

Fire Prevention

In Large Scale Wood Frame Multifamily Construction



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Former Deputy Fire Chief
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Montgomery County MD

FIRE PREVENTION



Introduction to Fire, and Causes



Statistics / Recent Incidents

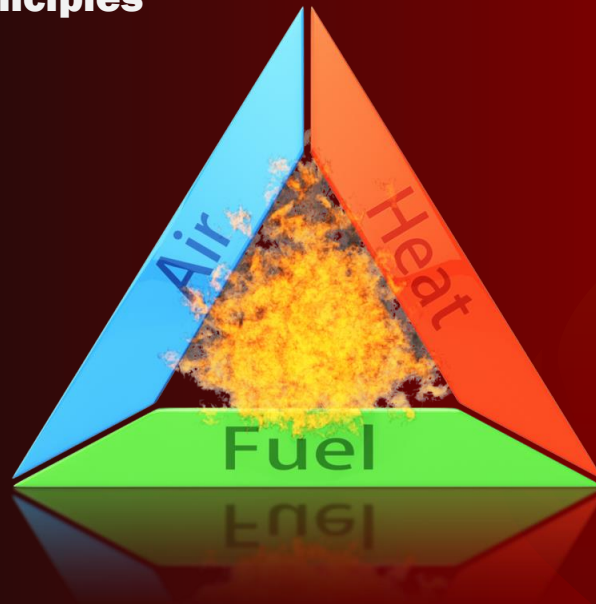


Preventative Measures

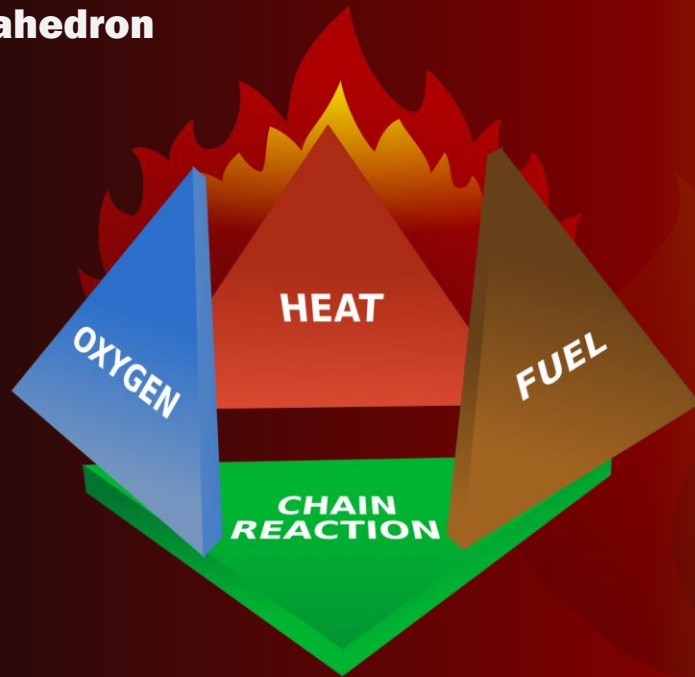


