

CONSTRUCTION FIRE PROTECTION

PRESENTED AT THE
53RD ANNUAL CAFAA CONFERENCE

FEBRUARY 8, 2024

Bob Sullivan
(NFPA)



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Construction Fire Protection

NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations

California Automatic Fire Alarm Association (CAFAA) – 2024 Conference

Date: 2/8/2024

Connecting prevention, protection and education for a safer world

National Fire Protection Association (NFPA)

Bob Sullivan – NFPA Southwest Regional Director



IT'S A BIG WORLD. LET'S PROTECT IT TOGETHER.®


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NFPA U.S. REGIONAL REGIONAL OPERATIONS 2023

Bob Sullivan

- NFPA Southwest Regional Director
- Southwest Region:
AZ, CA, CO, KS, MO,
NM, NV, UT, WY



Canada: King

Director: Boyd
Director: McCluskey

<https://www.nfpa.org/About-NFPA/Contact-Us>

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Contact Information

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Southwest Regional Director | NFPA
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National Fire Protection Association Who Are We?

- The National Fire Protection Association (NFPA) is a global self-funded nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. Based in Quincy, Mass.
- Consensus-based standards development organization
- About 300 employees & about 40,000 members

Our Mission

*To help save lives and reduce loss with information,
knowledge and passion*



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Construction Fire Background



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Why are buildings under construction vulnerable?

- Incomplete/inactive fire protection systems
- Incomplete passive fire protection, often combined with large quantities of exposed combustible construction materials
- Different fire load
- Construction activities – welding/hot work



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What could possibly go wrong?

Hazards

- ✓ Cutting
- ✓ Welding
- ✓ Roofing
- ✓ Cooking
- ✓ Others



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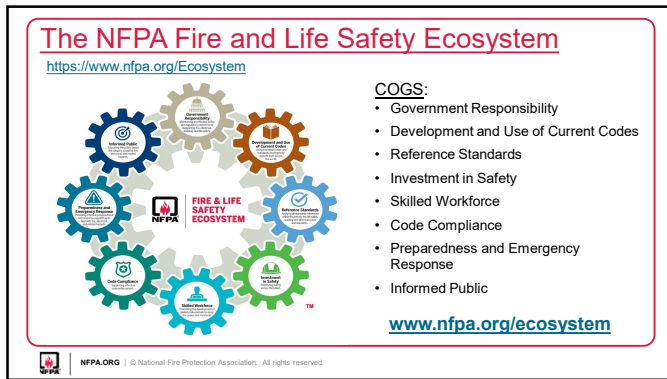
Construction Sites – Other Common Concerns

- Limited Fire Department Access
- Limited Water Supply for Firefighting
- Exposed Combustible Construction
- Large Quantities of Combustible Construction Materials
- Lack of Compartmentation
- Lack of Functioning Fire Protection Systems
- Limited Site Security / Fire Watch Personnel



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NFPA Report: Fires in Structures Under Construction (2023 Report)

Annual report available for free download on the NFPA website:

<https://www.nfpa.org/education-and-research/research/nfpa-research/fire-statistical-reports/fires-in-structures-under-construction>

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Fires in Structures Under Construction by Use

Table A. Fires in Structures Under Construction by Property Use:
2017–2021 Annual Averages

Property Use	Fires	Civilian Injuries	Direct Property Damage
Residential	76%	76%	79%
Mercantile or business	6%	5%	3%
Outside or special property	5%	4%	11%
Assembly	3%	5%	2%
Storage	3%	2%	1%
Health care, detention, correction	2%	7%	2%

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Examples of Construction Fires



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Apartment Building- Las Vegas, NV

- June 20, 2023.
- \$90M project 75% complete, only one structure saved (Clubhouse)
- Cause under investigation.
- Fire crews on site for days to maintain coverage at the site.



