Fire Attack / Ventilation

Module 11

Coordinated efforts of multiple fire companies is needed for a successful fire attack

Step 1 – Size-Up

Step One: *Size-up*

First

step in resolving any emergency

Everyone

does a size-up

Continually

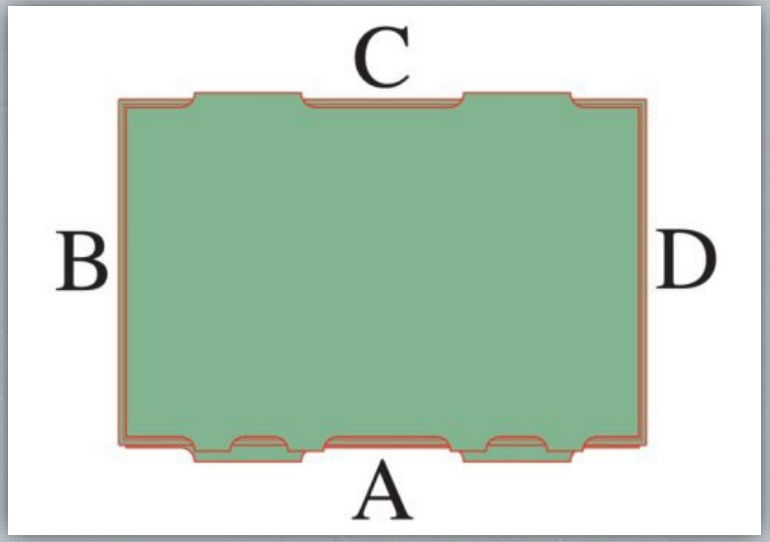
conducting your own size-up will help ensure safety

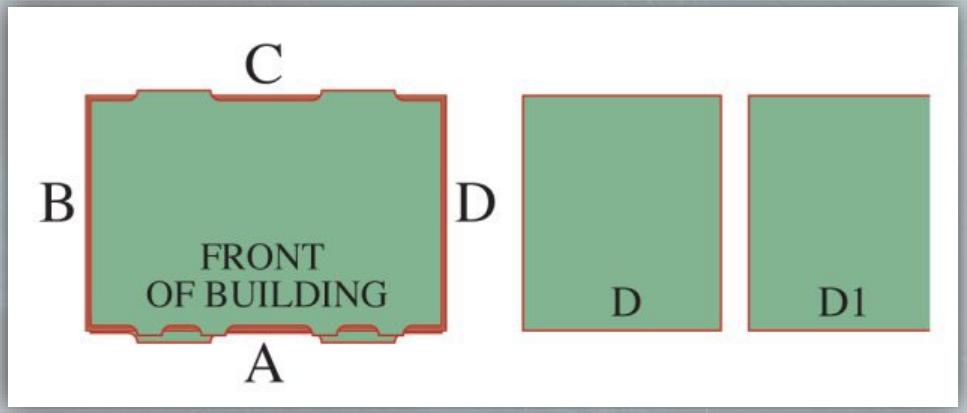
Describing Areas of the Building

Common Terminology

Common

terminology allows for quicker communications about strategy and tactics





Large

incidents can be broken into areas of responsibility

Step 2 – Strategy: Offensive Strategy

Step Two: *Developing a Strategic Plan*

Aggressive

interior search and attack

Factors must be present

- Lives can be saved
- Limited fire with salvageable areas
- Building is safe to operate in until extinguishment

Defensive Strategy

Step Two: *Developing a Strategic Plan*

Factors

- No savable human life
- Building and contents can not be salvaged
- Building is unsafe because of heavy fire involvement
- Fire load on lightweight components

Defensive to Offensive or Transitional

Step Two: *Developing a Strategic Plan*

Heavy

fire involvement prevents getting close enough for offensive attack

Hazards

may need to be controlled before entry

Quick

knockdown may allow the IC to switch to an offensive strategy

Photo courtesy of Cy Fair

Offensive to Defensive Strategy

Step Two: *Developing a Strategic Plan*

Give Up interior attack

- Search completed, but too risky for interior attack
- No headway made on the fire
- Fire progressing too rapidly

Step 3 - Establish a Reliable Water Supply

Step Three: *Establish a Reliable Water Supply*

First Priority

at any fire

Enough

water to overcome the heat from the fire must be applied to ensure extinguishment

Step 4 - Forcible Entry

Step Four: *Forcible Entry*

First team to the building

- Response area may dictate tool choice
- Choose the appropriate place to enter (often front door)
- Consider forcible exit (how to get out if conditions worsen)
- Control doors when forcing by using rope, webbing, or tools

Step 5 - Conduct Search and Rescue

Step Five: *Search and Rescue*

Search through the building for fire and victims

Rescue operations begin when the victim is located

Communicate with command when victims are located

Two

separate events

Attack Decisions include

- Size of the hoseline
- Positioning of the hoseline
- Coordinating with other fireground functions

Photo courtesy of Brettsfirephotos.com

Nozzle Operator Duties in the Stretch

Step Six: *Fire Attack*

Carry

the nozzle and the working length of hose

Bleed

air from the line and check the flow

Communicate

with the officer and backup firefighter

Nozzle Operator Techniques

Step Six: *Fire Attack*

Variety

of ways to position during advance

Knees

can be switched to allow pants insulation to cool

Backup Firefighter Duties During Advance

Step Six: *Fire Attack*

Relieve the nozzle reaction from the nozzle operator

or

Nozzle Team Duties During Advance

Step Six: *Fire Attack*

Stay Low

when entering the door

- Watch what the smoke does when the door is opened
- Listen for the stream splashing off of the ceiling, walls, etc
- Sweep the floors

Water Hammer

Step Six: *Fire Attack*

Open

and close the nozzle slowly

Pressure

can be increased as much as six times by water hammer

Modified Direct Method of Attack

Step Six: *Fire Attack*

Most common method

- Straight stream
- Directed to the seat of the fire
- Also can cool ceiling and walls

