Incident Safety Officer

The eyes and ears for both the incident commander and the firefighters

The Effective Safety Officer

- Has good communication skills
- Good understanding of the responsibilities of the position
- Has sincere attitude towards safety
- Can be viewed as a role model
- Ability to recognize potential hazards
- Must understand risk management

Recommended Qualifications

(NFPA 1521 Chap. 4)

- Fire Officer I – NFPA 1021
- Have and maintain knowledge, skill and abilities to manage incident scene safety
- Knowledge of safety and health hazards involved in emergency operations
- Have knowledge of building construction
- Knowledge in the use of departments personnel accountability system
- Knowledge of incident scene rehabilitation

Functions of the Safety Officer

- Provides current information about the scene to the IC
- Consults with the IC on matters concerning safety
- Can alter, suspend or terminate life threatening operations if required
- Keep current PAR
- Monitor all radio traffic

Functions of the Safety Officer

- Participates in the Incident Action Plan
- Watches fire ground activities for general safety issues.
- Don’t be a “Bunker Gear Cop”
- Monitor building conditions
- Practice Risk Management

Bunker Gear Cop

- At every incident there are gear issues that need to be corrected!
- Focusing on gear issues alone will make you lose your authority on scene
- Correct issues with the individual, not the crew.

Risk Management
Classic Risk Management

- Identify Hazards: Primary function of the ISO. Always monitoring the fire ground.
- Evaluate Hazards: based on *Severity* and *Frequency*
- Prioritize Hazards: Highest chance for most severe situation
- Control Hazards: Incident mitigation
- Monitor Hazards: Revisit and adapt to the hazards as time goes on.

READING BUILDINGS

Understanding Building Construction

Building Construction

- Important to Understand Theories and Principles Involved.
- Know The Early Warning Signs Of Structure Failure And Collapse Potential
- "Undress The Building"

Building Construction – *Why?*

- To Give I/C and Safety Officers an edge in planning for a safe and effective fire attack.
- To alert ISO's to potential hazards presented by a particular type of construction.
- To alert ISO's to the effects of fire and fire suppression activities on selected building materials

Building Components

- *Column:* A structural member that is loaded in Compression
- *Beam:* A structural member that transmits a load perpendicular to the load
- *Girder:* A beam that supports other beams
- *Lintel:* A beam that supports the load above an opening in a wall
- *Truss:* A beam that uses triangle struts and ties to attach a top and bottom chord, simulating a solid beam
- *Wall:* Essentially a long narrow column

Forces Applied

- *Compression:* Both ends being pushed together. (ex. Column)
- *Tension:* Pulling of the ends (ex. Top of a beam)
- *Shear:* Forces occur in both directions. Two parallel members connected that want to slip past each other.

Forces vs. Material

Material -	Compression	Tension	Shear
Wood -	good w/grain	marginal	poor
Concrete -	good	poor	poor
Reinforced Concrete -	good	fair	fair
Steel -	good	good	good

Vertical Load Systems

Concept of gravity load path

- Loads must be transferred from source to ground
- Walls are load bearing or Non-load bearing
- Any portion destroyed by fire can create a complete building collapse
- Connections usually fail first

Types of Loads

- Cantilever Loads (Eccentric)
- Dead Loads (Axial)
- Live Loads (Water, People)
- Impact Loads (Explosive)
- Wind Loads (Torsional)
- Suspended Loads (Hood system)

Construction Types

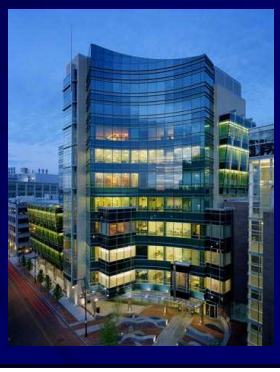
- Type I - Fire Resistive (fire proofing)
- Type II - Noncombustible (exposed steel)
- Type III - Ordinary (concrete & wood)
- Type IV - Heavy Timber (large mass wood)
- Type V - Wood Frame (lightweight wood)
- Unclassified - Hybrids (all the above)

Key Construction Considerations

- 4 Key considerations in assessing building construction in relation to fire safety
  - Compartmentalization
  - Building elements adding to fire load
  - Void spaces
  - Collapse resistance

Type I – Fire Resistive

- Active defense system
- 3 and 4 hour fire resistive construction
- Vertical enclosures
- Floor to floor compartmentalization
- Steel encased in concrete or with fire proofing



Firefighting Tactics

- Determine specific floor
- Verify fire location before committing handlines
- Systematic evacuation of building occupants - Begin with fire floor then work up
- Address public through PA system if available
- Gain control of building systems
  - HVAC should be shut down
  - Elevators under FD control
  - Ensure building fire pumps are working

Fire Fighting Tactics

- Confine and extinguish the fire
  - Coordination of attack and ventilation
  - Be aware of limited water supply
  - Protect exposures above the fire

Fire Fighting Tactics – Type I

- Fire Spread By:
  - Auto ignition from floor to floor movement
  - Through void spaces in exterior walls
  - HVAC systems
  - Vertical shafts

Ventilation Considerations

- Vertical ventilation using stair shafts
- Use stair shaft that opens to the roof
- Don't use the elevator shaft!
- Use another stairwell (unburned side) for attack operations
- Horizontal ventilation is a last resort – due to disturbing the stack effect

Type II – Non-Combustible Construction

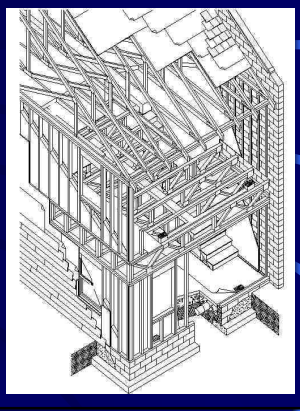
- Does not contribute to the fire load
- Very high strength to mass ratio
- Fire resistance is dependant on mass
- No fire resistance rating
- Conducts heat and spreads fire
- High collapse potential (as early as 5 min.)

