Codes that Safeguard Buildings During Construction

BCD-231

ICC INTERNATIONAL CODE COUNCIL® PREFERRED PROVIDER

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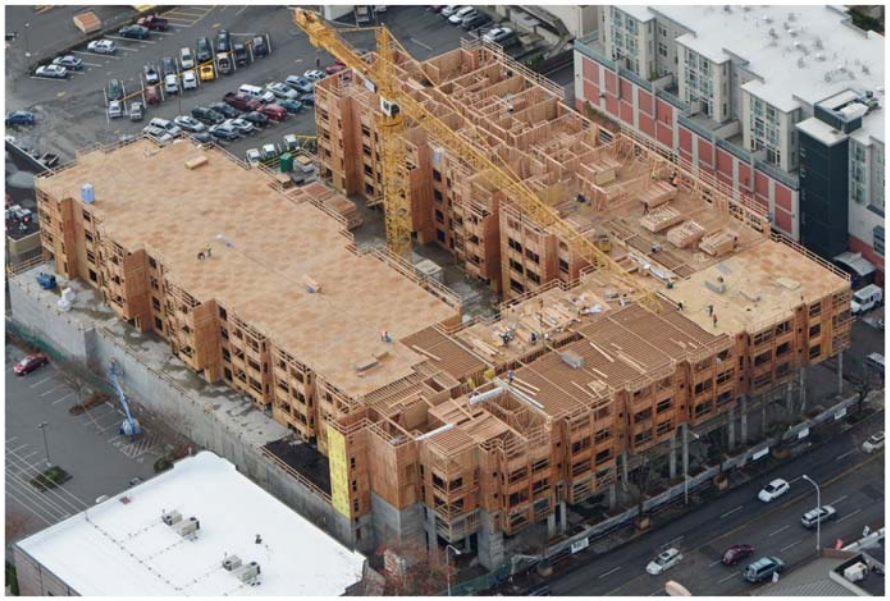
American Wood Council

Texas Fire Protection Association
TFPA

CONTINUING EDUCATION AIA


AMERICAN
WOOD
COUNCIL
About AWC
Codes and Standards
Green Building
Manufacturing Environmental Regulation
Advocacy and Public Policy

COURSE DESCRIPTION



This program provides information to assist the Fire Service charged with responsibilities for fire and life safety on a construction site to follow best practices. Builders and building officials will also benefit from the information provided. The purpose is to reduce the risk of injuries and losses from fire. The information applies to the design and planning stages as well as the actual construction phase of buildings. Many hazards can be addressed before they become an issue by adoption of best practices and rigorous code enforcement. The primary focus of this program is on large buildings during construction. Other topics that include demolition, alterations, renovations, repair and maintenance, as well as newly-completed buildings will be discussed. This program provides guidance that is based on compliance with Chapter 33 of the *2021 International Fire Code*, Chapter 33 of the *2021 International Building Code*, and NFPA Standards 1 and 241.

LEARNING OBJECTIVES

Upon completion, participants will be better able to:

1 Risks & Hazards

Identify risks & hazards on constructions sites. Learn the leading causes of fires in structures under construction.

2 Codes & Standards

Apply model codes and standards that pertain to safety precautions during construction. Including code changes in the 2021 IFC and 2019 NFPA 241

3 Best Practices

Identify best practices regarding housekeeping, hot work, equipment fueling, smoking, food preparation and other hazardous activities on construction sites.

4 Fire Safety Plans

Identify the components of a good fire safety plan and be able to work with builders to develop a plan.

CONSTRUCTION FIRE SAFETY COALITION

www.constructionfiresafety.org

Free to Qualified Officials

Fire Safety Manuals

Links & Resources

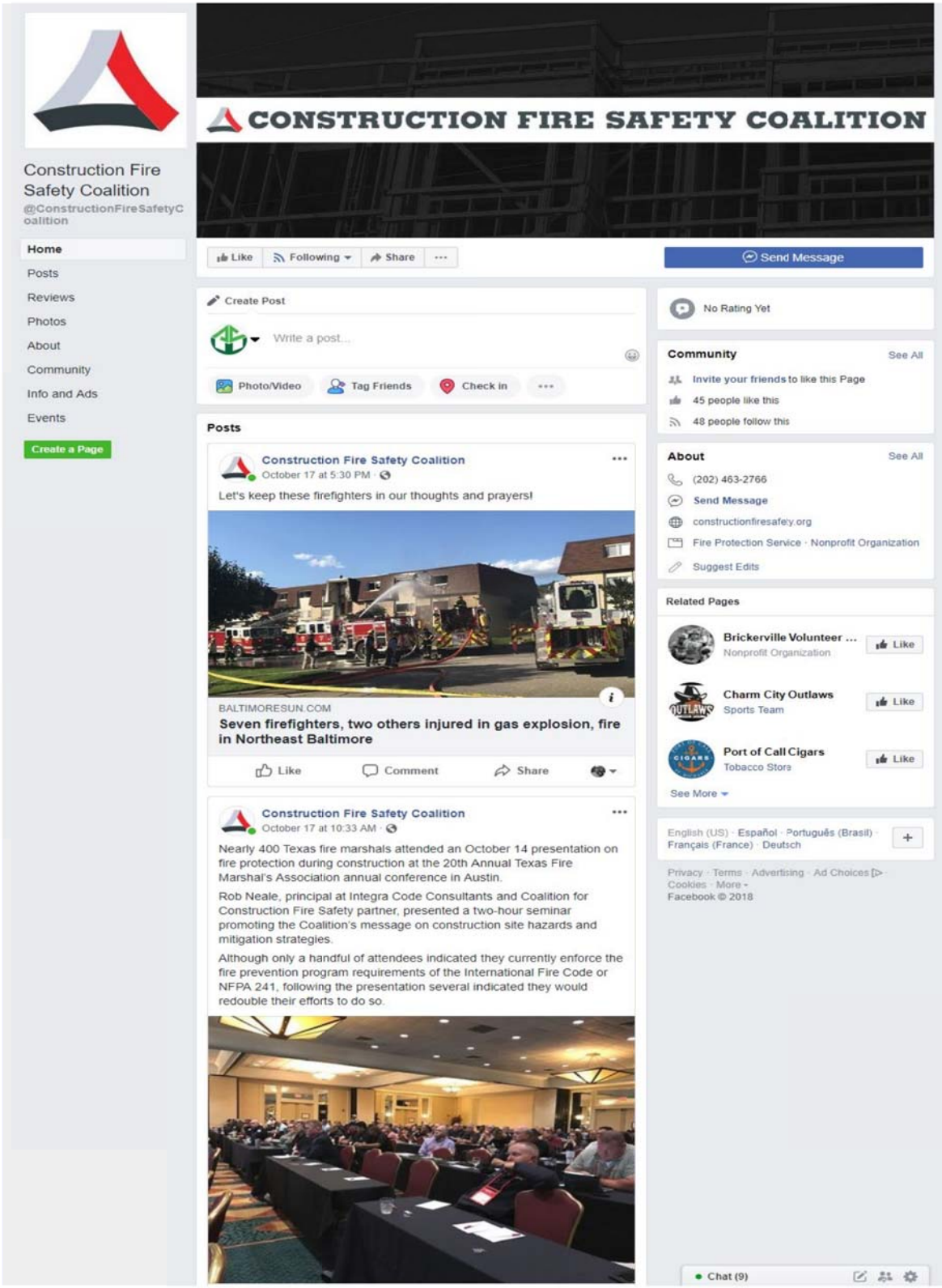
Webinars

Checklists & Guidance documents

Quarterly newsletters

CONSTRUCTION FIRE SAFETY COALITION

Visit our Facebook Page!