Fog Streams

Step Six: *Fire Attack*

Draw

large amounts of air into the fire area

Create

large amounts of steam due to smaller water droplets

Heat

can be pushed down to the floor

Step 7.- Ventilate

Step Seven: *Ventilate*

Proper

ventilation allows for rapid advance to the fire

Decreases

the potential for flashover

Horizontal Ventilation

Step Seven: *Ventilate*

Opening

windows and doors to ventilate the fire area

More

efficient when opened opposite the advancing hoseline

A Single

firefighter with the proper tools can create a great deal of ventilation

Vertical Ventilation

Step Seven: *Ventilate*

Allows

heat and smoke to exit the building

Prevents

mushrooming and limits horizontal fire spread

Positive Pressure Ventilation

Step Seven: *Ventilate*

Before

fire attack

- Fire may grow rapidly
- Driven into voids

After Fire

is knocked down

- Fire can light up with fresh air

Step 8 - Protect Exposures

Step Eight: *Protect Exposures*

Cutting

off fire and not allowing it to spread

Large

lines apply water directly to the exposed building

Remove

curtains or drapes from windows

Step 9 - Fire Control and Overhaul

Step Nine: *Fire Control and Overhaul*

Open Up

any burned surfaces to expose concealed spaces

Wash

down any hot spots and charred surfaces

PPE

must be worn during the overhaul process

Basic Fire Attack

Scenario: Fire in a 1 Story House

EMERGENCY TRAINING SOLUTIONS LLC

FRESNO FIRE EST. FFD 1877

Fire Engineering
TRAINING THE FIRE SERVICE FOR 130 YEARS

Scenario Response

- 0223 hours
- Reported fire in a single story house
- Newer development
- 3 Engines, 2 Truck, 1 Battalion Chief

House and Layout

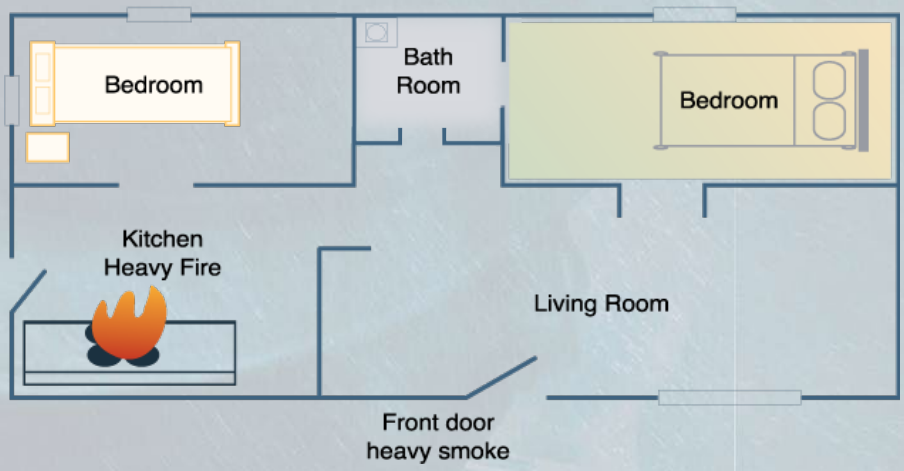
Scenario: 1st Floor Fire

Heavy fire out kitchen window

- Heavy black smoke out front door
- Fire out side door
- Rear windows seeping smoke
- Heavy smoke from gable vent
- Occupants report teenage son did not get out

Size-Up

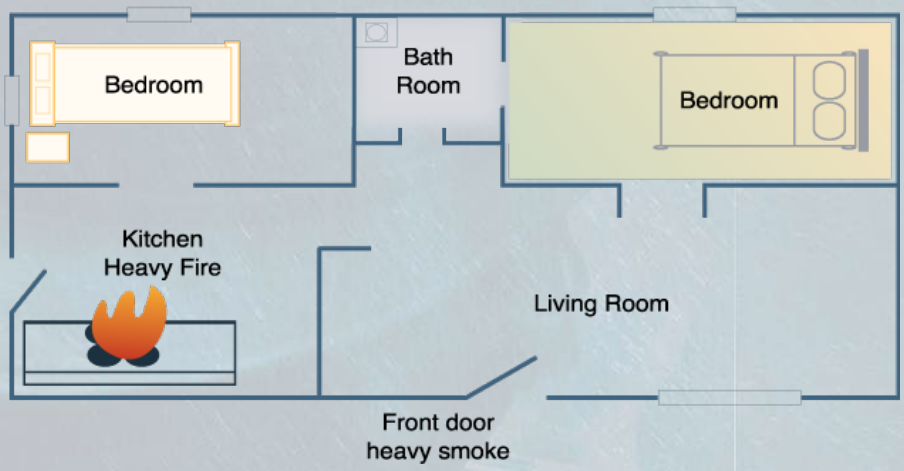
Scenario: 1st Floor Fire



- Fire location / construction
- Life hazard
- Fire control
- Forcible entry / ventilation
- Stretching / water supply

Strategic Plan

Scenario: 1st Floor Fire



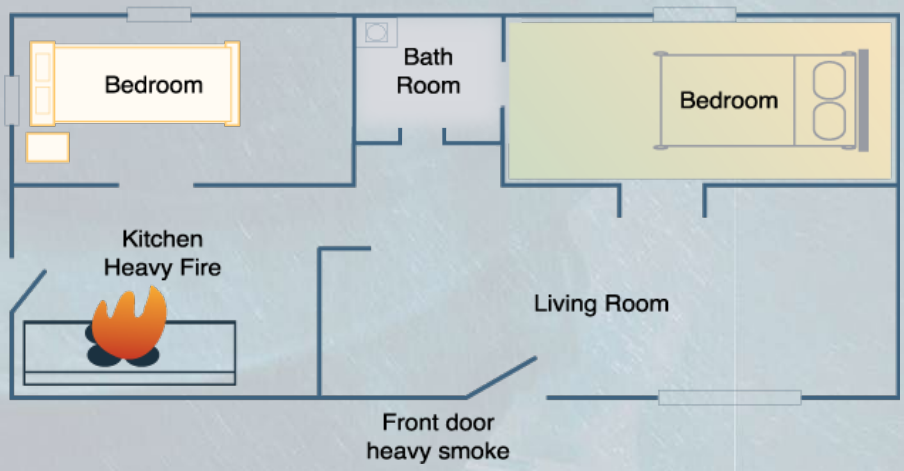
- Offensive vs. defensive
- What do we know?
- What don't we know?