Open Discussion

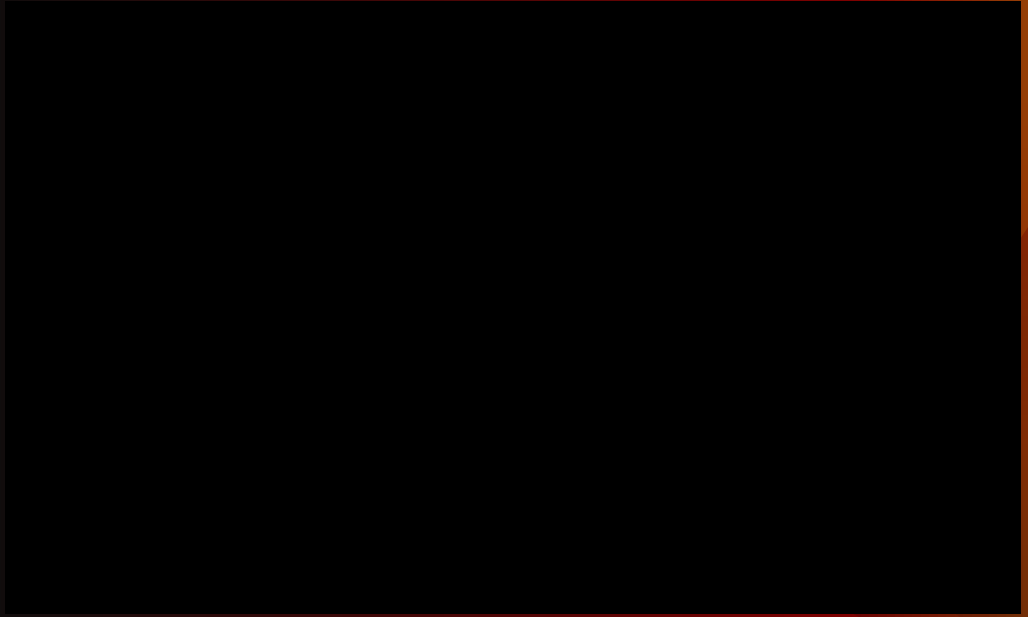
Basic Principles



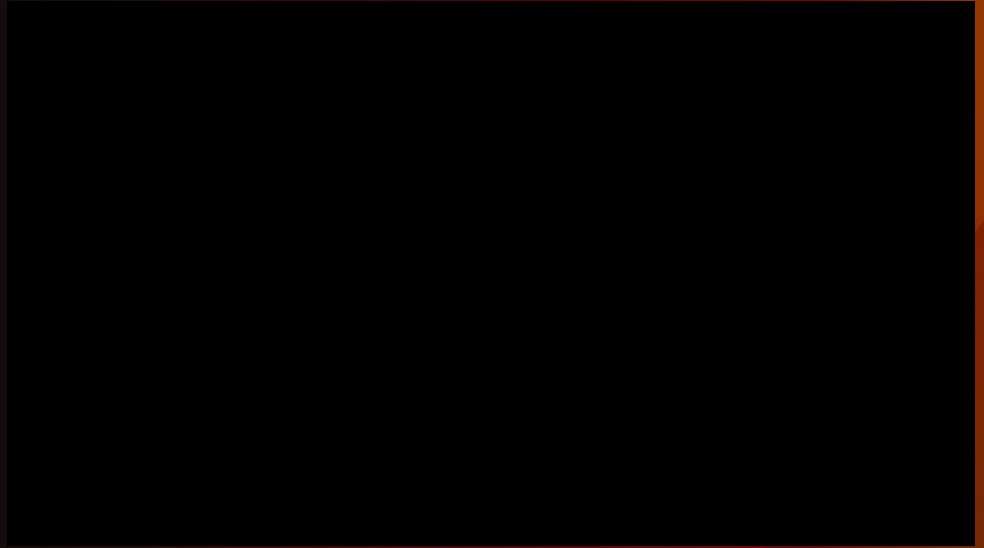
Fire Tetrahedron



Basic Fire Principles

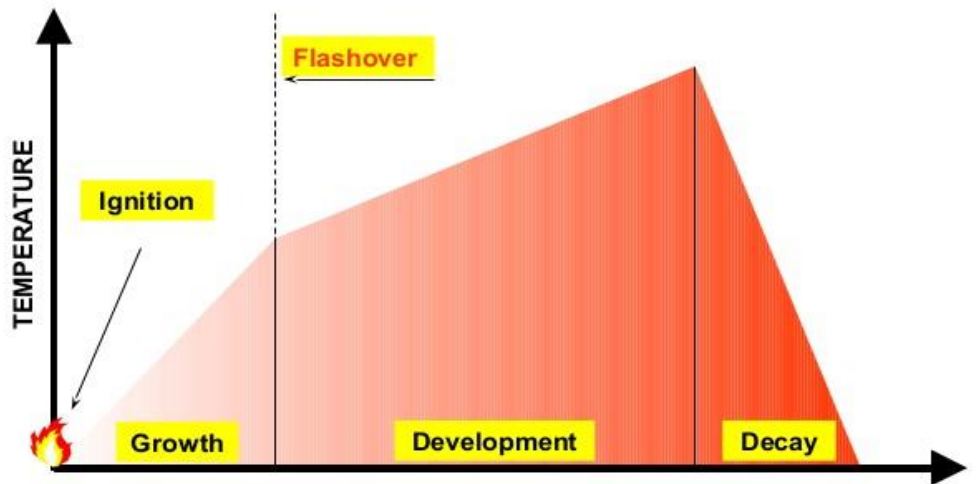


Chemical Chain Reaction (Alternate Reaction)



Fire Timeline

Timeline of a Fire








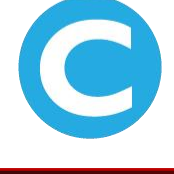

Fire Theory

The more finely
divided any material
is, the more readily it
burns.