Nature of the Problem

U.S. fire departments report the following structure fire averages

- 3,840 under construction
- 2,580 during major renovations

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

Risk Management

Construction market hammered by rising fire, water damage claims

Claire Wilkinson
June 04, 2019

Construction companies are stepping up risk management efforts and making greater use of technology in response to a growing number of fire and water damage claims during construction projects, according to industry sources.

Related Stories

Inland marine premiums double in decade: Best

Most Read in Risk Management

1. 2019 Break Out Awards
2. Damaged Noah's Ark replica awash with insurer resistance
3. AIG promotes McElroy to head North American general insurance
4. Dismissal of suit challenging IRS

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The Insurance Industry
Fire Loss: Most Severe

- Fire is almost three times the average claim size from water damage.
- Fire losses are only one-twelfth of all claims in total

Wilkinson, Claire, *Construction Market Gets Hammered by Rising Fire, Water Damage Claims*, Business Insurance.com, Posted June 4, 2019.

Significant Fires During Construction

Bound Brook, NJ
January 12, 2020

- Meridia Main
- 174-unit apartment
  - 2 story concrete podium
  - 4 stories wood frame
- 7 alarms
- 70 departments/ 3 Counties
- Destroyed 4 surrounding buildings
- Power cut to downtown for a day
- Commuter rail line shut down
- 100 homes evacuated
- Arson- arrest made

Courtesy NJ.com

Wilsonville, OR
March 31, 2019

- $10 million loss
- 1am in the morning
  - Three alarms
  - Six roof exposure fires
- Four-story wood-frame
  - 20-unit apartment building
- Radiant heat melted 14 vehicles
- Incendiary fire- ATF

Courtesy the Oregonian

Courtesy the Oregonian

Denver, Colorado
March 7, 2018

- Two dead
- Middle of afternoon
  - Three alarms
  - Six roof exposure fires
- Five-story wood-frame
  - 80-unit multi-family
- Radiant heat melted 40 vehicles
- Undetermined cause

Courtesy the Denver Post

Courtesy the CBS Denver

College Park, Maryland
April 24, 2017

- Seven-story mixed use
  - Retail/residential
- Sprinkler system installed, but not yet operational
- UMD closed, senior housing evacuated
- $39 million
- Cause: accidental
- Razing top five floors

Courtesy the Washington Post

Fairfax County, VA: February 8, 2020

Time: Approximately 8am

Location:2800 block of Poag Street, Penn Daw, Fairfax County, VA

Response: 5 Alarms- Firefighters from Alexandria, Arlington, Fort Belvoir and Prince George's County assisted Fairfax County.

Injuries: One firefighter and one civilian (passerby) were taken for minor injuries

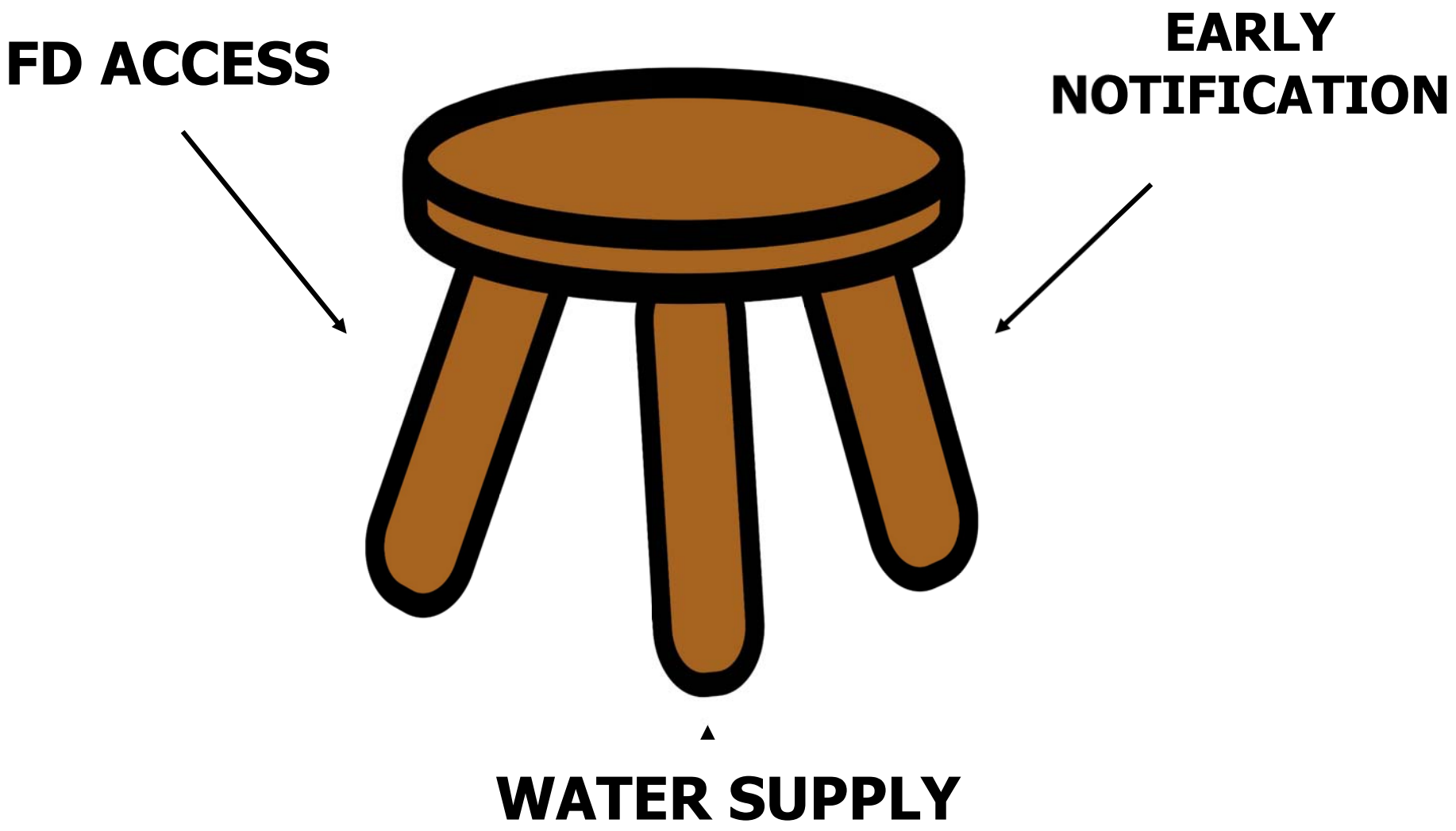
Cause: Cigarette dropped into a combustible garbage chute

Oakland, California
July 7, 2017

- The Waverly
  - Seven story, mixed use
  - 328,000 ft^2
  - 196 units
- Construction crane collapse risk
- 100 neighbors evacuated
- ATF: Undetermined cause
- Similar to other East Bay arson fires

