



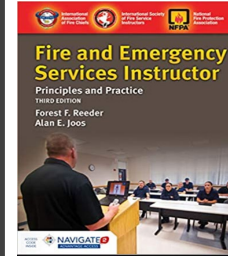
# A Better 360

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***Structure Fire Size-up  
Skills for the ISO***







## Forest Reeder, MPSA

*Fire Chief (ret.)*

*Tinley Park IL Fire Department*

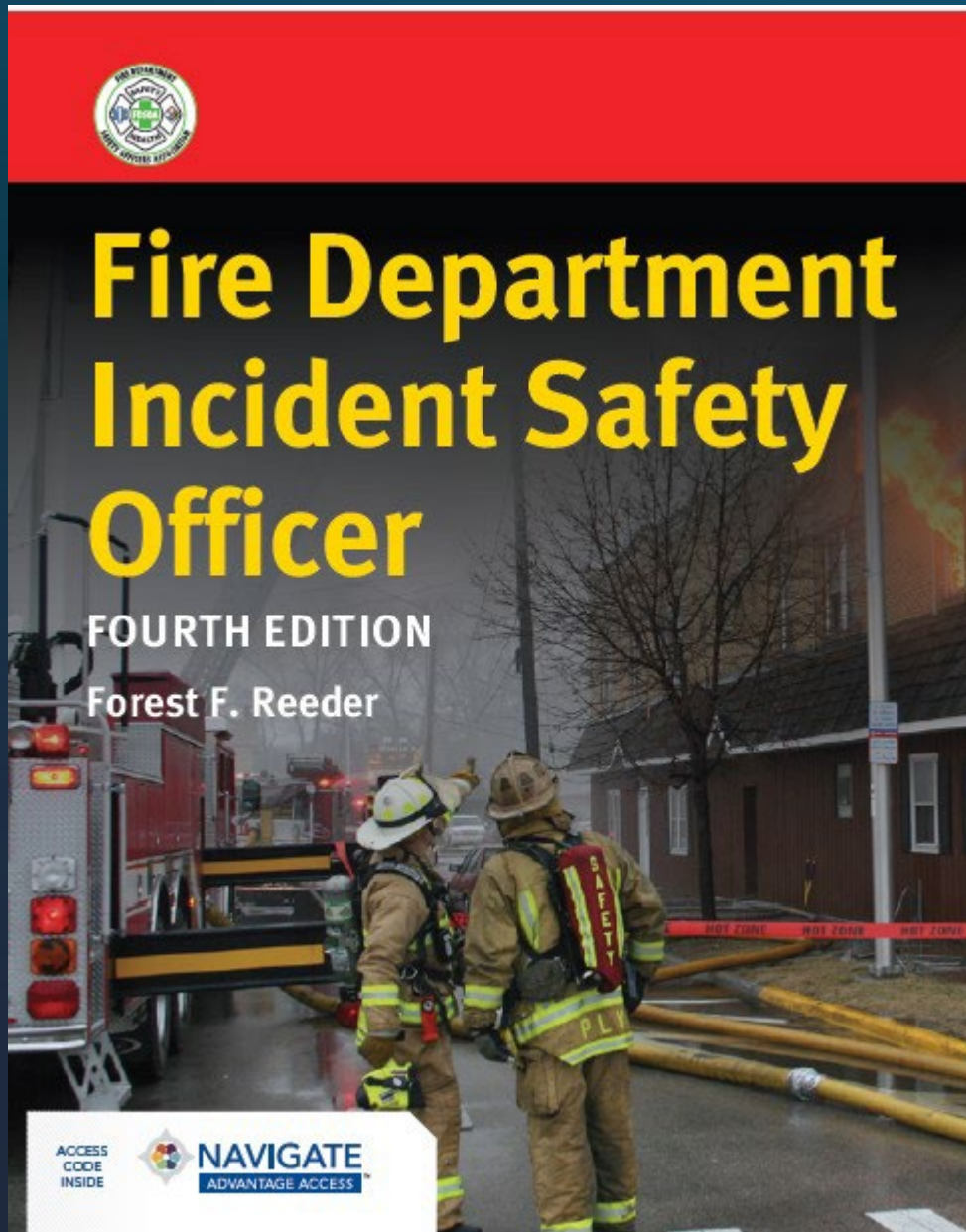
*47 Years of Service*



**Fire Engineering®**

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For more  
information, review  
Chapters 9 & 10