Fire Theory

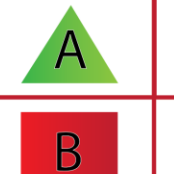

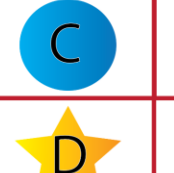


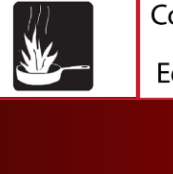


Fire Classes

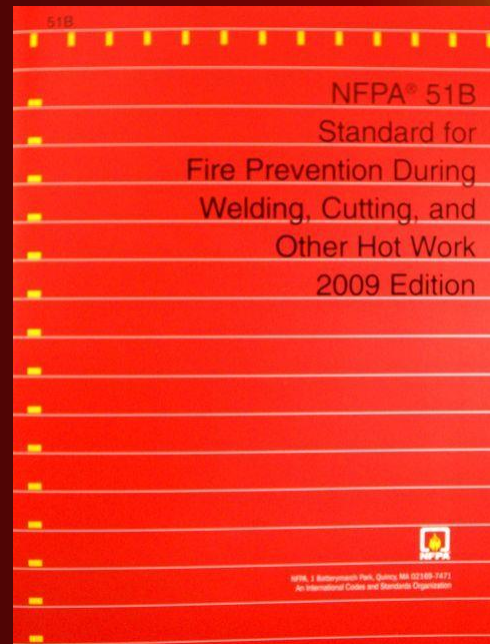
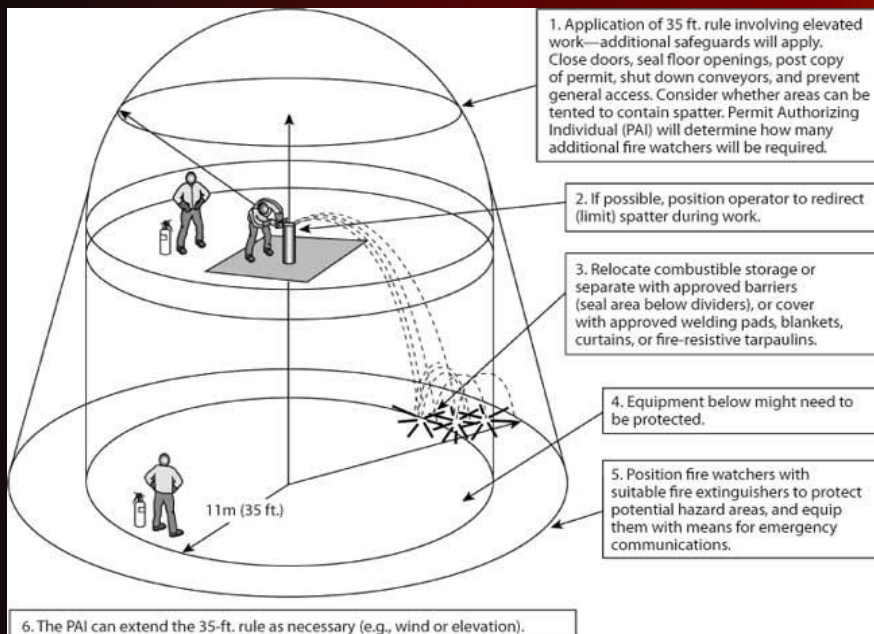


	Paper, Wood, Plastics, Fabric, Rubber, Trash	
	Gasoline, Oil, Grease, Some Paints and Solvents	
	Energized Electrical Equipment, Appliances, Computers, Circuit Breakers, Wiring	

Fire Classes



		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
		Flammable Liquids	Grease, Oil, Paint, Solvents
		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
		Combustible Metal	Magnesium, Aluminum, Etc.
		Commercial Cooking Equipment	Cooking Oils, Animal Fats, Vegetable Oils

NFPA 51B**NFPA 51B**

IBC International Building Code



29 CFR 1926 Subpart F



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IBC Building Types

IBC Building Types

TYPE I & II

The main elements or systems of construction are labeled “noncombustible: meet the test criteria prescribed in the ASTM Standard E 136.” Examples of these materials would be masonry, concrete and steel. Combustible materials within the systems of the building are permitted under section 603 of the IBC, such as thermal insulation or interior floor finishes.