Photo credit: SF Gate. com

The Three-legged Stool of Effective Firefighting



Understanding Risks & Hazards

It’s no surprise that construction sites can become an unsafe environment

SOURCES OF FUEL

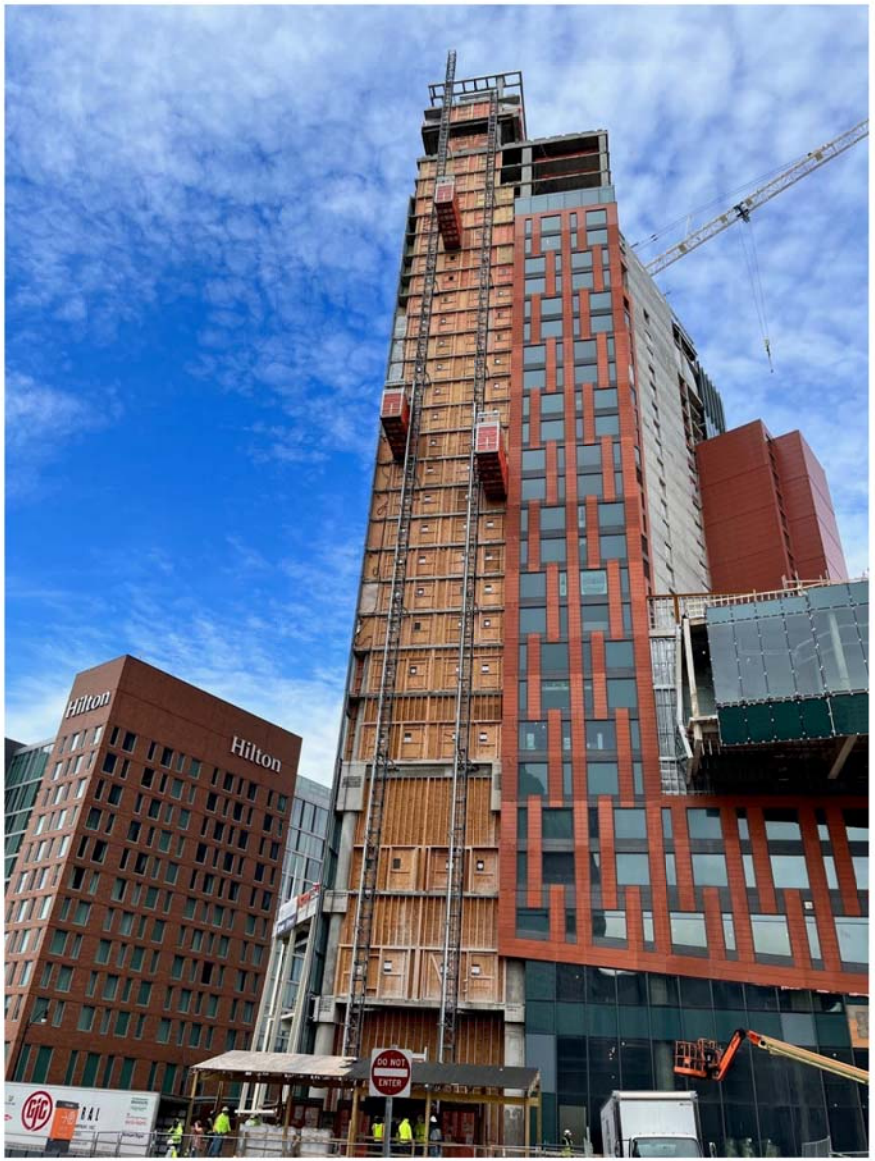
- Combustible refuse and trash
- Building materials
- Flammable gases - e.g. propane
- Flammable liquids
- Packaging materials

SOURCES OF FUEL

Hilton Towers under construction

No fuel to burn on a Type I building right?

DON'T BE FOOLED



SOURCES OF IGNITION

- Smoking Materials
- Cooking
- Open Flames
- Electrical equipment
- Light fixtures
- Heat and Sparks from grinding and cutting metal
- Arson

SOURCES OF IGNITION

CAUSES OF NEW CONSTRUCTION FIRES

- Cooking Equipment - 22%
- Electrical- 16%
- Heating Equipment- 15%
- Intentionally Set- 11%
- Torch, burner or soldering iron- 7%
- Exposure Fires - 4%
- Smoking- 4%
- Spontaneous Combustion- 4%

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

CAUSES OF NEW CONSTRUCTION FIRES

- Cooking equipment is the leading cause of fires, but they are usually minor.
- Electrical fires account for 16% of all construction fires but 42% of property damage
- Intentionally set fires make up 11% of construction fires but responsible for 32% of property damage

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

TIMING OF NEW CONSTRUCTION FIRES

- Occur more frequently in colder months.
- Peak times are between 1600 hrs. and 2000 hrs.
- 12% occur between midnight and 0400 hrs.

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

FIRES OCCURRING DURING MAJOR RENOVATION

- Electrical- 23%
- Heating Equipment- 15%
- Intentionally Set Fires - 12%
- Cooking Equipment - 10%
- Torch, Burner, or Soldering Iron - 9%
- Smoking Materials - 3%
- Exposure Fires - 3%

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

RECOMMENDATION FROM NFPA

- Ensure that the temporary electrical service follows installation requirements of the National Electrical Code®, electrical equipment is maintained and regularly inspected and use of extension wiring is kept to a minimum
- Prohibit the use of temporary cooking equipment
- Ensure that unauthorized temporary heaters are restricted from worksite and the heaters permitted are placed at safe distances from combustible and flammable materials
- Require a permit system for hot work activities and enforcing a thirty minute cool-down interval following use of torches, burners, or soldering irons.
- Reduce the risk of arson by safeguarding construction sites with fencing or other controls, such as lighting or after-hours security personnel, as needed.

Campbell, Richard, NFPA, *Fires in Structures Under Construction or Renovation,* February 2020

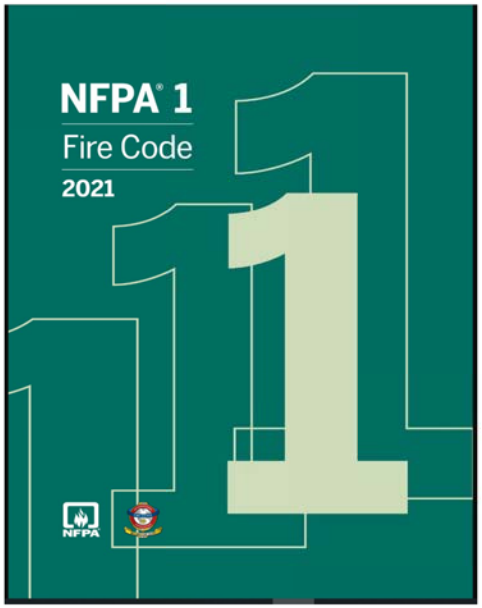
NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

CODES & STANDARDS/ ROLES & RESPONSIBILITIES

…that pertain to safety precautions during construction

MODEL CODES THAT SAFEGUARD CONSTRUCTION

Chapter 33



Chapter 16

Chapter 33

OWNER RESPONSIBILITIES

- **Safe work environment** – every owner's primary responsibility
- **Comprehensive management policy** – starts at the top and works down to labor force
- Building owner & general contractor – **high priority on fire safety**
- Builder's primary responsibility – **work closely with AHJ**
  - ensure **all regulatory requirements are met**
  - control **permitting process for hot work**