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NFPA 1550 Ch. 5  
NFPA 1700





**Be  
The  
Difference**



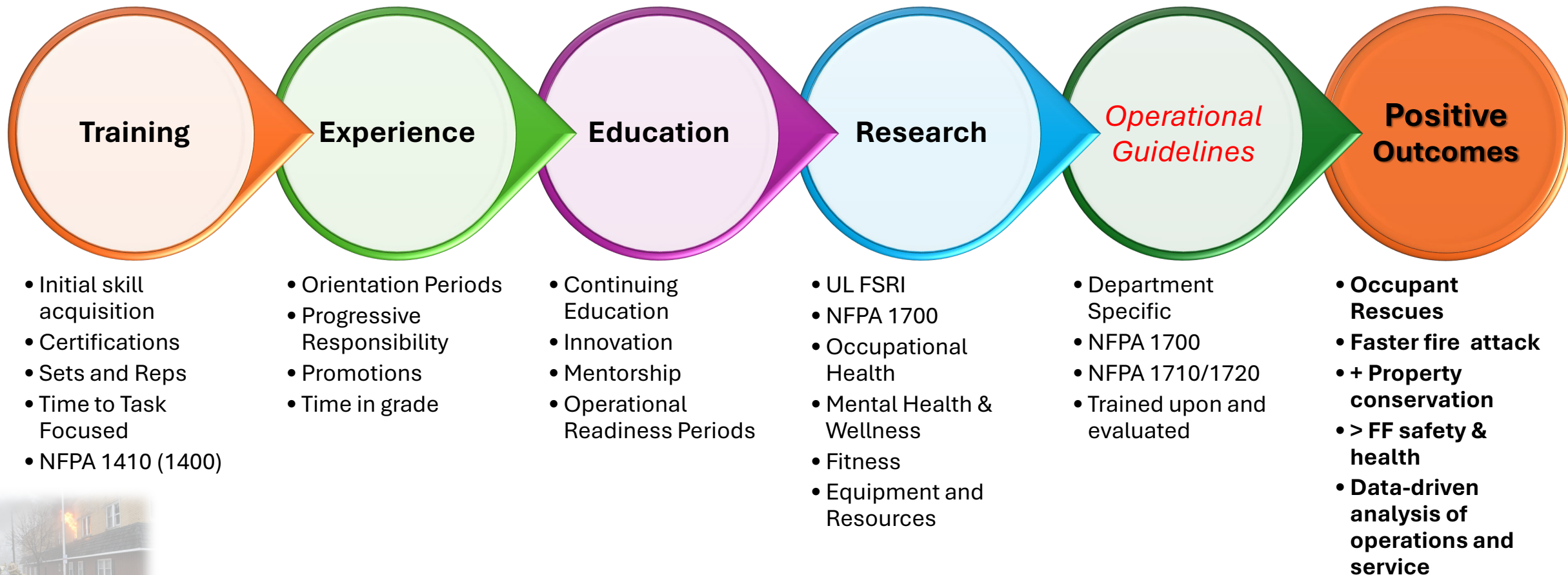


# Workshop Overview

- A 360-degree size-up of a structure fire scene reveals critical information and decision-making factors that enable the ISO to do their job.
  - New core skill information on fire dynamics, building stability assessment and tactical actions will be discussed in an interactive and evidence-based presentation.
  - Draft your own ISO On-The-Scene cue cards that can be used to apply new skills.
  - Learn to use a basic survival scan, hot zone and task assessment models for the most common fire incident responses.