Photo Credit: Michael Bell



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SouthPark Apartment Building Fire - Charlotte, NC

- May 19, 2023, 5-alarm construction fire
- Two construction worker deaths, several rescues
- Firefighters called a "MAYDAY!" during rescue attempts
- Cause was accidental – an insulation foam sprayer caught fire on the ground floor

Investigative report videos:

➤ <https://www.wbtv.com/2023/07/06/charlotte-fire-not-monitoring-construction-site-fire-safety-plans/> (4 mins, 18 secs)

➤ <https://www.wbtv.com/2023/07/10/red-flags-south-park-building-site-didnt-halt-construction-before-fire/> (4 mins, 37 secs)



Photo Credit: Charlotte Fire Department

NFPA Blog:

<https://www.nfpa.org/news-blogs-and-articles/blogs/2023/09/19/deadly-nc-construction-fire>



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SouthPark Fire - Charlotte, NC (Follow-Up)

- WBTV in North Carolina did an in-depth review
- Produced this **detailed investigative report**:
<https://www.youtube.com/watch?v=p5aWv3DiR8c>
 WBTV Investigates: Fire and Failure
 (Length: 43 minutes, 41 seconds)
- This investigative report discussed:
 - PLAN For having a fire
 - Construction site & evacuation pre-planning
 - Code and permitting requirements
 - Site emergency communication
- Additional news reports on this incident available at WBTV website: <https://www.wbtv.com/news/southpark-fire/>



Photo Credit: Charlotte Fire Department



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Laboratory Building- Cambridge, MA

- February 5, 2005.
- Underground lab
- After hours, no injuries.
- Cause may have been faulty lightbulb.
- Fire caused \$1 million in damage.



Photo Credit: Harvard University



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Laboratory Building- Newark, DE

- August 9, 2017.
- Renovation work.
- Cause may have been Sawzall igniting material in the ventilation system.
- Fire traveled through ductwork to another floor.
- One firefighter injury reported.



Photo Credit: Josh Shannon



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Apartment Building- Buffalo, NY

- March 1, 2023.
- Firefighter LODD.
- Cause under investigation.
- Fire caused \$2.6 million in damage.



Photo Credit: WIVB News



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High-Rise Building- Hong Kong

- March 2, 2023.
- 42 story tower fire.
- 2 people injured
- Fire started near top and spread down the building.



Photo Credit: Tyrone Siu/Reuters



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Apartment Building- Upland, California

- December 1, 2021.
- 8 buildings destroyed.
- 25 people displaced.
- No official cause reported.



Photo Credit: Fox 11 News



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Apartment Building- Seattle, Washington

- April 9, 2021
- 2nd fire in less than a week
- Suspected arson
- Original fire caused \$3 million in damage
- This fire caused an additional \$4000 in damage

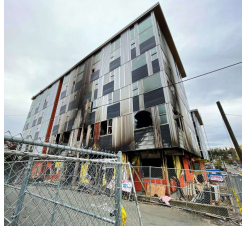


Photo Credit: Komo News



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Warehouse Fire- Brownsburg, IN

- March 18, 2022.
- Lack of hydrants.
- Cause may have been hotwork on roof.
- Fire contained to construction materials.



Photo Credit: Chris Anderson



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Historic Fire- Notre Dame Cathedral

- April 15, 2019.
- Approximately 850-year-old building.
- Sections of the cathedral were undergoing renovation.
- Multiple fire causes have been suggested.



Photo Credit: Bertrand Guay/Agence France-Presse — Getty Images



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The Numbers: Data on Construction Fires



2023 Annual Report
available for free download
on the NFPA website:

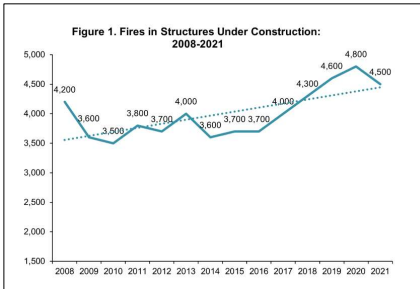
<https://www.nfpa.org/education-and-research/research/nfpa-research/fire-statistical-reports/fires-in-structures-under-construction>



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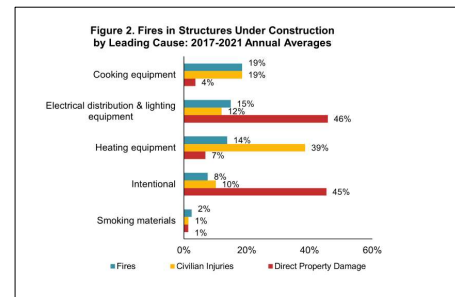
The Numbers: Data on Construction Fires