Establish Water Supply

Scenario: 1st Floor Fire

YOU ARE HERE

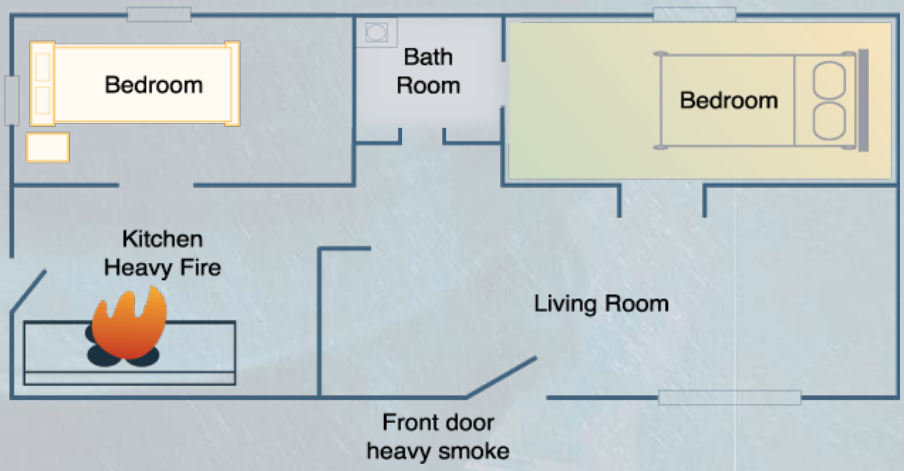
1. Size-up
2. Strategic plan
3. **Establish water supply**
4. Force entry/exit
5. Search and rescue
6. Fire attack
7. Ventilate
8. Protect exposures
9. Fire control and overhaul
10. Pick up and return



- Hydrant
- Tanker shuttle
- Drafting

Forcible Entry / Exit

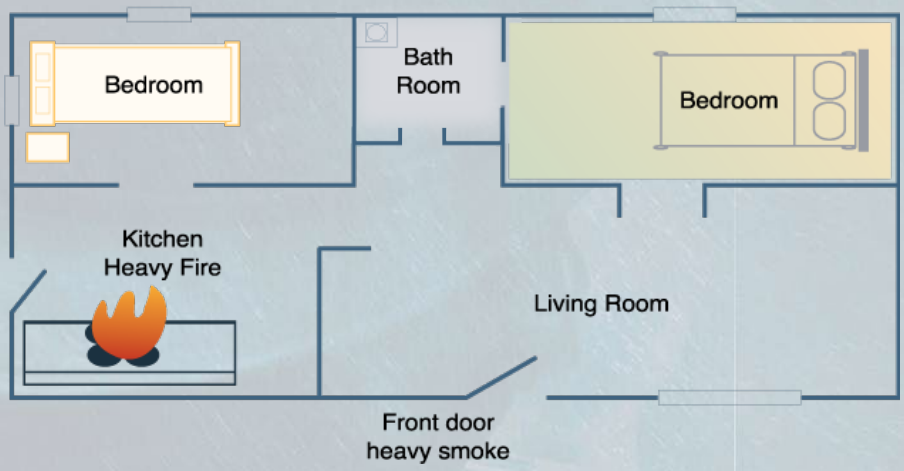
Scenario: 1st Floor Fire



- When is it done?
- Who is assigned?
- Tools needed?

Search and Rescue

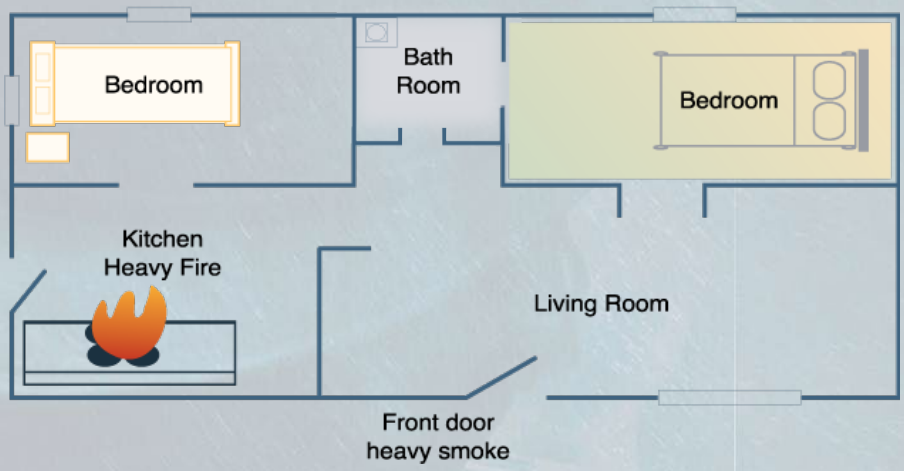
Scenario: 1st Floor Fire



- Where first?
- Multiple search teams available
- Engine considerations for the search team?

