

BUILDING CONSTRUCTION

TOP TEACHING TAKEAWAYS

ERA

- Pre-War: Up to 1940s
- Post-War: 1940s to 1970s
- Modern: 1970s to current

MATERIALS

- Floors, walls, roofs
- Wood, steel, masonry & concrete
- Legacy versus light weight

USE

- Residential (single or multi-family)
- Commercial (what is it used for)
- Residential over commercial (taxpayer or podium)

Fire fighters should always confirm that the interior finishes, layout, and spaces match the initial exterior size up.



HOSE STREAM MECHANICS

TOP TEACHING TAKEAWAYS

1. AIR ENTRAINMENT

Definition: The amount of air drawn into the hose stream by fast-moving droplets

Two Important Factors:

- Stream Type
- Nozzle Manipulation by FF
- NOT: Nozzle type or Flow & Pressure

Air Flow Values:

- Smooth Bore/Straight Stream: 6,000 CFM max
- Fog Streams – 15,000 CFM max
- Average PPV Fan: 8,000 to 15,000 CFM

A broken stream moved quickly can entrain as much air as a PPV fan – think of it as a FAN in your HANDS!

2. WATER MAPPING

Definition: The ability to distribute water throughout compartments in the fire building.

Perpendicular Streams to a Surface = 360° Radiating Coverage

Steep Angles = Uniform Coverage: Coat the Box!

On the Start: Steep angle, work to shallow

On the Advance: Shallow Angles, Water Out Ahead

Fire Compartment(s): Steep Angles, Water Close

Methods of Deflection:

- **Interior:** Door Jamb/Header
- **Exterior:** Window Header/Lintel



INTERIOR FIRE CONTROL

TOP TEACHING TAKEAWAYS

General:

- Use a thermal imager during fire attack for building orientation and fire flows.
- Use the reach of the stream!
- Smoke = Fuel – Flow water early and often!
- Wet surfaces don't burn
- Surface cooling causes gas contraction
- Suppression stops things from getting worse, ventilation is needed to make things better!

Why The Flow & Move?

- Keeps the bad stuff out ahead
- Compartmentalize with water – “Make a Door”
- Can stop or reverse the flow path!

TWO APPLICATION METHODOLOGIES:

1. On the Advance

- **First:** Swipe the Centerline of the Box, Near to Far (Judge Distance + Initial Cooling)
- **Second:** Shallow Angles with Stream Out Ahead with a Consistent ‘O’ Pattern (Cooling While Advancing)
- **Third:** Early Water Into Fire Compartment – Window Header/Jamb

2. Into the Fire Compartment(s)

- **First:** Steep Angles to Coat the Box
- **Second:** Lower the Stream to Base Fuels
- **Third:** Enter the Compartment For Final Extinguishment/Mop-Up

Immediately Begin Hydraulic Ventilation - Fastest Return to Tenable Conditions!

REMEMBER:

- Straight or solid streams for knockdown – NO fog streams!
- Bale fully open or bale fully closed, NO in between!
- Placement over volume – Maneuverability over GPM!



HYDRAULIC VENTILATION

TOP TEACHING TAKEAWAYS

BENEFITS:

- Provides the quickest return to tenable conditions
- Should be thought of as life safety measure

TECHNIQUE:

- Begin IMMEDIATELY after knockdown
- Open ALL other doors and windows for fresh air intake
- Use multiple hoselines if possible
- Droplets must leave the room for the air entrained to leave
- Further into the room (away from the window) the better

MOVE THE MOST AMOUNT OF AIR BY:

- FAN IN YOUR HAND!
- Combination Nozzle = Rotating Fog Stream – 15,000 CFM +
- Smooth Bore Nozzle = Take Tip Off, Open Bale $\frac{1}{3}$ to $\frac{1}{2}$ - 5,000 to 10,000 CFM



EXTERIOR FIRE CONTROL

TOP TEACHING TAKEAWAYS

REMEMBER “THE BIG 3”

1. Get the most amount of water into the window
2. With the least amount of air
3. And don't block the opening with the stream

TECHNIQUE:

- Use a steep angle initially – coats the box!
- Get as close to the building as possible (Steeper Angle)
- Watch for conversion (Should be less than 30 Seconds)
 - If no change, then alter the distribution
 - Sweep with your body, NOT the nozzle
- Final steps (Mop-Up):
 - Above grade: apply water to the window header/lintel
 - At grade: place nozzle in window and coat base fuels



SEARCH & RESCUE

TOP TEACHING TAKEAWAYS

- Survivability cannot be assessed from the exterior
- Finding them is the first step to removing them
- If you cannot see, they cannot breathe
- Must assume survivable spaces exist – where can we search
- Door initiated vs. window initiated
- Distance, duration, and elevation of victim(s)
- Isolation/compartmentalization (horizontal ventilation)
“water on the fire”
- Keep victims low; limit the victim’s toxic and thermal exposure during removal
- Each victim removal is unique, consider proximity to the fire, the path/elevation and speed of removal.
- During removal, keep the victim’s airway low and move fast
- Sometimes, the best option for survival is isolation
- Interior landmarking/orientation
- Coordinate and facilitate patient treatment/transport with on-scene resources upon removal from the structure