NFPA – FIRE SAFETY PROGRAM

*"A **fire safety program** shall be included in **all construction, alteration, or demolition contracts**, and the right of the owner to administer and enforce this program shall be established, even if the building is entirely under the jurisdiction of the contractor."* NFPA 241 Sec. 1.3.4

- The **owner must designate** a person who shall be **responsible for the fire prevention program** and **authorize them to enforce** its provisions. NFPA 241 Sec. 7.2

PROGRAM MANAGER RESPONSIBILITIES

NFPA 241 sec. 7.2.4

- Proper training in the use of fire protection equipment
- Development of pre-fire plan with local FD
- Responsible for presence of adequate fire protection devices
- Supervision of the permitting of hot work
- Weekly self inspection program
- Authorize planned impairments
- Responsible for the guard service

EMPLOYEE RESPONSIBILITIES

Establishment and maintenance of work conditions is management's responsibility

However, all employees should also be fire and safety conscious

- Report - all potential fire hazards
- Observe - all fire safety rules, procedures and codes of safe practice
- Use - tools, safety equipment and personal protective equipment provided

JOB SITE VISITOR RESPONSIBILITIES

Job site visitors must check in with site supervisor for safety reasons

Visitors must wear appropriate PPE

- Hard hat and safety vest
- Goggles
- Stout shoes

Visitor safety tips

- Staying visible
- Remaining alert
- Being aware of surroundings
- Never approaching equipment, unless the operator has acknowledged their presence
- Not parking vehicles in any way that would block fire department access

AHJ RESPONSIBILITIES

Team providing local government representation

1. Building Department – provides enforcement and oversight of building construction process in accordance with state and local statutes
2. Fire Prevention Bureau – enforces adopted Fire Code provisions
3. Fire Suppression Division – develops
   - pre-fire plan, tactics, and strategy
   - site assessment of water supply, access to the area, and exposure protection

FIRE SAFETY PROGRAM

Construction Site Safety Plans

FIRE SAFETY PROGRAM

All of the following should be addressed in a fire safety program

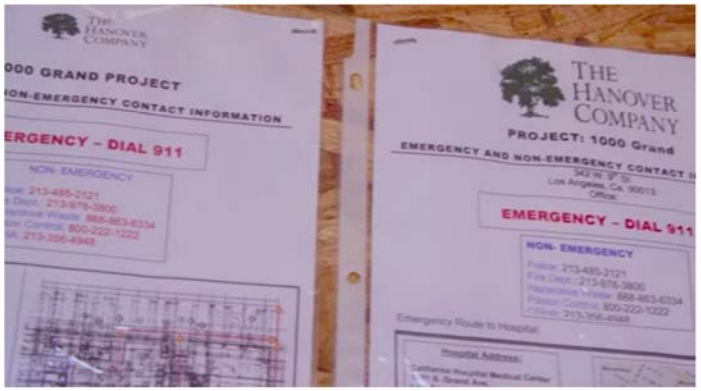
- Good housekeeping
- On-site security
- Fire protection systems: installation as construction progresses and preservation of existing systems during demolition
- Training of employees
- Development of a pre-fire plan w/ local fire department
- Rapid communication
- Consider special hazards
- Protection of existing structures from exposure to fire

FIRE SAFETY PLAN

NFPA 241 Chapter 7 / IFC 3308

Fire prevention plan (FPP) should include

- Organizational structure and responsibilities for fire safety
- Name and contact phone number of person(s) responsible for FPP compliance
- Arrangements for recording fire safety training given to site personnel and visitors, including required actions in case of fire
- Risk assessments and FPE reports requiring specific fire safety measures
- Fire safety requirements in compliance with applicable fire and building codes
- Procedures for emergency notification, evacuation and/or relocation of all persons in the building under construction which are aligned with site emergency notification plan



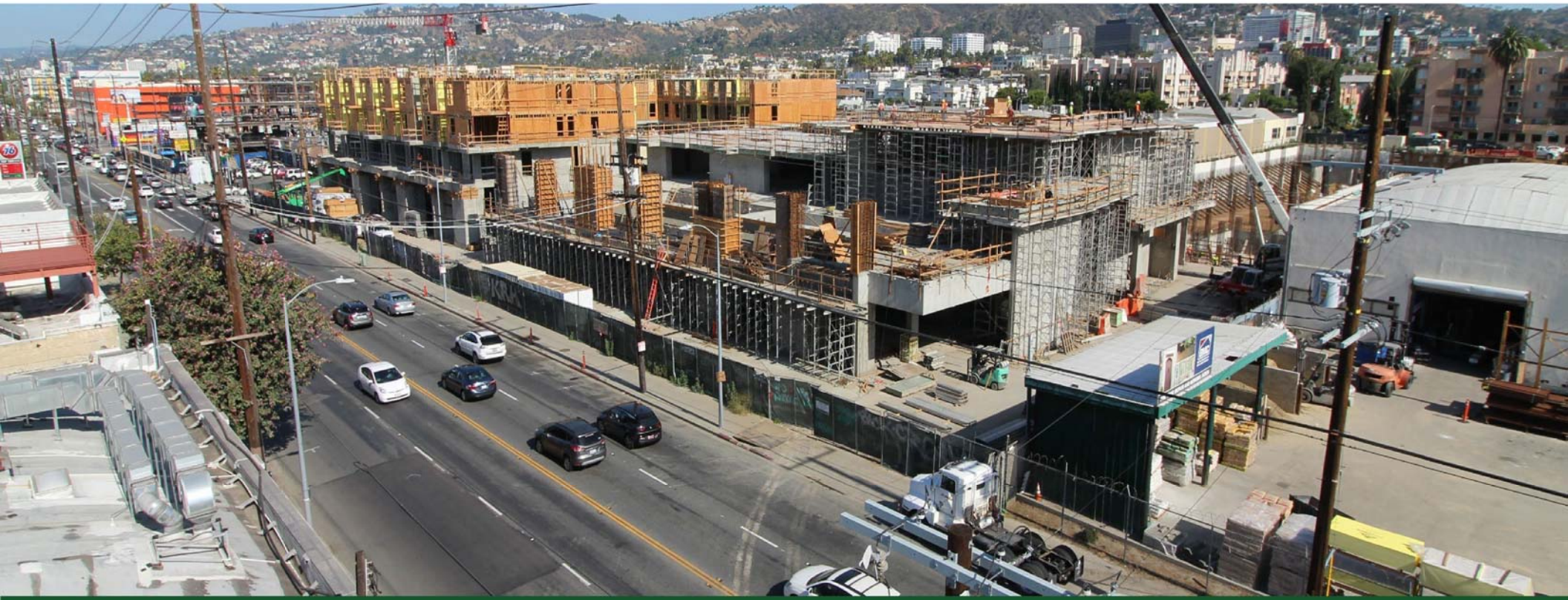
FIRE SAFETY PLAN: CONTINUED

- Fire prevention measures
  - security requirements
  - control of ignition sources
- Procedures for Hot Work permit operations, cutting and welding
- Electrical supplies and equipment
- Compliance with ‘smoking’ policies
- Plant equipment and vehicles
- Prohibition of open fires
- Control/reduction of combustible materials
- Control flammable liquids and gases
- Proper storage and disposal of waste materials
- Fire department access, facilities and coordination
- Evacuation plan and procedures