Fire Attack

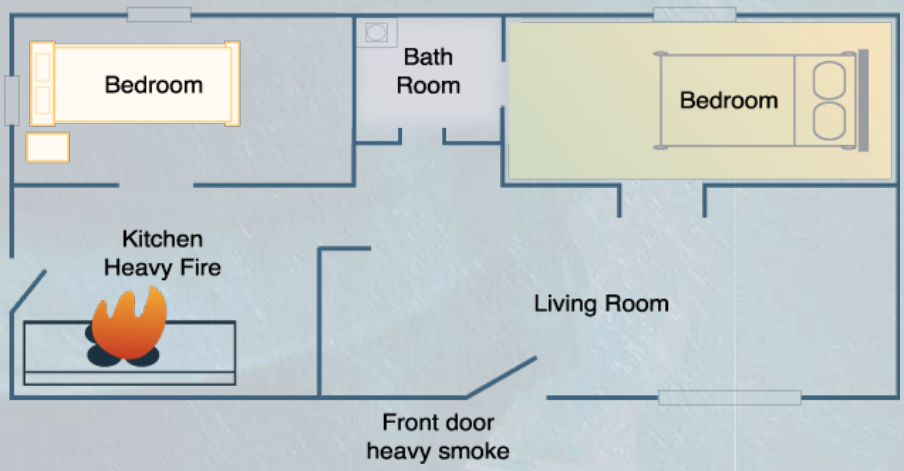
Scenario: 1st Floor Fire



- Size line?
- Entry point?
- Attack type?
- Stream pattern?

Ventilation

Scenario: 1st Floor Fire



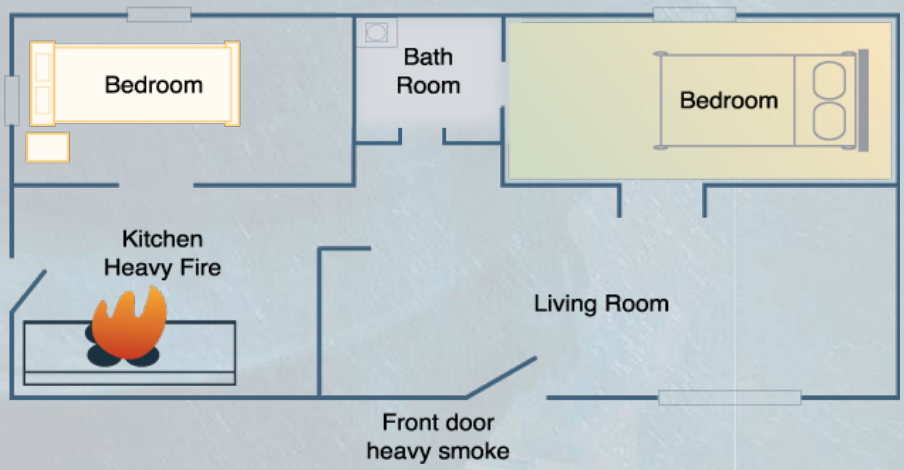
- Vertical or horizontal?
- When?
- Where?

Protect Exposures

Scenario: 1st Floor Fire

YOU ARE HERE

1. Size-up
2. Strategic plan
3. Establish water supply
4. Force entry/exit
5. Search and rescue
6. Fire attack
7. Ventilate
8. **Protect exposures**
9. Fire control and overhaul
10. Pick up and return



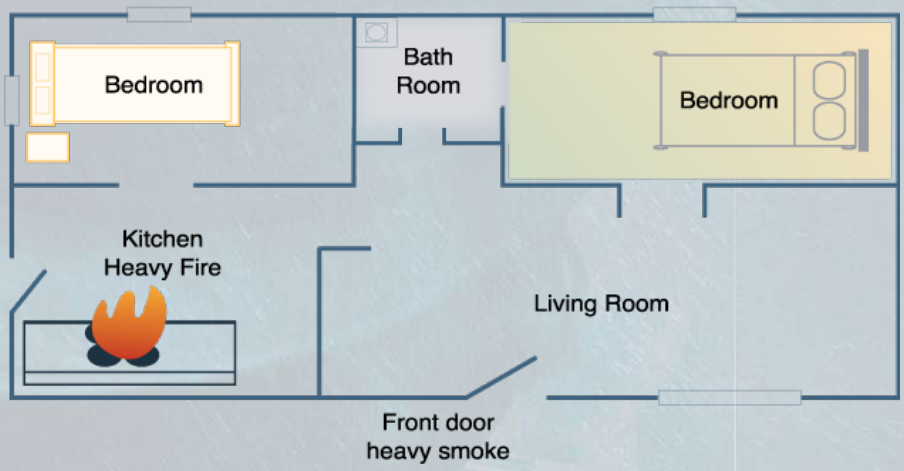
- Exterior vs. interior exposures
- Unburned areas

Fire Control and Overhaul

Scenario: 1st Floor Fire

YOU ARE HERE

1. Size-up
2. Strategic plan
3. Establish water supply
4. Force entry/exit
5. Search and rescue
6. Fire attack
7. Ventilate
8. Protect exposures
9. **Fire control and overhaul**
10. Pick up and return



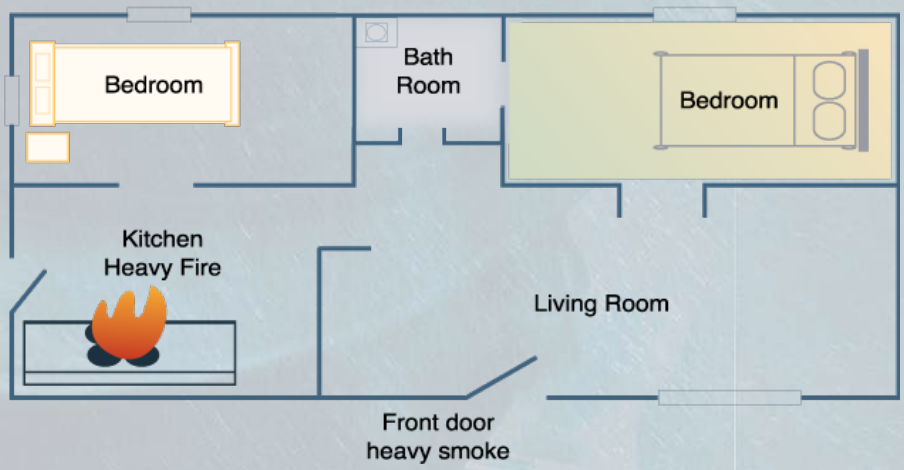
- Tools?
- Where first?
- Smoke removal?