# Safety Triad > Relationships and Outcomes







# ISO Priorities

Immediate

Potential

In “Staging”



# Action Models

## Checklists

## Cue Cards



# ISO

## Operational Checklist



| Action Plan   |   | OFFENSIVE                              | DEFENSIVE                            | Elapsed Time |
|---|---|--|--------------------------------------|--------------|
| Primary Functions   | Report to IC                                | Complete                               | Evaluate & remove imminent hazards   | 5            |
|   | IAP Review                                  | 360 size-up                            | Advise IC of potential hazards       | 10           |
|   |   |  | Evaluate assignments & effectiveness | 15           |
| Significant Incident Events   | Water on Fire                               | Rescue(s)                              | Fire Behavior Event(s)               | 20           |
|   | Master Streams<br><i>How Long Operating</i> | Primary<br>Secondary                   | Ventilation<br>Collapse Zones        | 25           |
| Construction Information  |   |  |                                      | 30           |
| Dimensions:   |   |  |                                      | 35           |
| Stories: Basement: Y / N  |   |  |                                      | 40           |
| Lightweight / Truss   | Wood Frame                                  | Ordinary                               |                                      | 45           |
| Noncombustible  | Fire Resistant                              | Installed Systems                      |                                      | 50           |
| Collapse Potential Evaluation   |   |  |                                      | 60           |
| Likely  | Questionable                                | Unlikely                               |                                      |              |
| EVALUATE THE POSITIONS OF COLLAPSE DANGER ZONE (HEIGHT + 1/2)               |   |  |                                      |              |
| <input type="checkbox"/> Bldg Condition                                     | <input type="checkbox"/> Excessive loads    | <input type="checkbox"/> Water applied |                                      |              |
| Set Entry Restriction Markings  |   |  |                                      |              |
| Utilities   |   |  |                                      |              |
| Gas   | Electric PV ESS                             | Water                                  |                                      |              |
| Incident Termination Activities<br><i>Debrief with IC &amp; SSO</i>         |   |  |                                      |              |
| Air Monitoring<br>4 Gas, Particulate,<br>Other<br>Issue all clear from SCBA | RIT Demobilized<br>All companies advised    | Cause & Origin<br>Team Safety          |                                      |              |
| PAR   | REHAB                                       | DECON                                  |                                      |              |
| Operations Evaluation   |   |  |                                      |              |
| Hostile Fire Event Potential  |   |  |                                      |              |
| Traffic control   |   |  |                                      |              |
| Smoke evaluation (color, velocity)  |   |  |                                      |              |
| % of building involved in fire  |   |  |                                      |              |
| Estimate of required water flow   |   |  |                                      |              |
| Ladders to upper floors for escape  |   |  |                                      |              |
| Exposures protected   |   |  |                                      |              |
| Tactical assignments effective  |   |  |                                      |              |
| Overall PPE use   |   |  |                                      |              |
| Slip/fall hazards   |   |  |                                      |              |
| Communications within span of control                                       |   |  |                                      |              |
| Accountability system usage   |   |  |                                      |              |
| Environmental conditions  |   |  |                                      |              |
| REHAB & EMS on standby (Location)   |   |  |                                      |              |
| Operational benchmarks completed  |   |  |                                      |              |

MAYDAY  
WATCH-  
OUTS

RIT

REAR of  
BLDG

ON-  
DECK

TASK  
LOAD

COMMS

HAZARD MEDIC: MONITOR EVALUATE DEVELOP INTERVENE COMMUNICATE





# The ISO at a Structure Fire

## At Every Incident – The ISO at Work

- Accountability for hot zone crews
- Communicate immediate concerns to the IC
- Identify your PALS
- Evaluate fire dynamics
- Assess structural integrity