FIRE SAFETY PLAN: CONTINUED

- Fire protection provisions
  - portable fire extinguishers
  - standpipes
  - hydrants, hose reels and water supplies
  - automatic fire sprinklers*
  - automatic fire detection and alarm systems*
  - temporary emergency lighting*
- Separation from adjacent buildings and other hazards
- Special provisions if work is being carried out in occupied buildings
- Urban wildland interface clearance requirements, if appropriate

*These items can only be evaluated during the final stage of construction



BEST PRACTICES & CODE REQUIREMENTS

…regarding site security, housekeeping, hot work, equipment fueling, smoking, food preparation and other hazardous activities on construction sites

SITE SECURITY

- Guard service shall be provided when required by the AHJ
    - New provision: Combustible construction exposed during construction more than 40ft above grade plane-guard service required (2019)
- Security fences shall be provided where required by the AHJ
- Entrances to the structure under construction must be secured

SITE SECURITY

- Site security plan, based on security assessment, should include:
  - Personal observations
  - Logbooks
  - Video technology
  - Scheduled patrol routes
  - Proper notification procedures

- The guard service must be trained in the following
  - Notification procedure
  - Function & operation of fire protection equipment
  - Familiarization of fire hazards
  - Use of construction elevator

SITE SECURITY

- 2020- 24 multifamily construction fires
    - 16 are reported in the media as “suspicious”

SITE SECURITY

THEY ALWAYS PUT-UP FENCES AFTER THE FIRE!

SITE SECURITY

- Convincing corporate leadership of the critical importance of site (physical) security during daytime operation and nighttime trespass prevention is a challenge.
    - An effective security perimeter interferes with site logistics, can be limiting to placement of construction stock
    - Most contractors aren't sufficiently sophisticated to understand how fences really affect site logistics.
    - Fences need not be a barrier to site logistics, a common challenge among urban builders.

SITE SECURITY

- Thoughts on Site Security
  - Video/artificial intelligence fence line monitoring.
  - "Real fence" surrounding the site - secured into the ground/pavement/sidewalk. No "weighted base" temp fencing.
  - Signs – "video security" and "no expectation of privacy"

SEPARATION DISTANCES

- There must be adequate separation between buildings under construction and temporary construction related structures*
- Example from Table 4.2.1
  - 20 feet of temp structure exposing wall length would need to be 30 feet away from building under construction

*a 75% distance reduction permitted with automatic sprinkler system in temporary structure

HOUSEKEEPING

- Housekeeping “rules” not the same as housekeeping “activity”
- Can quickly deteriorate from lack of action
- Supervisors need to enforce consistently and take action when it is violated
- NFPA 241 deals with waste disposal in Section 5.4

HOUSEKEEPING

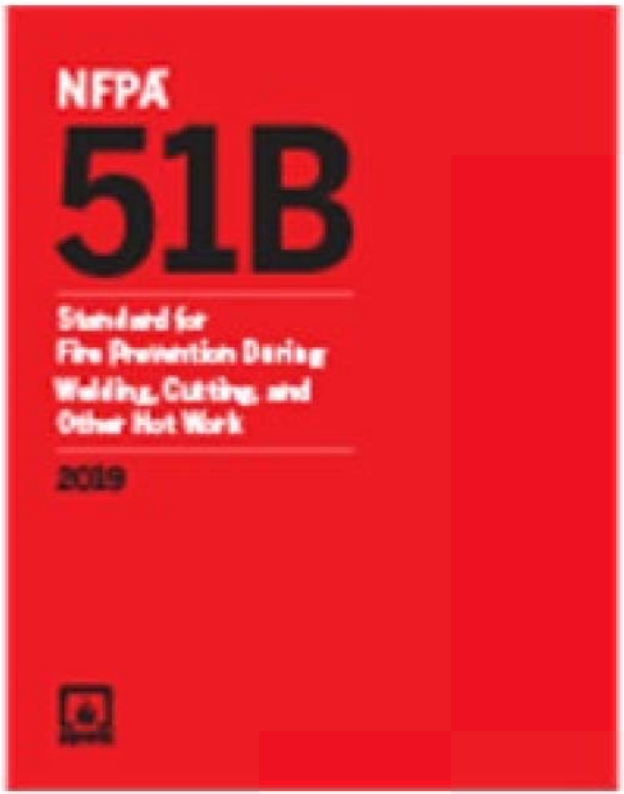
- Clear premises of all refuse and process waste
- Remove waste, scrap and debris daily
- Keep all building site areas free of accumulated packing materials (e.g. pallets, paper, etc.)
- Provide appropriate metal bins (or dumpsters with lids) for combustible waste disposal such as oil rags
  - Empty these containers at the end of every shift
  - Take contents off-site

HOUSEKEEPING

- Storage places accessible to firefighters
- Clear spaces around stored materials and provide adequate gangways between them
- If a sprinkler system is installed, all material stacks should not impede effective sprinkler operations
- Open-topped dumpsters containing combustible materials should be emptied or moved to at least 35 ft from combustible structures at the end of each work shift. (A.5.4.1)

HOT WORK

5.1.1 Responsibility for hot work operations and fire prevention precautions, including permits and fire watches, shall be in accordance with NFPA 51B except as modified in Chapter 9.*



HOT WORK

Hot work includes all activity that could initiate fires or explosions by providing a heat source that ignites combustible material

Definitions

- Hot Work: Work involving burning, welding, or a similar
- operation that is capable of initiating fires or explosions.

- Designated Area. A specific location designed and approved for hot work operations that is maintained firesafe, such as a maintenance shop or a detached outside location, that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas.

- Permit-Required Area. Any location other than a designated area that is approved for hot work and is made fire-safe by removing or protecting combustibles from ignition sources.

BEST PRACTICES - HOT WORK

- Hot Work Permits – issued by Permit Authorizing Individual (PAI) under Hot Work Program permitting welding or other Hot Work to be done on locations

- Hot Work Program – a permitted program, carried out by a general contractor allowing them to oversee and issue permits for Hot Work conducted on the job site

- Permit Authorizing Individual – The individual designated by management to authorize hot work.

- Torch-Applied Roof System – bituminous roofing systems using membranes that are adhered by heating with a torch and melting asphalt back coating instead of mopping hot asphalt for adhesion

HOT WORK

1.3.1 This standard shall apply to the following hot work processes:
(1) Welding and allied processes
(2) Heat treating
(3) Grinding
(4) Thawing pipe
(5) Powder-driven fasteners
(6) Hot riveting
(7) Torch-applied roofing in conjunction with the requirements of NFPA 241*
(8) Similar applications producing or using a spark, flame, or heat

HOT WORK

Hot Work should be closely controlled

Implement a permit system including

- Requirements for written permission (a permit) prior to commencement of hot works
- Hot works permits must be specific to a location, activity and work period and must not provide blanket coverage for more than one location activity or work period

HOT WORK

Other management practices to reduce ignition potential

- Reinforce accountability and ensure constant fire mitigation measures
- Combustible materials at least 35 feet away from Hot Work area
  - If they cannot be moved, cover area with a fire-resistant blanket
  - Sweep floors in these areas of all combustible waste and debris
- Cover all floor and wall openings within 35 feet of a hot work area to prevent hot sparks from entering walls or falling to a lower level
- Hot Works should never be conducted in the presence of flammable gases, vapors, liquids, or dust

HOT WORK

- Provide appropriate fire extinguishers that are properly sized, fully charged, and ready for operation
- Keep evacuation paths clear
- Assign a suitably trained and equipped person to fire watch during hot works until released by the PAI
- PAI to inspect hot works areas at day's end
  - Also by security staff, if reasonably practicable and safe to access the area
- Provide means for communicating an alarm in accordance with Emergency Action Plan

FIRE WATCH: NFPA 51B 4.4

- Shall be trained to recognize the inherent hazards of the work site and hot work operations
- Fire watch shall be assigned no other duties
- Has the authority to stop hot work operations if unsafe conditions develop.
- A fire watch shall be posted for the duration of the hot work
- A fire watch shall be maintained for 1 hour after completion of hot work operations. Longer for torch applied roofs.

