extinguishing system, NFPA 25 is applicable. Inspections must determine that connections are unobstructed, well-protected and in good working order.

Plugs or covers must be installed to protect threads and pipe openings, and must be

easily removed to permit connection of a fire hose.

Caps or plugs must be kept in place whenever the connection is not in use to discourage the insertion of objects into the connection openings. The interior of piping behind connection clappers must be checked for foreign material and obstructions.

Threads must be compatible with local fire service hose couplings and free of burrs, depressions and other flaws. Couplings must spin freely. Clappers, if installed in the pipe openings, must open easily and automatically return to the closed position.

Exposed piping, fittings,



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valves and couplings  
must be free of water  
where subject to  
freezing. Defects must  
be corrected without  
delay. These and other  
maintenance features  
are addressed in NFPA  
25.

Next Month SECTION  
913

FIRE PUMPS (page 441)

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The International Code Council, a membership association dedicated to building safety and fire prevention, develops the codes used to construct residential and commercial buildings, including homes and schools. Most U.S. cities, counties and states that adopt codes choose the International Codes developed by the International Code Council.

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The Center for Campus Fire Safety 978.961.0410 [SupportTeam@campusfiresafety.org](mailto:SupportTeam@campusfiresafety.org)



# Iowa State University Celebrates Campus Fire Safety Month

Iowa State University held its 5<sup>th</sup> annual National Campus Fire Safety Month event on September 19<sup>th</sup>, 2014. The event was co-hosted again this year by the Ames Fire Department. The fire department's participation is a critical factor to the success of this event.



When the fire trucks arrive the students immediately start gathering. They stop by on their way between classes to get fire extinguisher training. At the event we utilize the Bullex training systems of both the Ames Fire Department and Iowa State Environmental Health & Safety. In three hours, approximately 500 students, staff and faculty are trained on the safe use of fire extinguishers. The first 400 participants are given a T-Shirt commemorating the event.



This year to help promote the event, we took pictures of students putting out a fire with an extinguisher and posted them on the Iowa State EH&S Twitter account. The participants were asked to attach their twitter handles to their pictures so that their followers would get the tweets as well. This strategy helped spread the fire safety message to a broader audience. By noon, pictures of the Iowa State Campus Fire Safety Month event were leading a popular fire safety hashtag. It's challenging to keep up with the latest trends, but we've learned that social media is an important tool in our outreach efforts.



Interstate Batteries was a new addition to the event this year. They saw the pre-event advertisements and wanted to participate. For the last several years Interstate Batteries has been involved in an Iowa State Fire Marshall initiative to promote home fire safety. They play a valuable role by spreading awareness of the importance of regular testing and maintenance of home smoke detectors. This program has been attributed to saving lives in Iowa. At the event they handed out hundreds of free nine volt batteries to students, staff and faculty for stand-alone smoke detectors. We were very pleased to have them join our event and hope that they will return next year.



The annual fire safety event is a key opportunity for us to reach a new student audience. We urge all campus fire safety professionals to get out on their campuses and talk to students in their environment. This year's event was another great day for fire safety at Iowa State University! And we had a great time doing it!



The Fire Safety team at Iowa State University EH&S



IOWA STATE UNIVERSITY





# 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

A large, faint, light green wireframe dome structure is centered in the background of the lower half of the page. It has a grid-like pattern of lines forming a hemispherical shape.

WASHINGTON, DC  
JULY 31, 2014



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October 7, 2014

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 "Dominic Sims".

Dominic Sims, CBO  
Chief Executive Officer

A handwritten signature in black ink, appearing to read "Stephen D. Jones".

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



# 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.*

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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.

# 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.*

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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.

# 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.*

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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:

# 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.*

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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.



# 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.*

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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 DirVectors

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



# 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.*

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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.*