## Immediate Priorities



# The Balance Point

ISO Trap

Tactical  
Decisions

VS

ISO

Responsibility



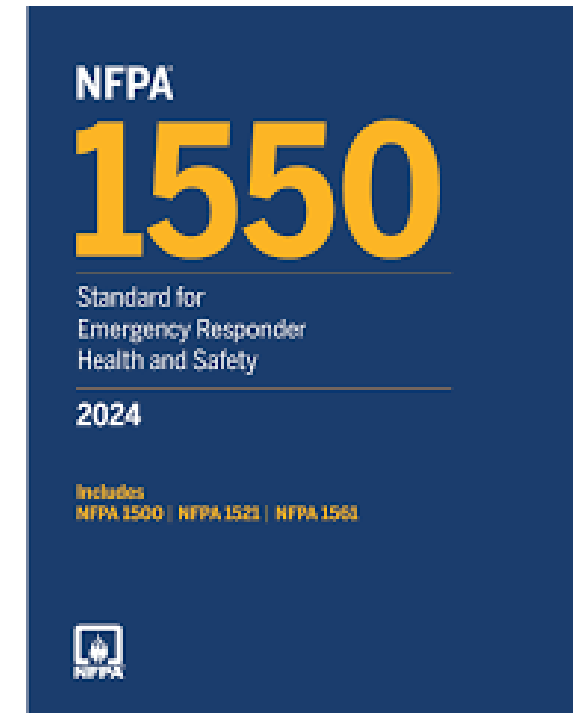
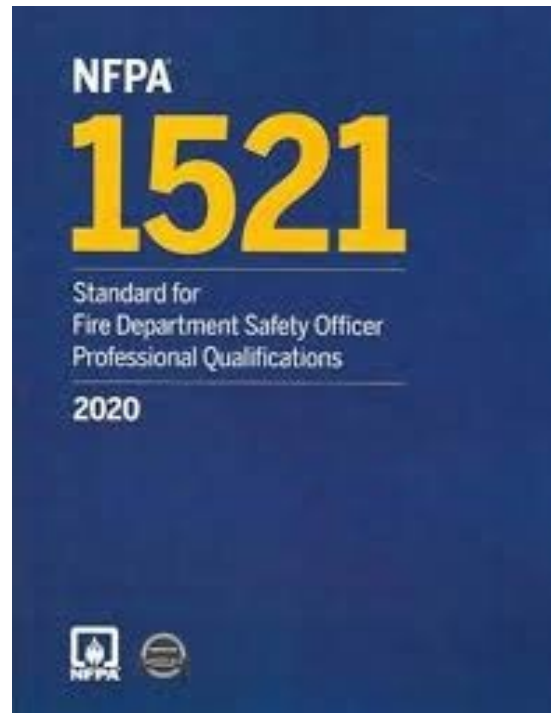


# Identify the Most Significant Factor(s)





# The Standard







# Key Modernizations

- **Technology Integration:**
  - Recognizes the role of technology, such as drones, AI, and thermal imaging
- **Documentation and Communication:**
  - Prioritizes real-time communication and thorough documentation, reflecting advances in incident management practices.
- **Proactive Safety Measures:**
  - While 2017 was more reactive, the 2024 version introduces proactive strategies, such as pre-incident planning and enhanced training requirements for ISOs.
- **Alignment with NFPA 1700:**
  - Chapter 5 of NFPA 1550 aligns ISO duties with modern firefighting tactics, ensuring consistency with fire dynamics principles.





# What's New – ISO Duties

## NFPA 1521 (2017)

- Defined the ISO's role broadly as ensuring safety through hazard identification, risk assessment, and operational oversight.
- Included responsibilities for advising the Incident Commander (IC) and ensuring compliance with established safety practices.

## NFPA 1550 (2024 – Ch. 5)

- Expands ISO duties to include:
  - Proactive engagement in pre-incident planning and resource allocation.
  - Enhanced ***oversight of personal protective equipment (PPE) usage and performance during incidents.***
  - A more prominent role in integrating post-incident debriefings and critiques to address safety lessons learned.
- Places greater emphasis on interagency communication, particularly for large-scale or multi-agency incidents.





# What Right Looks Like





# What's New – Size-up

## NFPA 1521 (2017)

- Focused on the ISO's role in monitoring and evaluating ongoing size-up.
- Required the ISO to continuously assess the incident's conditions, hazards, and risks.
- Emphasized the importance of dynamic risk assessment as the incident evolves.

## NFPA 1550 (2024 – Ch. 5)

- Expanded size-up responsibilities to include more structured hazard assessments using risk management frameworks.
- Encourages integration with predictive modeling tools and situational awareness technologies where available.
- Adds explicit language about ensuring ***accountability for personnel as part of size-up.***





# What Right Looks Like





# What's New – Recon

## NFPA 1521 (2017)

- Reconnaissance was addressed as part of the ISO's role in identifying hazards and risks through direct observation.
- ISO was tasked with physically evaluating the incident scene to identify unsafe acts and conditions.