TYPE I Construction



IBC Building Types

TYPE I & II

To simplify, primary subtype differences are for structural frame and bearing wall fire ratings: Hourly Fire-Resistance Ratings

- I-A: 3 hours
- I-B: 2 hours
- II-A: 1 hour
- II-B: no hourly rating required

IBC Building Types

TYPE III

A combination of systems usually comprised of “exterior walls of noncombustible materials and the interior building elements are of any material permitted by the IBC.” Fire-retardant-treated wood is acceptable in exterior walls that comply with section 2303.2 of the IBC with at least a 2-hour fire rating. Subtypes with varying degrees of hourly fire ratings are listed in Table 601 of the IBC.

TYPE III





IBC Building Types

TYPE IV

Known as heavy timber or mill construction “in which the exterior walls are of noncombustible materials.” Interior building elements utilize wood structural members and heavy wood decking. Building elements do not contain “concealed” spaces and contain systems that prevent a fire from the exterior into unprotected openings.



IBC Building Types

TYPE V

The least restrictive construction type permits exterior and interior walls to be comprised of any materials permitted by the IBC. A typical example of this building type is a wood-framed single family residence.



IBC Building Types

TYPE V

Type V-A: “Protected construction,” all major building elements must have at least a 1-hour fire-resistance rating. Exception: non-load bearing interior walls and partitions have no rating.

Type V-B: No fire-resistance ratings are required except for exterior “fire separation distance” listed in Table 602 of the IBC.

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PODIUM STRUCTURES

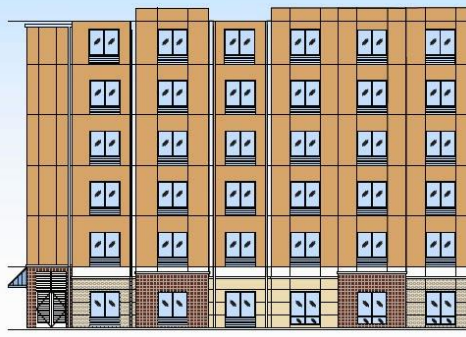


TYPE V



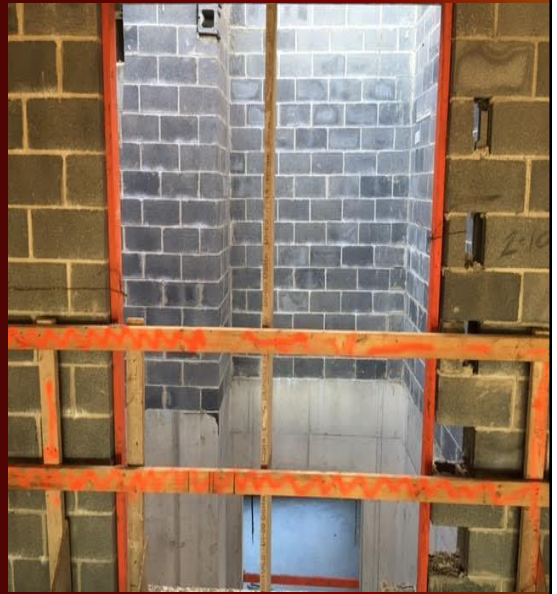
Podium Construction

Five-Story Wood-Frame
Structure over Podium Slab



- Combination of Building Types
- Commercial and Residential
- Type I and Type III
- Type I and Type V
- Sprinkler Systems
- Fire Protection with Rated Fire Walls
- Stairs and Elevators with Concrete or CMU Walls.
- Increasing Demand by Developers and Owners