FIRE DYNAMICS

TOP TEACHING TAKEAWAYS

STAGES OF FIRE

- Ignition/
Incipient
- Growth
- Fully
Developed
- Flash Over
- Decay

NEUTRAL PLANE

- Can tell you what level (floor) the fire is on
- Best recognized at an opening (entry point) prior to entering structure

VENTILATION LIMITED FIRES VS FUEL LIMITED FIRES

- Availability of air
 - Add air and fire will grow
 - Increase HRR
- Confined in a structure
 - Limit the air

FLOW PATH

- Identify the flow path
- Control the flow path
 - Openings are ventilation
 - Flowing on the advance can control the flow path

PRESSURE

- HRR goes up so does pressure
- Cooling equals contraction not expansion
- High pressure goes to low pressure areas

SMOKE IS FUEL

Cool smoke on the advance

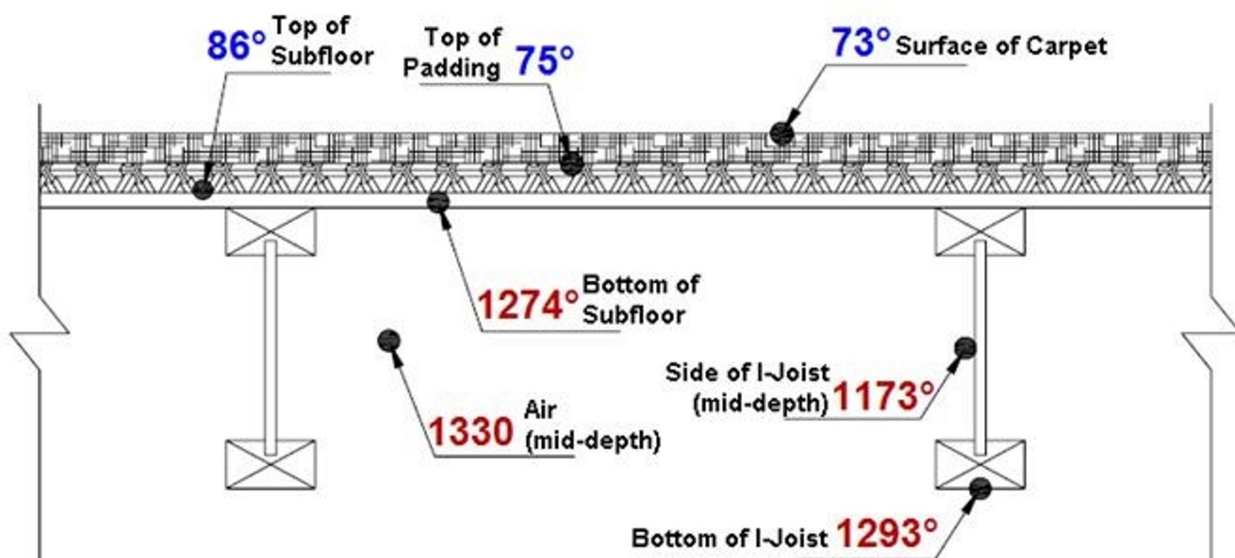
- Volume
- Density
- Velocity
- Color



THERMAL IMAGING

TOP TEACHING TAKEAWAYS

- Fire service Thermal Imagers (TI) are **inaccurate and unreliable thermometers**. ‘Spot Temperature’ and Temperature Measurement Bar **should not be used** pre-fire control to make tactical interior firefighting decisions
- TIs are not X-ray machines, it cannot see through objects, ***TIs only “see” absorbed / radiated / emitted / transmitted IR from material’s surface.***
- ***TIs may give an indication of a heat condition, movement, and thermal contrast*** above and below a fire fighter and valuable in size-up, but a ***TI will give no indication of existing structural integrity or reliable predictive indicators of structural collapse.***
- The reduced Field of View of TI requires the TI Operator to scan the space at multiple levels; Life, Layout, and Location (scanning low, mid, high & shoulder to shoulder)
- The TI is only a tool to support and aid emergency operations — **know your tools**
- Applications for TI, include, but not limited to: Search and Rescue, Size Up, and Fire Attack / Stream Placement. All require communication, coordination, and control (C³) to enhance operational effectiveness and efficiency.



SIZE UP

TOP TEACHING TAKEAWAYS

- Incident Priorities: **L.I.P.**
 - Life Safety = All Clear
 - Incident Stabilization = Water on the Fire
 - Property Conservation = Loss Stopped
- Keep the wind at your back
- Identify Fire Location
 - Gather credible face-to-face bystander information on the fire location
 - Fast Water on Tank Water: Exterior and Interior Fire Control
 - Look for Low Intake, High Exhaust (LIHE)
- Read the Smoke: Volume, Velocity, Density, and Color
 - Volume - Recognize the scope and scale of the event
 - Velocity - The PRIMARY indicator of the Fire Location
 - Density - Smoke is Fuel!
 - Color - Sets the stage but doesn't tell the story
- Identify Searchable Spaces
 - How can you get there? Door vs Window initiated Search.
 - What is faster? Take the problem away from the victims or take the victims away from the problem.
 - Occupied until proven vacant
 - Gather credible face-to-face bystander information, which narrows the search area