## NFPA 1550 (2024 - Ch. 5)

- Introduces enhanced requirements for ***reconnaissance, specifying the use of thermal imaging and other assessment technologies.***
- Mandates that reconnaissance efforts be documented and communicated in real-time to command staff.
- Aligns with modern practices such as ***drone-based reconnaissance*** and remote sensing for complex incidents.





# What Right Looks Like







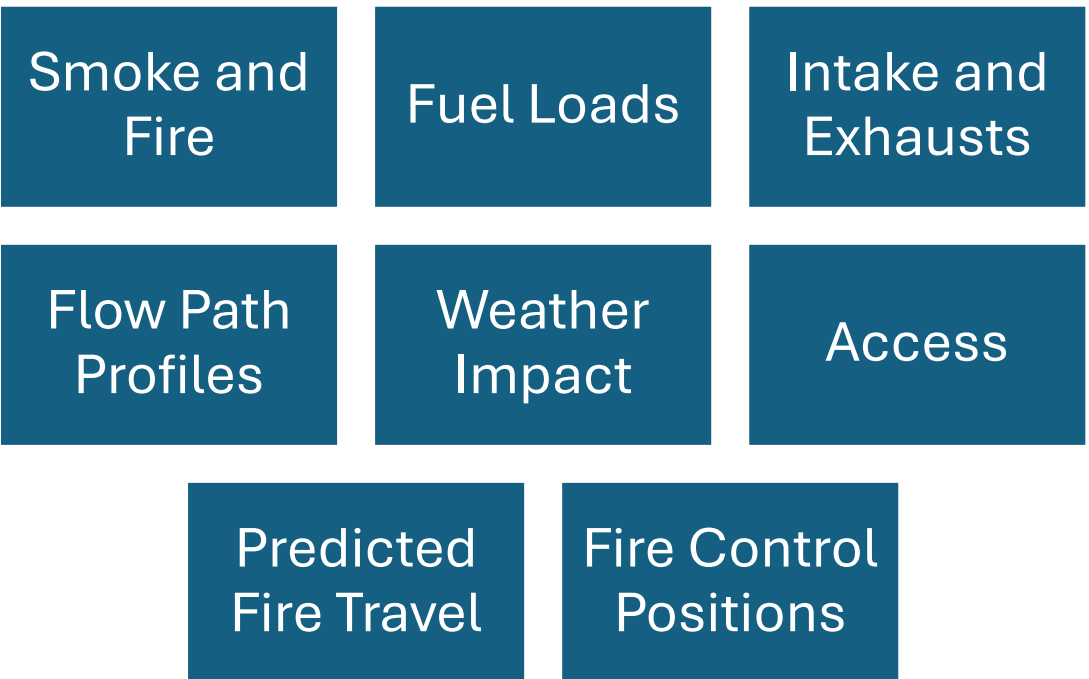


# A Better 360

## Must Do's

- Eyes on the Rear
- Identify any Challenges
- Identify any Changes
- Building Profile
  - Stories
  - Basement | Type of Basement
- Utilities
- Occupant Status Cues

## Fire Dynamics





# Key Size-Up Components

## Pre-Arrival



**Information  
Gathering**



**Risk  
Awareness**



**Risk  
Thresholds**

## Knowledge Check



# Tools – Cue Cards & Action Models



PALS



TAP



MEDIC



REHAB



CAN



LIP





# Initial Size-up – A Quick Look



**Survival Scan**



**PALS**



**TAP**





# Survival Scan – Our Recon

## Hot Zone

- On Top
- Under
- Inside
- Next To

## Entry

- Level of Fire
- Below
- Above

## Depth

- How Deep
- Close to exit
- 150' Rule

## Cooling

- Happening
- Improving
- < Turbulent

## Exhaust

- Turbulence
- Working into it
- VVDCS

## EDITH

- 2 ways out of every area







# PALS – Who We’re Watching Over

## People



- ☐ Who is Assigned
- ☐ Crew Integrity
- ☐ Work Matches IAP
- ☐ Resource Depth

## Air



- ☐ How Long on Air
- ☐ Current Air Supply
- ☐ Point of No Return

## Location



- ☐ Area of Building
- ☐ Stability of Location
- ☐ Structural Stability

## Surroundings



- ☐ Structural Stability
- ☐ Fire Dynamics
- ☐ Unknowns



# TAP – Are We Winning?

## Time

- Working Time
- On Air
- Without Relief
- Support
- Time-Out?
- Impact on Structural Stability