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Fires in Structures Under Construction by Cause



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Fires by Month and Time of Day

Figure 3. Fires in Structures Under Construction by Month: 2017-2021 Annual Averages

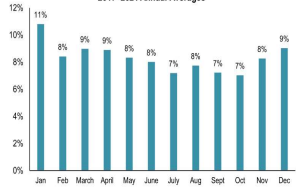
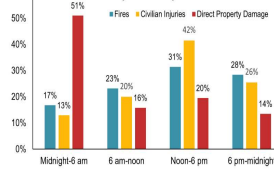


Figure 4. Fires in Structures Under Construction by Time of Day

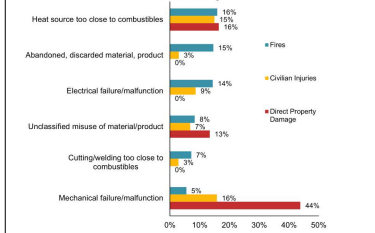


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Factors Contributing to Ignition

Figure 6. Fires in Structures Under Construction by Factors Contributing to Ignition: 2017-2021 Annual Averages



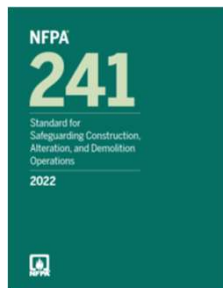
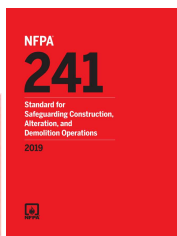
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NFPA 241: Through the Years

Recommended
Good Practice Requirements for
BUILDING CONSTRUCTION OPERATIONS

May
1933
Revised 1937



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National Fire Protection Association (NFPA)

- Over 350 Codes & Standards
- One or more Technical Committees for each Standard
- Committee members develop the standards
 - Balanced by interest categories
 - Built by consensus
 - Typically about 30 principal members, each with an alternate.



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NFPA Technical Committee Interest Categories

1. **Manufacturer (M):** A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.
2. **User (U):** A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.
3. **Installer/Maintainer (I/M):** A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.
4. **Labor (L):** A labor representative or employee concerned with safety in the workplace.
5. **Applied Research/Testing Laboratory (R/T):** A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.
6. **Enforcing Authority (E):** A representative of an agency or an organization that promulgates and/or enforces standards.
7. **Insurance (I):** A representative of an insurance company, broker, agent, bureau, or inspection agency.
8. **Consumer (C):** A person who is or represents the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in (2).
9. **Special Expert (SE):** A person not representing (1) through (8), and who has special expertise in the scope of the standard or portion thereof.
10. **Utility (UT):** This classification is used specifically for the National Electrical Code project.



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NFPA 241 Technical Committee

- Construction Companies
- Fire Departments
- Building Officials
- Engineering/Design Companies
- Insurance Companies
- Large Companies/End Users of New & Remodeled Bldgs
- Fire Protection System Companies



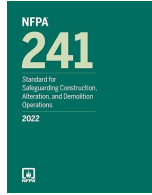
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NFPA 241 – Next Edition (2027 Edition)

Get involved in the code-revision process!

- www.nfpa.org/241
- Current edition is the 2022 Edition
- The next edition – 2027 Edition – is currently going through the code-revision process
- Draft 2027 Edition is open for Public Input, the Closing Date is: June 4, 2024
- First Draft Report for 2027 Edition will be posted on March 25, 2025
- First Draft Report will then be open for Public Comment, (for Second Draft) – Closing Date will be June 3, 2025



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NFPA 241 in the International Fire Code (IFC)

- NFPA 241 (2019 Edition) is one of the referenced NFPA standards in IFC Chapter 80
 - NFPA 241 has been a referenced NFPA standard in the IFC since the first publication of the IFC in 2000
 - IFC (2021) Chapter 33, Fire Safety During Construction & Demolition
 - IFC Section 3301.1, Scope – directly states a requirement for compliance with NFPA 241 for items not specifically addressed in the IFC
 - IFC Section 3303.2 (Site Safety Director) – states that if guard service is provided in accordance with NFPA 241, the Site Safety Director shall be responsible for the guard service