ELECTRICAL- BRANCH CIRCUITS

- Branch circuits shall originate in an approved power outlet or panelboard.
- All conductors shall be protected by overcurrent devices
- Runs of open conductors shall be located where the conductors are not subject to physical damage, and the conductors shall be fastened at intervals not exceeding (10 ft).
- Electrical devices shall be maintained in a safe condition.
- Extension cords shall be maintained free from damage.
- Damaged equipment and cords shall be removed from service until rendered safe.

ELECTRICAL- LIGHTING

- Temporary lights shall be equipped with guards
- Temporary lights shall be equipped with heavy-duty electrical cords with connections and insulation maintained in safe condition.
- Temporary lights shall not be suspended by their electrical cords
- Splices shall have insulation equivalent to that of the cable.
- Temporary wiring and lights shall be removed immediately upon the completion of the construction

ELECTRICAL- COMMON VIOLATIONS

Open Splices and bad wiring

BEST PRACTICES - SMOKING

5.3.1* Smoking shall be prohibited at or in the vicinity of hazardous operations or combustible/flammable materials, and "No Smoking" signs shall be posted in these areas.

5.3.2 Smoking shall be permitted only in designated areas.

5.3.3 Where smoking is permitted, safe receptacles for smoking materials shall be provided.

BEST PRACTICES - COOKING

- Cooking equipment shall be placed and used in such a manner so that it is secured against overturning or displacement.
- Cooking shall only be located in approved cooking areas that are designated by approved signs, which state the following:

WARNING!

DESIGNATED COOKING AREA — COOKING OUTSIDE OF A DESIGNATED COOKING AREA IS PROHIBITED

- Cooking outside of approved cooking areas shall be prohibited.

BEST PRACTICES - EQUIPMENT

- No vehicles should be parked inside of buildings unless fire detection systems are installed and monitored
- Make sure that the equipment has cooled down and there are no leaks in the fuel or hydraulic system
- Internal combustion engines and associated equipment located so that their exhausts discharge away from combustible materials
- Prevent combustible materials coming in contact with hot surfaces of Internal combustion engines and associated equipment
- Fuel storage and service areas should not be located within structures under construction.
- Policies for refueling of tools and equipment should require that the appliance be cool before refilling

BEST PRACTICES - WASTE MATERIALS

- Schedule delivery of combustible materials as close to installation as possible
- Remove combustible waste materials, including dust and debris, from the building and immediate vicinity at shift end
- Store scrap lumber and combustible materials before its disposal as far from buildings as reasonably practicable
- Unless specific items of vegetation are planned to be retained, remove all dry vegetation 60 feet from buildings under construction and work areas
- Prohibit open fires, including burning of waste materials, on site

BEST PRACTICES - HEATING EQUIPMENT

- Locate temporary areas to protect against weather outside of any structure
- Conduct refueling of heating devices outside and safely
- Maintain separation distance from combustible materials
- Require personnel to be in attendance when the heater is running
- Restrain device to minimize risk of knock-over or incorrect location
- Inspect regularly

BEST PRACTICES - COMBUSTIBLE MATERIAL STORAGE

Where significant volumes of wood framing and other combustible building materials are to be stored on site, they should be stored in a secure area at least 30 feet away from any buildings or partially constructed buildings, as well as any location where hot work is undertaken

Temporary storage of equipment to be installed, or excessive combustible construction or packing materials, shall not be permitted in unprotected structures under construction or alteration unless authorized by the authority having jurisdiction.

BEST PRACTICES - EXPOSED COMBUSTIBLE MATERIALS

For buildings of four or more stories, where the exposed façade is combustible or construction is predominantly of combustible construction, consider additional controls

- Progressively clad exposed combustible materials with fire-resistant coverings
- If sprinklers are to be provided, progressively commission the system

BEST PRACTICES – PASSIVE SYSTEMS

- Early installation of permanent or temporary fire compartments can limit fire spread
- Address protection of door openings, windows, shafts and service penetrations
- Provide temporary fire alarm system and modified evacuation procedures to address expected fire spread rate
- Provide separation distances or fire barriers between adjacent buildings appropriate to the fire hazard

TEMPORARY SEPARATION WALLS

- Protection shall be provided to separate an occupied portion of the structure from a portion of the structure undergoing alteration, construction, or demolition operations when such operations are considered as having a higher level of hazard than the occupied portion of the building.

- Walls shall have at least a 1-hour fire resistance rating. Walls and opening protectives shall be permitted to be nonrated when an approved automatic sprinkler system is installed and operational

- Opening protectives shall have at least a 45-minute fire protection rating.

BEST PRACTICES - FLAMMABLE LIQUIDS & GASES

Storage and use of flammable liquids and gases require specific safety measures that address risks of use in confined spaces and potential explosions, in addition to normal fire risks

Typical requirements found in NFPA Standards include

- NFPA 30- *Flammable & Combustible Liquids Code*
- NFPA 54- *National Fuel Gas Code*
- *NFPA 58- Liquefied Petroleum Gas Code*

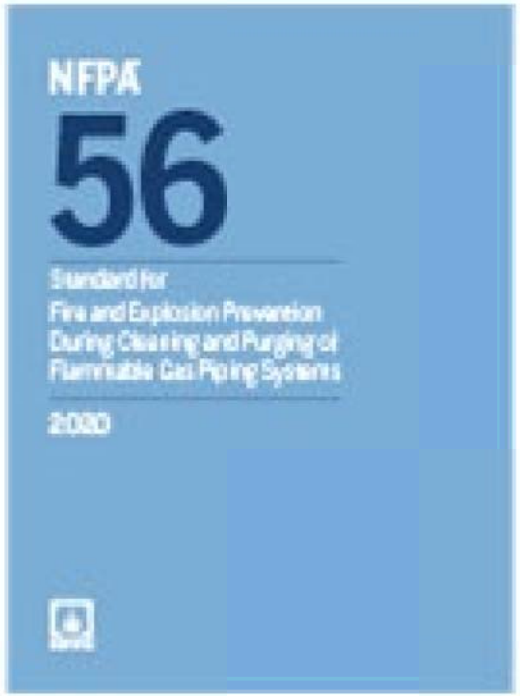
NFPA

NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

GAS LINE PURGING

- New Section:
- Fuel gas piping shall be properly cleaned and purged prior to it being commissioned or decommissioned in accordance with NFPA 56.
- Fuel gas shall not be utilized for the cleaning of piping under any circumstance.