## Actions

- What's Done
- What's Not Done
- What's Not Assigned
- Match the IAP and Risk Profile
- Back-up in Place

## Progress

- Positive
- Negative
- Adjustments to the IAP
- Tactical Benchmarks Complete







# Strategic Decision Making – Working in the ICS

Strategy  
Confirmed

360  
Complete

Positive  
Water Supply

Water on Fire

Air Control  
Measures

Searches All  
Clear

Control  
Zones in  
Place

Under  
Control



# Building Stability – Characteristics and Vulnerabilities



## Type V: Wood-Frame Construction

### Common Occupancies

- Single-family homes
- Two-family residences
- Multi-family dwellings
- Business
- Assisted living facilities

### Characteristics

- Majority is residential construction
- (could be more to come)

### Vulnerabilities

- No enforceable fire code in private residences
- Vacant/abandoned structures, unmaintained, prone to vandalism
- Fire growth can be rapid over non-rated contents
- Collapse zones
- Highest frequency of accidental fires within this construction type (cooking, smoking, etc.), which can lead to increased firefighter injuries
- When present, fire sprinkler systems for residential occupancies might not provide coverage in concealed combustible spaces, such as attics.

### Firefighter LODD Report Reference

F2006-26 Date Released July 20, 2007 Career Engineer Dies and Fire Fighter Injured After Falling Through Floor While Conducting a Primary Search at a Residential Structure Fire – Wisconsin



## Type III: Ordinary Construction

### Common Occupancies

- Residential
- Mercantile
- Mixed Use
- Strip malls

### Characteristics

- Noncombustible exterior
- Noncombustible structural components
- Most have a masonry exterior enclosing a wood frame

### Vulnerabilities

- Open floor plans, achieved by utilizing lightweight truss construction
- Limited, unknown, or inconsistent building fire protection and life safety features
- Ventilation issues (heat, smoke control)
- Collapse zone consideration
- Fire spread to adjacent separated spaces within the building envelop through penetrations, unprotected openings, interstitial spaces, and so forth.
- When present, fire sprinkler systems for residential occupancies might not provide coverage in concealed combustible spaces, such as attics.

### Firefighter LODD Report Reference

F2010-38 Date Released Dec 22, 2010 Two Career Fire Fighters Die and 19 Injured in Roof Collapse during Rubbish Fire at an Abandoned Commercial Structure – Illinois







A.



B.

**TABLE 6-4 Collapse Indicators**

| Indicators of Collapse          | Observations by the ISO   |
|---------------------------------|---|
| Visual                          | <ul style="list-style-type: none"> <li>Cracks in walls, especially those that develop or grow during a fire</li> <li>Leaning walls</li> <li>Pitched or sagging floors</li> <li>"Racked" doorways (door stuck in a shifted frame)</li> <li>Presence of stabilization features: cables and exterior spreaders (ornamental stars, plates), tie-rods, buttresses</li> </ul> |
| Audible and Physical            | <ul style="list-style-type: none"> <li>Moaning/groaning sounds</li> <li>Cracking noises</li> <li>Any type of movement</li> <li>Movement or shifting of water on the floor</li> <li>Smoke pushing through cracks in the wall</li> <li>Vibrations</li> <li>Lack of water runoff from firefighting operations</li> </ul>   |
| Environmental                   | <ul style="list-style-type: none"> <li>Heavy snow or rain load on a roof</li> <li>Heavy wind conditions</li> <li>Earthquake</li> <li>Impact load such as a vehicle striking a building</li> </ul>   |
| Occupancy                       | <ul style="list-style-type: none"> <li>Overloading of floors and/or roof</li> <li>Concentrated loads</li> <li>Waterlogged goods soaked during firefighting operations</li> </ul>  |
| Existing Structural Instability | <ul style="list-style-type: none"> <li>Cracks, spalling, or deterioration in load-bearing elements</li> <li>Previous repairs or modifications that may have weakened the structure</li> <li>Evidence of past structural failures or collapses</li> <li>Inadequate maintenance or neglect</li> </ul>   |
| Fire and Explosion Damage       | <ul style="list-style-type: none"> <li>Sustained moderate-to-heavy fire conditions (measured from time of ignition, not arrival time)</li> <li>Explosion (such as from an ignition of natural gas leak)</li> <li>Loss of wood structural mass (beams) due to fire attack</li> </ul>   |
| Lightweight Construction        | <ul style="list-style-type: none"> <li>Unprotected, bare steel members subjected to fire in non-combustible uses</li> <li>Wooden I-beams and lightweight wood trusses subjected to fire, particularly when directly exposed to a basement fire or when burning is in a truss void</li> </ul>  |
| Other                           | <ul style="list-style-type: none"> <li>Sudden changes in smoke or flame patterns</li> <li>Increased rate of fire spread or intensity</li> <li>Unusual sounds or vibrations</li> <li>Localized structural failures or collapses</li> </ul>   |