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NFPA 241 in the 2022 California Fire Code

- 2022 California Fire Code is based on the 2021 IFC
 - Chapter 33 – Fire Safety During Construction and Demolition
 - Chapter 33 Matrix Adoption Table indicates the SFM has adopted the entire chapter without any state amendments
 - References NFPA 241 (2019 Edition)
 - Section 3301.1, Scope – directly states a requirement for compliance with NFPA 241 (2019 Edition) for items not specifically addressed in the IFC
 - Section 3303.2 (Site Safety Director) – states that if guard service is provided in accordance with NFPA 241, the Site Safety Director shall be responsible for the guard service
 - Requirements for guard service are listed in NFPA 241, Section 7.2.5



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Pathway to NFPA 241 in the International Building Code (IBC)

- IBC (2021 Edition) Chapter 33, Safeguards During Construction
- IBC Section 3302.3 (Fire Safety During Construction), requires compliance with applicable provisions of IFC Chapter 33 for fire safety during construction
 - IFC Chapter 33 references NFPA 241



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Pathway to NFPA 241 in the International Building Code (IBC)

- IBC (2021 Edition) Chapter 33, Safeguards During Construction
- IBC Section 3302.3 (Fire Safety During Construction), requires compliance with applicable provisions of IFC Chapter 33 for fire safety during construction

Pathway to NFPA 241 in the 2022 California Building Code

- 2022 California Building Code is based on the 2021 IBC
- Chapter 33 – Safeguards During Construction
- Chapter 33 Matrix Adoption Table indicates the SFM has adopted the entire chapter without any state amendments
- Section 3302.3 (Fire Safety During Construction), requires compliance with applicable provisions of Chapter 33 of the California Fire Code
 - IFC Chapter 33 references NFPA 241



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2019 Edition of NFPA 241

Std. for Safeguarding Construction, Alteration, and Demolition Operations

- Chapter 1 – Administration
- Chapter 2 – Referenced Publications
- Chapter 3 – Definitions
- Chapter 4 – Temporary Construction, Equipment, And Storage
- Chapter 5 – Processes and Hazards
- Chapter 6 – Utilities
- Chapter 7 – Fire Protection
- Chapter 8 – Safeguarding Construction and Alteration Operations
- Chapter 9 – Safeguarding Roofing Operations
- Chapter 10 – Safeguarding Demolition Operations
- Chapter 11 – Safeguarding Underground Operations
- Chapter 12 – Safeguarding Construction Operations for Tall Timber Structures
- Annex A & B



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Reorganization – 2022 Edition of NFPA 241

> Chapter 1 – Administration	> Chapter 9 – Safeguarding Demolition Operations
> Chapter 2 – Referenced Publications	> Chapter 10 – Safeguarding Roofing Operations
> Chapter 3 – Definitions	> Chapter 11 – Safeguarding Underground Operations
> Chapter 4 – General Requirements (Chapter 4 now includes Fire Protection in the 2022 Edition)	> Chapter 12 – Safeguarding Construction Operations for Tall Mass Timber Wood Structures
> Chapter 5 – Temporary Construction, Equipment, and Storage	> Chapter 13 – Safeguarding Construction Operations for Large Wood Frame Structures (Chapter 13 is a New Chapter in the 2022 Edition)
> Chapter 6 – Utilities	> Annex A – Explanatory Material
> Chapter 7 – Processes and Hazards	> Annex B – Informational References
> Chapter 8 – Safeguarding Construction and Alteration Operations	



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NFPA 241: Fire Prevention Program Manager (Partial List) – Chapter 4 in 2022 Edition

- Owner must designate
- Authority to enforce the fire prevention program
- Must have knowledge of standards
- Responsible for guard service
- Responsible for training on protection equipment
- Must conduct daily inspections
- Ensures presence/adequacy of devices
- Authorizes impairments
- Responsible for the development of pre-incident plan



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NFPA 241 (2019): Fire Prevention Program

Section 7.1.1

An overall project-specific Fire Prevention Program shall be developed.