BEST PRACTICES - FLAMMABLE LIQUIDS

- Train workers in storage and handling of dangerous goods
- Keep storage of flammable liquids and gases to a day's supply
- Provide clear signage identifying materials being stored and prohibiting smoking, open flame, hot works, and use of mobile phones

BEST PRACTICES - FLAMMABLE LIQUIDS

- Deal with leakage or spillage promptly and safely
- Keep flammable liquid containers and tanks closed when not in use
- Segregate storage of flammable liquids and gases from materials that could intensify fire
- Properly remove flammable materials in approved containers before work is carried out on an empty container or vessel
- Liquids may only be used for their intended purposes

BEST PRACTICES - GARBAGE CHUTES

- Construct chutes of noncombustible materials and locate outside building envelope
- Minimize accumulation of combustible materials close to the chute
- Change-out dumpsters frequently to prevent chute clogging
- Protect combustible trash chute interior by a temporary automatic sprinkler within a recess near chute top*

*Can be connected by a firehose or commercial rubber hose not less than ¾" diameter

BUILT-IN FIRE PROTECTION FEATURES

The following components and systems are not considered to be effective in minimizing the risks until they are complete:

- Fire stairs, including fire-resistant walls
- Fire-protective materials to structural steel
- Automatic fire sprinkler systems and other automatic suppression systems
- Fire compartment boundaries, including fire doors, penetration seals, and general protection of other openings

FIREFIGHTING ACCESS: COMMAND POST- NFPA 241§7.5.1

New Provision!

- A suitable location at the site shall be designated as a command post and provided with plans, emergency information, keys, communications, and equipment, as needed.
- The person in charge of fire protection shall respond to the location command post whenever fire occurs.

FIREFIGHTING ACCESS: KEY BOX NFPA 241 § 7.5.2

New Provision!

- Where access to or within a structure or an area is unduly difficult because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the authority having jurisdiction shall be permitted to require a key box to be installed in an accessible location.
- The key box shall be an approved type and shall contain keys to gain access as required by the authority having jurisdiction.

FIREFIGHTING ACCESS: EXTERIOR

- Every building must be accessible by a road with an all-weather driving surface of at least 20’ of unobstructed width
- The required width of access roadways shall not be obstructed in any manner, including obstruction by parked vehicles.
- Dead-end roads more than 150’ must include a turnaround
- Access road(s) must be within 150’ of all exterior 1st floor walls

FIREFIGHTING ACCESS: STAIRS

- Provide at least one useable stairway at all times
- Extended upward as each floor is completed
- Stairways must be lighted
- Enclose stairways once exterior walls are complete
- Provide identification signs to include floor level, stair designation, and exit path direction

FIREFIGHTING ACCESS: HYDRANTS

- Free access from the street to fire hydrants and to outside connections for standpipes, sprinklers, or other fire extinguishing equipment, whether permanent or temporary, shall be provided and maintained at all times.
- Protective pedestrian walkways shall not be constructed so that they impede access to hydrants.
- No material or construction shall interfere with access to hydrants, siamese connections, or fire extinguishing equipment.

FIREFIGHTING ACCESS: STANDPIPES (WHERE REQUIRED)

- Maintain in conformity with building progress and ready for use
- Install at least one standpipe, prior to construction exceeding 40’, within one floor of the highest point of construction
- Must be conspicuously marked and readily accessible FDC
- One hose outlet on each floor
- A water supply providing a minimum flow of 500 gallons per minute provided (IFC)

FIREFIGHTING ACCESS: WATER SUPPLY (NFPA 241)

- Fire protection water supply (temporary or permanent) shall be available as soon as significant combustible material is present - NFPA 241 Section 8.7.2.1
- Where underground water main or hydrants are to be provided, they shall be installed, completed, and in service prior to start of construction

FIREFIGHTING ACCESS: WATER SUPPLY IFC

- An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible building materials arrive on the site, on commencement of vertical combustible construction and on installation of a standpipe system in buildings under construction
- A minimum fire flow of 500 gallons per minute shall be provided. The fire hydrant used to provide this fire-flow supply shall be within 500 feet of the combustible building materials, as measured along an approved fire apparatus access lane. Where the site configuration is such that one fire hydrant cannot be located within 500 feet of all combustible building materials, additional fire hydrants shall be required to provide coverage.

WATER SUPPLY: EXAMPLE OF A LOCAL INTERPRETATION

- The minimum fire flow required when the contractor brings combustible materials on site is 1,500 gpm at 25 psi.
- At least one hydrant shall be within 500 feet of any combustible materials.
- Contractor is responsible for ensuring that the water supply is available at all times

CASE STUDY- ROCKVILLE, MD 40 UPPER ROCK

- 149 unit, 4 story, construction fire
- Montgomery County, MD Fire Chief stated that to control the fire his units were flowing as much as 5,000 gpm
- How many jurisdictions could generate that flow?
- If adequate water is not available, operations must shift to exposure protection

AVALON BAY - FIRE ELIMINATION PLAN

- Site Security
- Source of ignition reduction
- Detection

AvalonBay COMMUNITIES

ABOVE THE CODE

- Wifi enabled remote sensors available

NEW CONSTRUCTION SAFETY CODE PROVISIONS NFPA 2019 EDITION

The 2019 edition includes not only a number of clarifications but an introduction of new requirements. A special provision is added to the application section that allows the authority having jurisdiction to implement portions of the standard as appropriate.

NEW CONSTRUCTION SAFETY CODE PROVISIONS
NFPA 241 2019 EDITION

- **Adds Definitions**
- **Electrical Service Disconnecting Means**
- **Guard Service Requirement**
- **Command Post and Key Box Requirement**
- **Tall Mass Timber Building Construction Requirements**

DEFINITIONS: NFPA 241 2019 EDITION

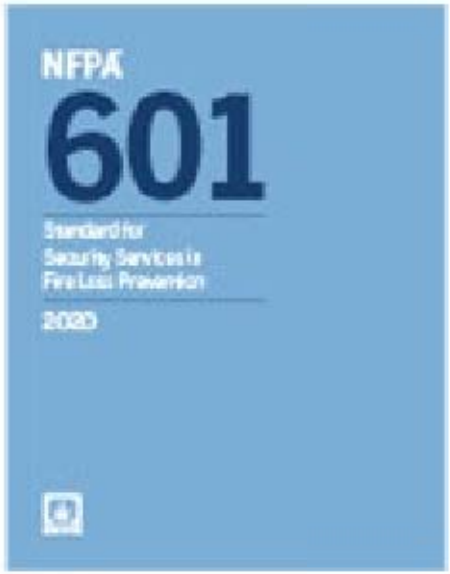
- **Cross Laminated Timber (CLT)**: A prefabricated engineered wood product consisting of not less than three layers of solid-sawn or structural composite lumber where the adjacent layers are cross-laminated and bonded with structural adhesives.
- **Critical Heat Flux (CHF).** The minimum heat flux at or below which there is no ignition
- **Facility Fire Brigade**. An organized group of employees at a facility who are knowledgeable, trained, and skilled in at least basic fire-fighting operations, and whose full-time occupation might or might not be the provision of fire suppression and related activities for their employer.