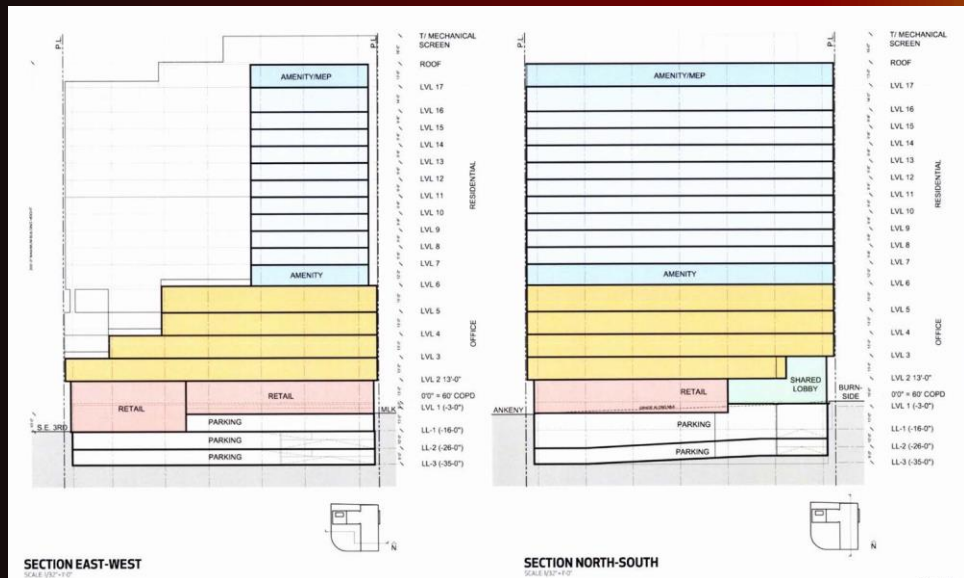
Podium Construction



Podium Construction



Podium Construction



Podium Construction

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Podium Construction



Podium Construction

FIRE PROTECTION CONTROLS MUST BE MAINTAINED

- Monitor Fire Load
- Trash Control, Sawdust etc.
- Fire Watch 1 Hr. After all Hot Work
- No Cooking in Building
- Proper Storage of Flammable Fuels
- Control of Sub-Contractors

Podium Construction

SUBCONTRACTOR POPULATION

- Homebuilders
- Non-Commercial
- Training, Education and Language Barriers
- Subcontractors miss leading training credentials
- Subcontractor control
- Subcontractor Safety and Fire Prevention Management
- Prompt corrective action when hazards are found

Podium Construction



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RECENT INCIDENTS

Recent Construction Fires

Maplewood New Jersey



Recent Construction Fires

Maplewood NJ

- 235 Unit Apartment Building
- Structure almost Completed
- 6 Alarm Fire
- Temporary Heating Caused Fire



Recent Construction Fires

Raleigh North Carolina



Recent Construction Fires

Raleigh North Carolina

- 51 Million Dollar Project
- 40% Complete
- 270,000 Square Feet
- 1-2 Bedroom Apartments
- Rooftop Deck
- Golf Simulator



Recent Construction Fires

Raleigh North Carolina

- Fire Started on 2nd Floor
- Complete Tower Crane Collapse
- Gusting Winds
- 5 Alarm Fire
- Damage to Surrounding Structures
- Damage to Local Telecom



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Recent Construction Fires

Overland Park, Kansas



Recent Construction Fires

Overland Park, Kansas

- 450 Mil. Dollar Development
- 22 Homes Damaged
- 8 Alarm Fire
- Caused By Welding Ops



Recent Construction Fires

College Park, MD



Fire Prevention

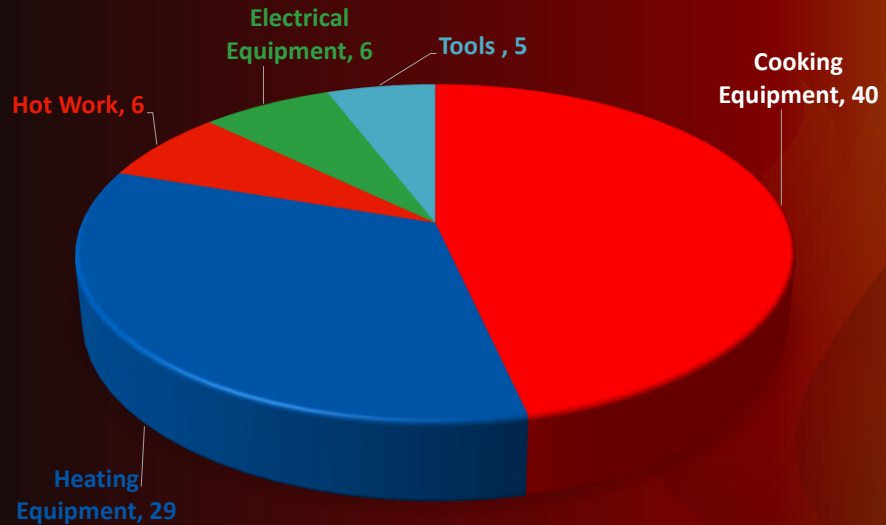
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CAUSES & PREVENTION

Fire Statistics

FIRE CAUSES IN CONSTRUCTION



The slide has a dark red background with a vertical strip of flames on the left side. The title "Fire Causes" is in orange and white text.