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NFPA 241: Fire Prevention Program Section 4.2 in 2022 Edition

- Pre incident plan
- Emergency contacts
- Site emergency communication procedures
- Site personnel
- Signage
- Hot work operations
- Fire protection systems
- Emergency incident location



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NFPA 241: Fire Prevention Program (continued)

- Good housekeeping
- Waste disposal
- Security
- Special hazards
- Protection of existing structures
- Documentation
- Life safety plan
- Temporary utilities



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NFPA 241: Fire Prevention Program

The Fire Prevention Program can also include other items:

New in the 2022 Edition – Section 4.3.2.2:

Measures used to place permanent fire protection systems temporarily in service during construction shall be as follows:

- (1) In conformance with the Fire Prevention Program
- (2) Evaluated based on the type and status of the system
- (3) Evaluated based on the conditions of the building construction



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NFPA 241: Enforcement

The AHJ has a critical role in ensuring safety on a construction site.

New Section in the 2022 Edition

1.6 Enforcement.

1.6.1

This standard shall be administered and enforced by the authority having jurisdiction (AHJ) designated by the governing authority.

1.6.2

The AHJ shall determine whether the provisions of this standard have been met.

1.6.3

The AHJ shall be permitted to accept partial requirements of this standard.



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NFPA 241: Enforcement Example

- City of Boston, MA recently implemented an affidavit program
 - Requires new construction submittals to name FPPM on new construction sites
 - Requires indicating compliance with requirement to develop a Fire Prevention Program

Program Information:

<https://www.boston.gov/departments/fire-prevention/fire-forms-permits-applications-and-fees#construction-related>

Affidavit Form:

https://www.boston.gov/sites/default/files/file/2023/01/NFPA%20241%20Affidavit_1.pdf



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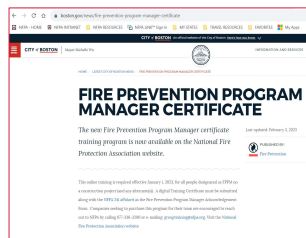
NFPA 241: Enforcement Example (continued)

City of Boston, MA

- Effective January 1, 2023, as part of the affidavit program, anyone designated as a FPPM on a construction project must submit a digital training certificate for the FPPM, indicating completion of the online NFPA FPPM Training

City of Boston website:

<https://www.boston.gov/news/fire-prevention-program-manager-certificate>



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NFPA 241: A Brief Overview via NFPA LiNK®

- Review of NFPA 241 (2019 Edition) Requirements
- Review of NFPA 241 (2022 Edition) Requirements



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NFPA LiNK®

- www.nfpa.org/LiNK
- Subscription-based digital application that delivers NFPA codes & standards, expert commentary and supporting content.
- Allows you to easily navigate and understand code requirements based on real-life situations, on the electronic device that you are using at the time a question comes up.
- Allows you to select specific content, bookmark topics, add notes, and share information.
- 14-day free trial available.



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NFPA® Resources: Fire Safety on Construction Sites

Resources available: <https://www.nfpa.org/Education-and-Research/Building-and-Life-Safety/Construction-Safety?i=65>

Training Programs:

- Fire Prevention Program Manager Online Training Series: <https://www.nfpa.org/product/fppm-series-21-ol/ols066?i=73#related-products>
- Construction Site Fire Safety Fundamentals Training: <https://www.nfpa.org/for-professionals/training-for-me/building-and-life-safety-training/construction-site-fire-safety-fundamentals-online-training>
- Hot Work Safety Certificate Online Training (Based on NFPA 51B): <https://www.nfpa.org/for-professionals/training-for-me/industrial-hazards-training/hot-work-safety-certificate-online-training>
- NFPA 241, *Safeguarding Construction, Alteration, and Demolition Operations* Online Training Series (2019 Edition): <https://www.nfpa.org/product/idp0241ol>
- NFPA 70E®, *Standard for Electrical Safety in the Workplace*: <https://www.nfpa.org/for-professionals/training-for-me/electrical-training/nfpa-70e-online-training-series-and-live-virtual-training>

For team training, or to secure digital team access to codes and standards:

Contact an NFPA representative by visiting [nfpa.org/BusinessSolutions](https://www.nfpa.org/BusinessSolutions) or scan:



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Thank You!

Questions?

www.NFPA.org/241



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CONSTRUCTION FIRE PROTECTION

Thank You



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