ELECTRICAL SERVICE DISCONNECTING MEANS: NFPA 241 2019 EDITION

6.1.1.4 *During construction or demolition activities, all temporary and permanent service equipment disconnecting means shall be readily accessible to emergency service personnel and shall be labeled as to which equipment is controlled by such disconnects.*

GUARD SERVICE REQUIREMENT
NFPA 241 2019 EDITION

7.2.5.1* *Guard service shall be provided where required by the authority having jurisdiction. Where required, buildings with combustible construction exposed during construction more than 40 ft above grade plane shall be provided with guard service when there are no crews on-site*



COMMAND POST AND KEY BOX REQUIREMENT
NFPA 241 2019 EDITION

7.5.1 Command Post. 7.5.1.1 A suitable location at the site shall be designated as a command post and provided with plans, emergency information, keys, communications, and equipment, as needed.

7.5.1.2 The person in charge of fire protection shall respond to the location command whenever fire occurs.

7.5.2 Key Box. 7.5.2.1 Where access to or within a structure or an area is unduly difficult because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the authority having jurisdiction shall be permitted to require a key box to be installed in an accessible location.

TALL MASS TIMBER BUILDING CONSTRUCTION REQUIREMENTS
NFPA 241 2019 EDITION

12.2* Roofing Operations. The requirements of Chapter 9 shall apply for roofing operations, except that torch-applied roofing systems shall be prohibited.

12.3* Fire Exposure Analysis. Before construction begins, a study shall be conducted by a fire protection program manager to assure that the sequencing of passive and active fire protection installations, combined with the separation provided between other structures on the same or adjacent lots, is adequate to prevent fire spread to the exposed structures.

12.3.2 Construction shall comply with the requirements established by the fire exposure analysis.

TALL MASS TIMBER BUILDING CONSTRUCTION REQUIREMENTS: NFPA 241 2019 EDITION

12.5.1* Guard service trained in accordance with 7.2.5.2 or other methods acceptable to the AHJ shall be required at all times that combustible construction has exceeded three stories and workers are not on the site.

12.5.2 Minimum 6 ft (1.8 m) high security fences shall be provided around the entire exterior of the construction site.

NEW CONSTRUCTION SAFETY CODE PROVISIONS IFC 2021 EDITION

New Tools to Aid the Fire Service Enforcement of Construction Safety Codes

NEW CONSTRUCTION SAFETY CODE PROVISIONS IFC 2021 EDITION

- **Daily Fire Safety Inspections**
- **Fire Watch Requirements**
- **Cooking Separation Requirement**
- **Site Safety Plan Requirement**
- **Site Safety Director Responsibilities**
- **Tall Mass Timber Construction Safety Requirements**

DAILY FIRE SAFETY INSPECTIONS

The most impactful change regarding construction fire safety is requiring the construction "Site Safety Director" to conduct daily fire safety inspections at the project site.

DAILY FIRE SAFETY INSPECTIONS

Site Safety Director must conduct daily fire safety inspections at the project site.

These daily inspections must include the exterior and interior of the buildings under construction everyday until the certificate of occupancy is issued.

The daily inspections must be documented and available immediately upon request of the fire official. Failure to conduct and/or document the daily inspections can result in a violation being issued.

3rd offense the fire official can issue a "stop work" order until the fire code official receives "satisfactory assurances" of future compliance.

REQUIREMENTS OF THE DAILY INSPECTIONS

- ✓ Inspect hot work areas
- ✓ Inspect all temporary heating equipment
- ✓ Ensure combustible trash and debris is removed from the non-work areas daily
- ✓ Ensure temporary wiring does not have exposed conductors
- ✓ Flammable liquids and hazardous materials are being stored properly in approved locations

REQUIREMENTS OF THE DAILY INSPECTIONS

- ✓ Fire hydrants are unobstructed and "clearly visible"
- ✓ Inspect fire access to confirm free of obstructions
- ✓ Ensure standpipes are in service and go up with the building within one floor of the highest construction
- ✓ Portable fire extinguishers are in service and properly spaced

FIRE WATCH REQUIREMENTS

Fire watch mandatory for buildings above 40 feet in height or with an aggregate area exceeding 50,000 square feet.

It was felt that "these buildings are large enough to create a significant loss to the community, endanger firefighters, and consume resources…if the building burns."

FIRE WATCH REQUIREMENTS

Allows fire watch personnel to also serve as security.

The fire watch personnel must be trained in the use of portable fire extinguishers and fire reporting.

The fire watch must have at least one means to notify the fire department.

Fire watch personnel must keep a record of all time periods of duty, including a log of all patrols and times and locations that buildings were entered and inspected.

COOKING SEPARATION REQUIREMENT

The designated cooking area must be at least 10 feet from combustible materials with a signage as the "designated cooking area" cooking outside this approved area is prohibited.

SITE SAFETY PLAN REQUIREMENT

A “Site Safety Plan” is now required and must be submitted prior to issuance of the of a building permit.

SITE SAFETY PLAN NEEDS TO INCLUDE:

- Name and contact information of Site Safety Director
- Documentation of the training
- Procedures for emergency notification
- Fire Department Vehicle Access
- Location of fire protection equipment and systems
- Smoking and cooking policy, designated areas
- Location and safety considerations for temporary heating equipment

SITE SAFETY PLAN REQUIREMENT

- Hot work permit plan
- Plans for control of combustible waste material
- Locations and storage methods of flammable and combustible liquids and other hazardous materials
- Provisions for site security
- Changes that affect this plan
- Other site-specific information required by the Fire Code Official

SITE SAFETY DIRECTOR TRAINING REQUIREMENT

The Site Safety Director must have qualifications "specific to their roles and responsibilities."

The training and qualifications must be made available to the fire official upon request.

No specific training or qualifications are enumerated in the code for the position of Site Safety Director.

SITE SAFETY DIRECTOR RESPONSIBILITIES

The duties of the Site Safety Director include:

- ensuring compliance with the site safety plan,
- responsible for the guard service,
- training of the fire watch personnel,
- ensure all fire protection equipment is operational,
- ensure hot work procedures are followed,
- plan for all system impairments,
- and maintain all required records.

TALL MASS TIMBER CONSTRUCTION SAFETY REQUIREMENTS

3303.5 Fire safety requirements for buildings of Types IVA, IV-B and IV-C construction. Buildings of Types IV-A,IV-B and IV-C construction designed to be greater than six stories above grade plane shall comply with the following requirements during construction unless otherwise approved by the fire code official:

1. Standpipes shall be provided in accordance with Section 3313.

2. A water supply for fire department operations, as approved by the fire code official and the fire chief.

TALL MASS TIMBER CONSTRUCTION SAFETY REQUIREMENTS

3. Where building construction exceeds six stories above grade plane and noncombustible protection is required, at least one layer of noncombustible protection shall be installed on all building elements on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

Exception: Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction.

4. Where building construction exceeds six stories above grade plane, required exterior wall coverings shall be installed on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

Exception: Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction

FIRST ARRIVING UNITS

8 MINUTES LATER

CONCLUSION

What is predictable, is preventable!

1 **Risks & Hazards**

We have identified causes of construction fires and risks and hazards associated with construction sites!

2 **Codes & Standards**

We reviewed safeguards during construction codes in *NFPA 241*, *IFC* Chapter 33, and *NFPA 1*.

3 **Best Practices**

We reviewed best practices to mitigate risks and hazards identified.

4 **Fire Safety Plans**

We went through components of a well-prepared fire safety plan.

AMERICAN WOOD COUNCIL

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This concludes The American Institute of Architects
Continuing Education Systems Course