Pick Up and Return

Scenario: 1st Floor Fire

YOU ARE HERE

1. Size-up
2. Strategic plan
3. Establish water supply
4. Force entry/exit
5. Search and rescue
6. Fire attack
7. Ventilate
8. Protect exposures
9. Fire control and overhaul
10. **Pick up and return**



- Lessons learned
- Clean and maintain equipment & tools

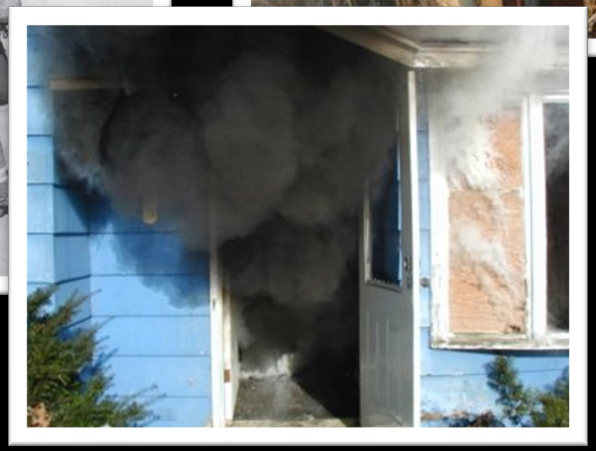
Basement Fires

Additional Fire Scenarios: Size-Up Concerns

Concerns

- Limited accessibility
- Accessing interior stairs can be like descending a chimney
- Limited Ventilation
- Floor above may be compromised
- May go unidentified for some time

Ventilation operations are vital to control fire spread and to protect victims in the fire building



Purpose

Introduction

Ventilation

does not put out fires

Proper

ventilation is integral in attack and extinguishment of fires

Most

structure fires will require ventilation as a primary concern

Venting for fire

- Coordinated with engine company advance
- Premature venting can increase fire size and intensity

Photo courtesy of Jim Burns

Classifications of Ventilation

Venting for life

- Used if there is known or suspected life in the area
- Calculated risk of pulling fire, heat, and gases towards the opening

What Is Smoke?

Simply combustion byproducts

- Solids
- Liquid particulates (aerosols)
- Fire gases

Smoke Contents

Particulates

in smoke will burn if heated

Fire gases include

- Carbon monoxide
- Sulfur dioxide
- Hydrogen fluoride
- Hydrogen chloride
- Hydrogen cyanide
- Aldehydes
- Benzene
- Acrolein

Carbon Monoxide

Smoke

Deadly

and common fire gas

Photo courtesy of www.brettsfirephotos.com

Causes

asphyxiation if inhaled in sufficient quantities

Hydrogen Cyanide

Smoke

Building

type and roof pitch will determine type and length of ladder needed

Photo courtesy of Jim Duffy

Aerial

ladders may be needed for ventilation

Natural Ventilation

Types of Ventilation

Opening

windows, doors, scuttles, and skylights to let products of combustion escape

Wind

currents can enhance or limit its effectiveness

Light

smoke conditions may call for natural ventilation

Cutting

a hole in the roof is another form of natural ventilation

Photo courtesy of Brettsfirephotos.com

Smoke

heat and gases naturally rise up and out of vent hole

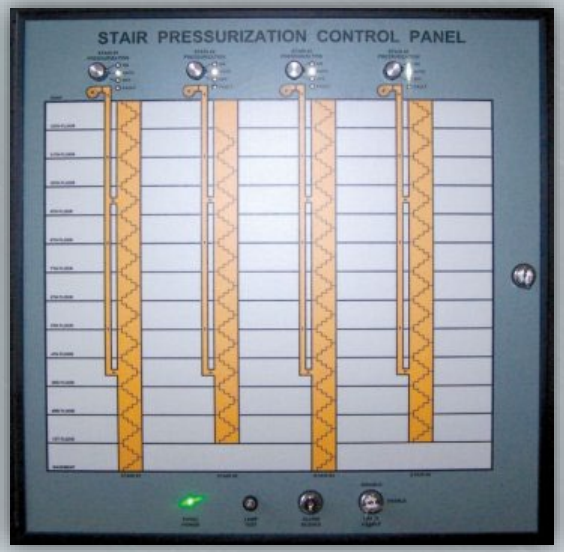
Mechanical Ventilation

Types of Ventilation

Provide

pressurized ventilation to a building

- Powered fans or blowers
- Hoselines for hydraulic ventilation
- HVAC systems
- Building smoke management system