Reproduced from Brannigan's Building Construction for the Fire Service, 6th edition.



# Operational MAYDAY Watchouts



**Disorientation** - Losing awareness of your surroundings due to heavy smoke, poor visibility, or complex structures.



**Low Air Supply** - Running out of breathable air, often compounded by delays in recognizing or resolving the problem.



**Structural Collapse** - Sudden failure of walls, ceilings, or floors, particularly in older or fire-damaged buildings.



**Entrapment or Immobilization** - Becoming stuck or pinned due to debris, structural failure, or equipment entanglement.



**Flashover** - Rapid ignition of all combustibles in a compartment, leading to extremely high heat and danger.



**Rapid Fire Growth** - Fire spread faster than anticipated, compromising egress routes.



**Failure to Locate Exit** - Difficulty finding the exit or safe zones due to smoke, confusion, or blocked paths.







# Human Factors MAYDAY Watchouts

**Freelancing** - Operating outside the incident action plan or without proper communication.

**Lack of Situational Awareness** - Failing to recognize the signs of deteriorating conditions or potential hazards.

**Complacency** - Underestimating risks in seemingly routine or low-intensity situations.

**Inadequate Training or Preparation** - Lack of familiarity with equipment, tactics, or procedures.

**Fatigue or Physical Strain** - Overexertion leading to diminished performance and decision-making.





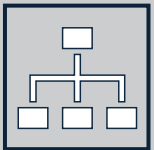
# Comms and Command MAYDAY Watchouts



**Loss of Radio Communication** - Unable to call for help or relay critical information.



**Overloaded Incident Command** - Command staff being overwhelmed and unable to track personnel or manage resources effectively.



**Failure to Monitor Crew Accountability** - Losing track of crew locations or assignments.





# Overall Incident Observations

---

- What MODE/strategy are they in?
  - Does it match the risk level
- What TASKS have been assigned?
  - In progress / complete / remaining
- Are the MODE/TASKS getting it done?
  - Is it TIME TO LEAVE
- Are tactical BENCHMARKS being achieved?
  - Fire Attack – All Clear – Under Control

# Overall Incident Observations #2

- Are SAFETY SYSTEMS in place
  - Did you complete the SURVIVAL SCAN
  - Have the most at risk been covered
  - RIC | RICO | Accountability | ASO
- Do you know WHO IS INSIDE / ON TOP / UNDER the hazard zone
  - Account for them first
- Are COMMUNICATIONS effective
  - All on same play book and in a 2-way communication mode



# Throughout the Incident

## Interventions Made



## IC Briefing



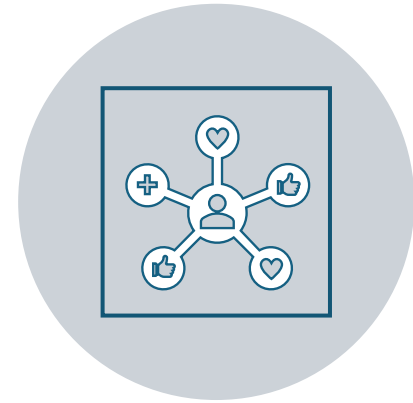
# Conclusions



**BE WHAT RIGHT  
LOOKS LIKE**



**MAKE A DIFFERENCE**



**BE BETTER EVERYDAY**