Fire Causes

- Cooking on Site
- Electrical
- Temporary Heating
- Chemical Storage
- Hot Work
- Smoking Material
- Arson (Malicious Fire Setting)

The slide has a dark red background with a vertical strip of flames on the left side. The title "Preventative Measures" is in orange and white text.

Preventative Measures

- Fire Protection Plan (Written)
- Employee and Subcontractor Training
- Electrical Hazards
- Cords off Ground
- Chemical Storage
- Eliminate Hot work as Much as Possible
- Hot Work Permits
- No Smoking or Vaping

Preventative Measures

- No Refueling of Engines in Proximity
- PAT monitoring
- No Gas Power Generators in the Structure
- Remove Ability to Cook on Site

Best Practices



Best Practices



- Minimum 10lb ABC extinguishers
- Mounted and visible
- Inspected continually
- Placed at every exit, and stairs
- At the source of all hot work with each worker conducting hot work
- Never rely on the 10 foot rule
- If your performing elevated work needs to be on the lift, and not a 5lb. extinguisher or less

Best Practices

- Cords and Tools Inspection
- Properly Rated
- Properly Listed
- Properly Used and Maintained
- No Modifications to Ends and Tools



Best Practices

- All Workers Trained In
 - Fire Prevention
 - Fire Protection
- Hold Regular Standowns
- Proper Orientation



Best Practices

- On use Fire Safety Fuel Cans
- Inspect For Damage
- Missing Flash Protecting Screens
- Keep 35' from the structure
- No Hot Refueling



Best Practices

- Everything Off The Ground
- Install Cord Corridors
- Decreases Susceptibility of Damage



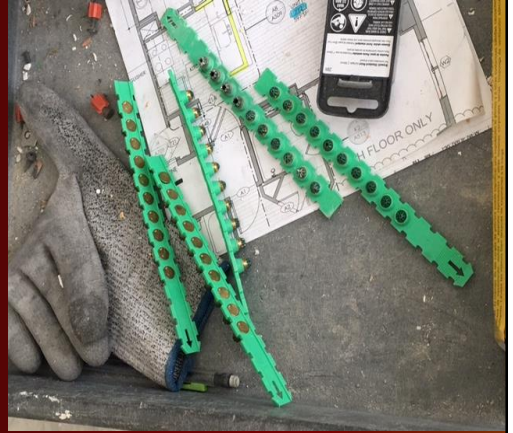
Best Practices

- No Gas Powered Units Inside
 - Liquid Fuel
 - Gas Fuel



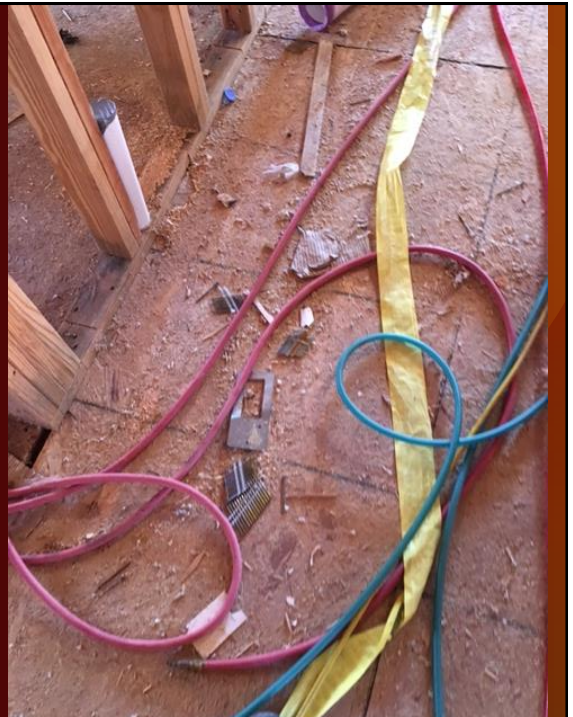
Best Practices

- PAT Training
- Disposal of Rounds
- Storage of Rounds
- Housekeeping



Best Practices

- Housekeeping
- Housekeeping
- Housekeeping
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Conclusion



We are going to see increased scrutiny of large scale stick build construction.

It is a safe structure, but the hazards of construction are easy to control.

Fire load must be monitored, and proper protective measures and controls implemented.