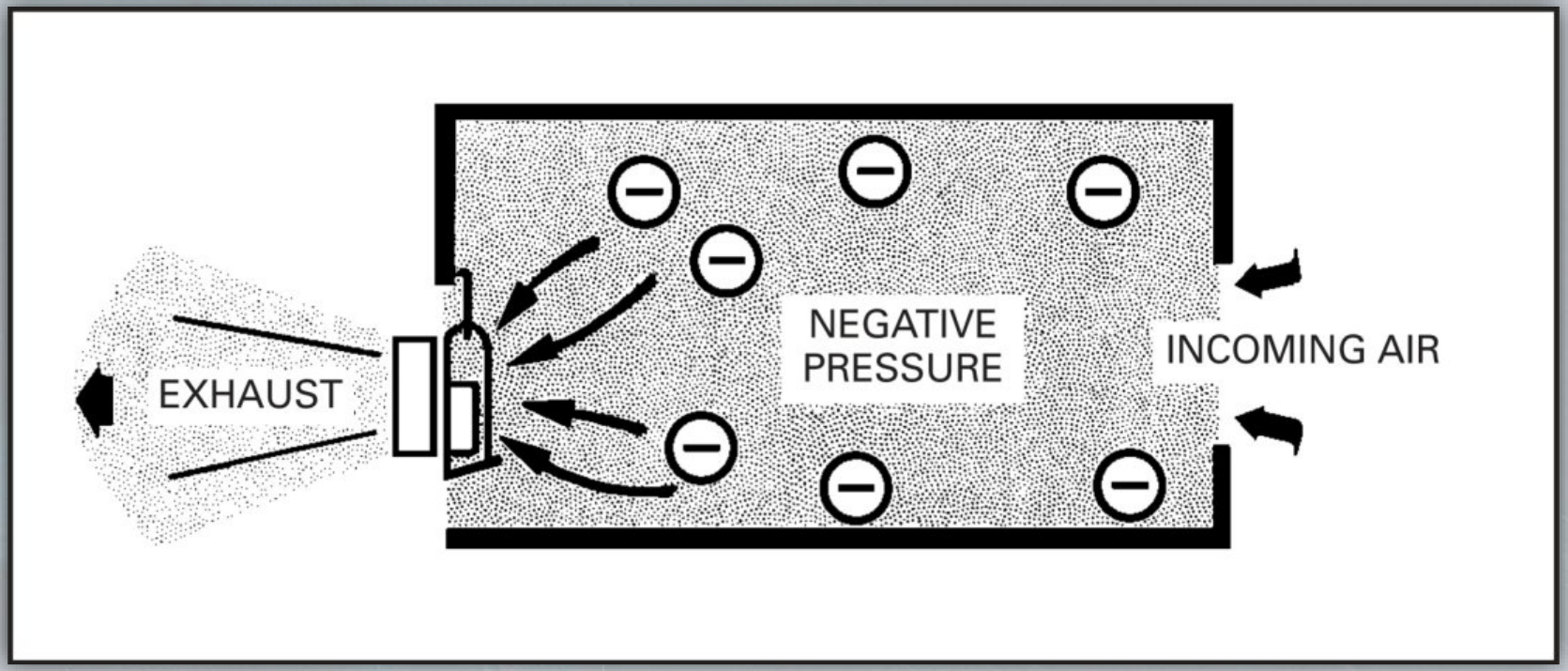


Negative Pressure Ventilation

Types of Ventilation

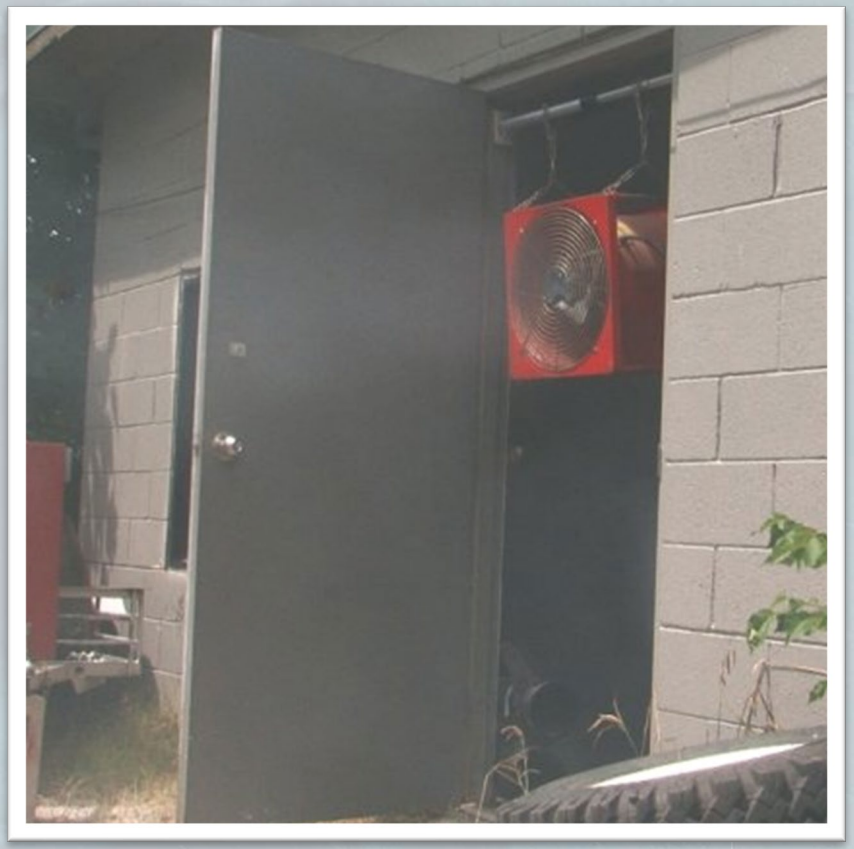
Blower

draws the products of combustion outside



Negative Pressure Ventilation

Types of Ventilation



Negatives

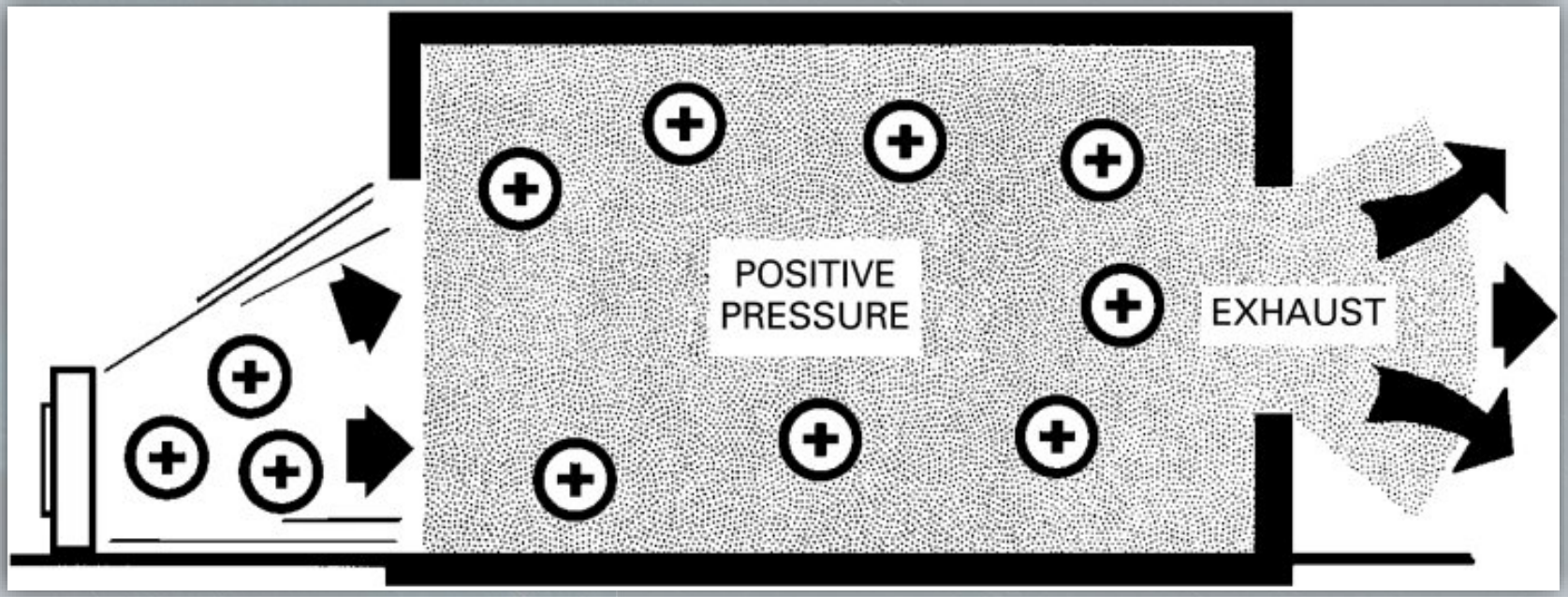
- Can cause recirculation of the smoke
- Draws contaminants over the blower
- Blocks doorways and windows
- Limited air flow

Positive Pressure Ventilation

Types of Ventilation

Forces

pressurized air into a building



Positive Pressure Ventilation

Types of Ventilation

Figure 1.

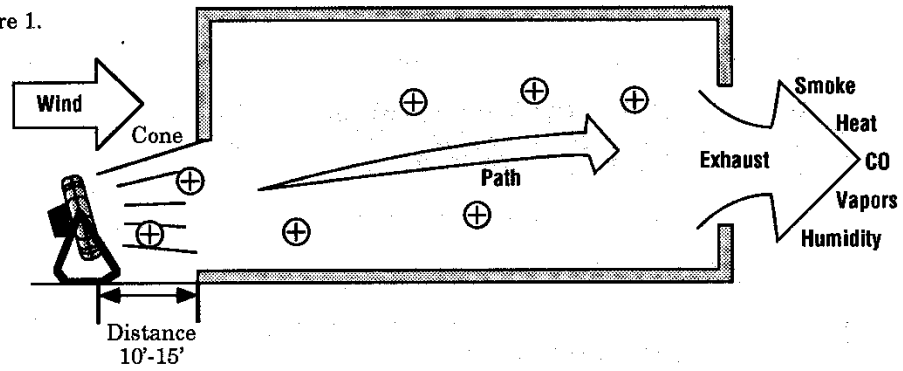
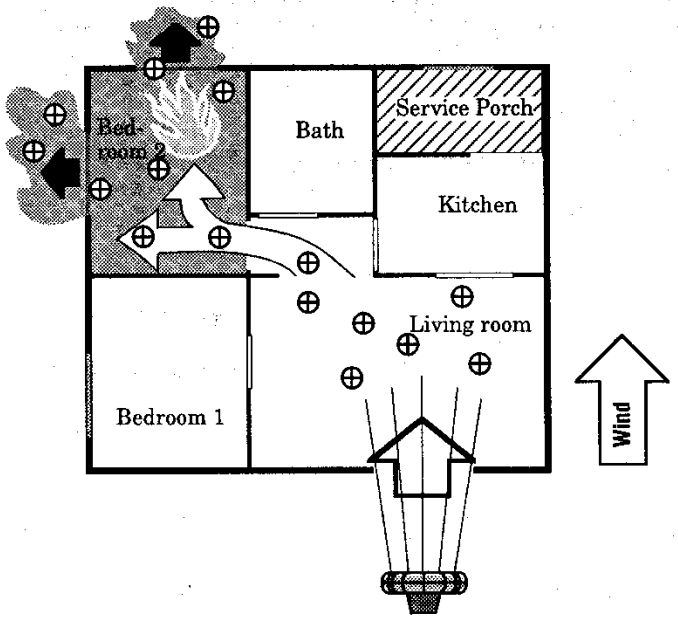


Figure 2.



Positive Pressure Ventilation

Types of Ventilation

Twice

as effective as negative pressure

Photo courtesy of K. Garcia

Exhaust

openings must be created before pressurizing the structure

Hydraulic Ventilation

Equipment for Ventilation Operations

Fog Streams

directed out a window
creates a venturi effect

Effectiveness

depends on the size of the opening and discharge of the nozzle

Smooth Bore

nozzles can also be used for hydraulic ventilation

Photo courtesy of Brett Dzadik

Determining Ventilation Priorities

Top Priority

is improving the interior environment

Increase

a victim's chance for survival

Enhance

the working environment for firefighters

Photo courtesy of Brettsfirephotos.com

Horizontal Ventilation

Ventilation Priorities

Simply

opening windows and doors

Effectiveness

depends on opening size and proximity to contaminants

Effective Horizontal Ventilation

Ventilation Priorities

Consider wind direction

- Will the wind accelerate the fire?
- Open leeward side windows first
- Then open windward side