Fire Fighting Tactics – Type II

- Employ cooling stream tactics
  - Steel - 1000˚ expands and sags moving walls
  - Lw steel – Failure in as little as 5 min.
- Commercial / Industrial occupancy
  - Large area – search techniques are critical
- Fire can spread through insulated roof material
- Direct additional streams to the ceiling
- Ensure personnel are outside the collapse zone

Type III Construction

- Exterior walls and structural members of non-combustible materials
- Interior structure and roof completely or partially constructed of wood
- "Main Street USA"
- Claimed the most Firefighter lives



Have you seen a Type III building?

Ordinary Construction
Problems

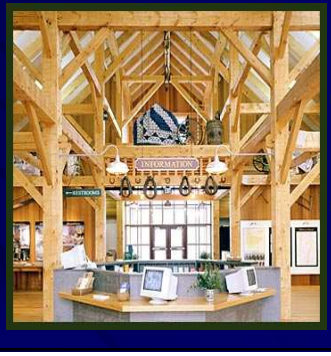
- Structural stability of Masonry walls
- Stability of columns, beams, and girders
- Old buildings – Several remodels
- Void Spaces
- Masonry walls prevent escape of heat / fire
- High fuel loads
- High Backdraft potential

Ordinary Construction
Tactical Consideration

- Designed with no consideration for fire or collapse
- Combustible fire gasses concentrate in voids and can cause a smoke explosion
- Early vertical ventilation is needed
- Roof integrity considered questionable until proven otherwise
- Lay lines into adjoining buildings
- Pull ceiling tiles as you go
- Monitor overhead with TIC

Type IV – Heavy Timber

- Exterior Walls made of non-combustible materials
- Interior structural members made of solid or laminated wood



Heavy Timber

- Exterior walls can be masonry
- Columns, beams, floors, and roof are heavy timber (True mill construction)
- There may be some steel in support sructure
- designed to contain no void spaces
- No rated fire seperations

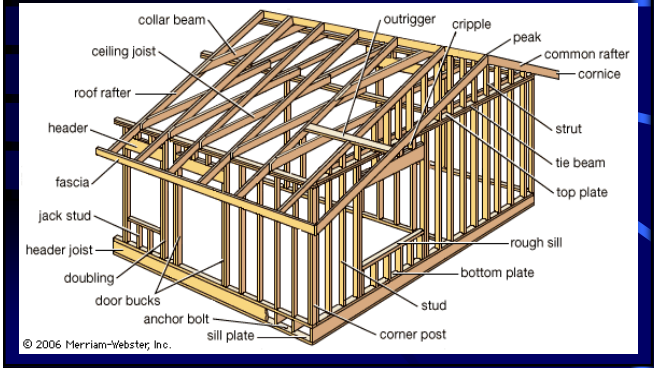
Heavy Timber

Tactical Considerations

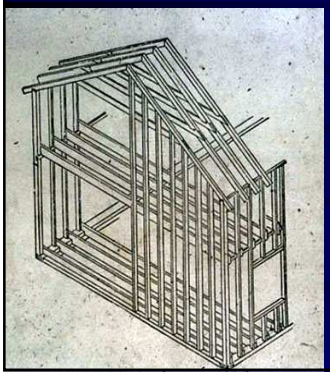
- Massive fuel load
- Serious exposure problems
- Consider choosing heavy streams
- Once structural involvement it is generally impossible to control
- Connections are the weakest link

Type V – Light Weight Wood Frame

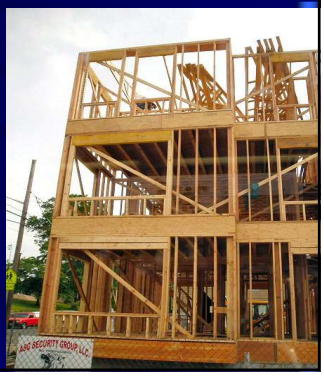
Combustible



Balloon Frame



Platform Wood Frame

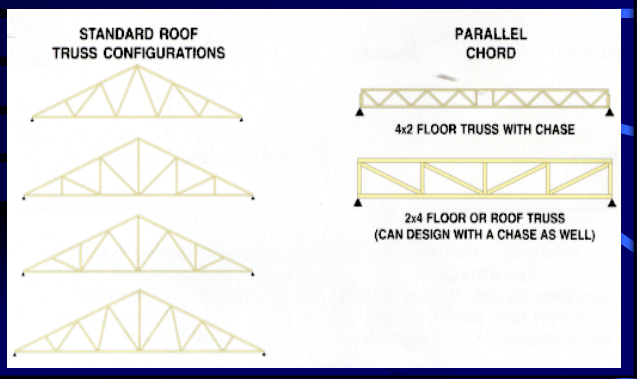


Combustible

- The entire building is made of combustible elements
- Many void spaces
- May have high flame spread on wall linings
- Stick frame provides resistance to sudden collapse
- Less compartmentalization

Truss Roof Construction

Wood Frame Truss System



Wood Frame Truss Warning *

- Engineered wood truss system fails in less than **10 minutes**
- Truss is held together by gusset plates that are only 3/8" deep.
- When one part fails, the whole truss fails
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Gusset Plates