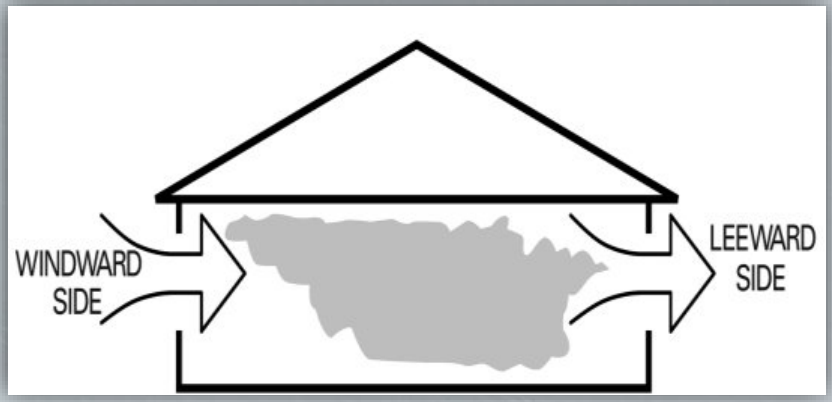


Photo courtesy of Keith Muratori

Open windows near the fire

- Allows steam, heat, and gases to escape
- Coordinate with nozzle team

Assisting Horizontal Ventilation

Ventilation Priorities

Mechanical

blowers or fans can be used to enhance effectiveness

Partition

large areas by closing doors

Vertical Ventilation

Ventilation Priorities

Releases

smoke, heat, and gases collecting at the upper levels

Mushrooming

contaminants collect at the high points and bank down to lower levels

Relieves

halls and stairways of smoke, assisting search and evacuation

Determining Path of Travel

Roof Ventilation

The First

member on the roof sounds the roof and determines path

Perimeters

of flat roofs are the strongest areas

Secondary

egress should be established for roof personnel

Consider Potential Fire Below

Begin

ventilation cuts in the weakest portion of the roof

Work

towards the means of egress

Smoke

issuing under significant pressure
indicates that the vent hole is too small

Do Not

make the cuts deeper
than the decking material

Common

hole sizes are 4′ x 4′ or 3′ x 6′ for
residential and 8′ x 8′ for commercial

After the Cut

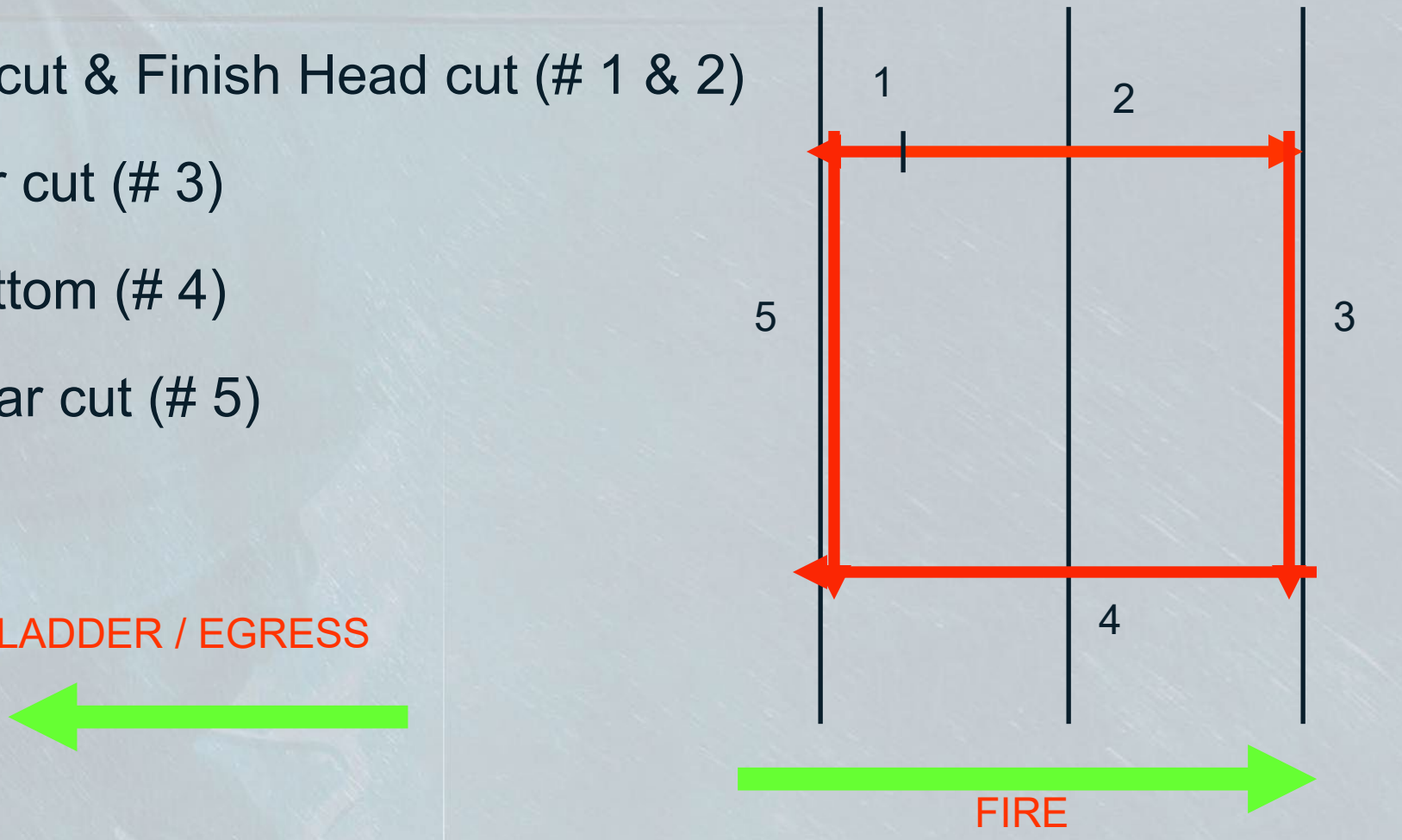
Roof Ventilation

Proper ventilation requires that the ceilings below be pushed in

- Announce over the radio
- Position to the windward side
- Keep out of the escaping smoke, heat, and gases

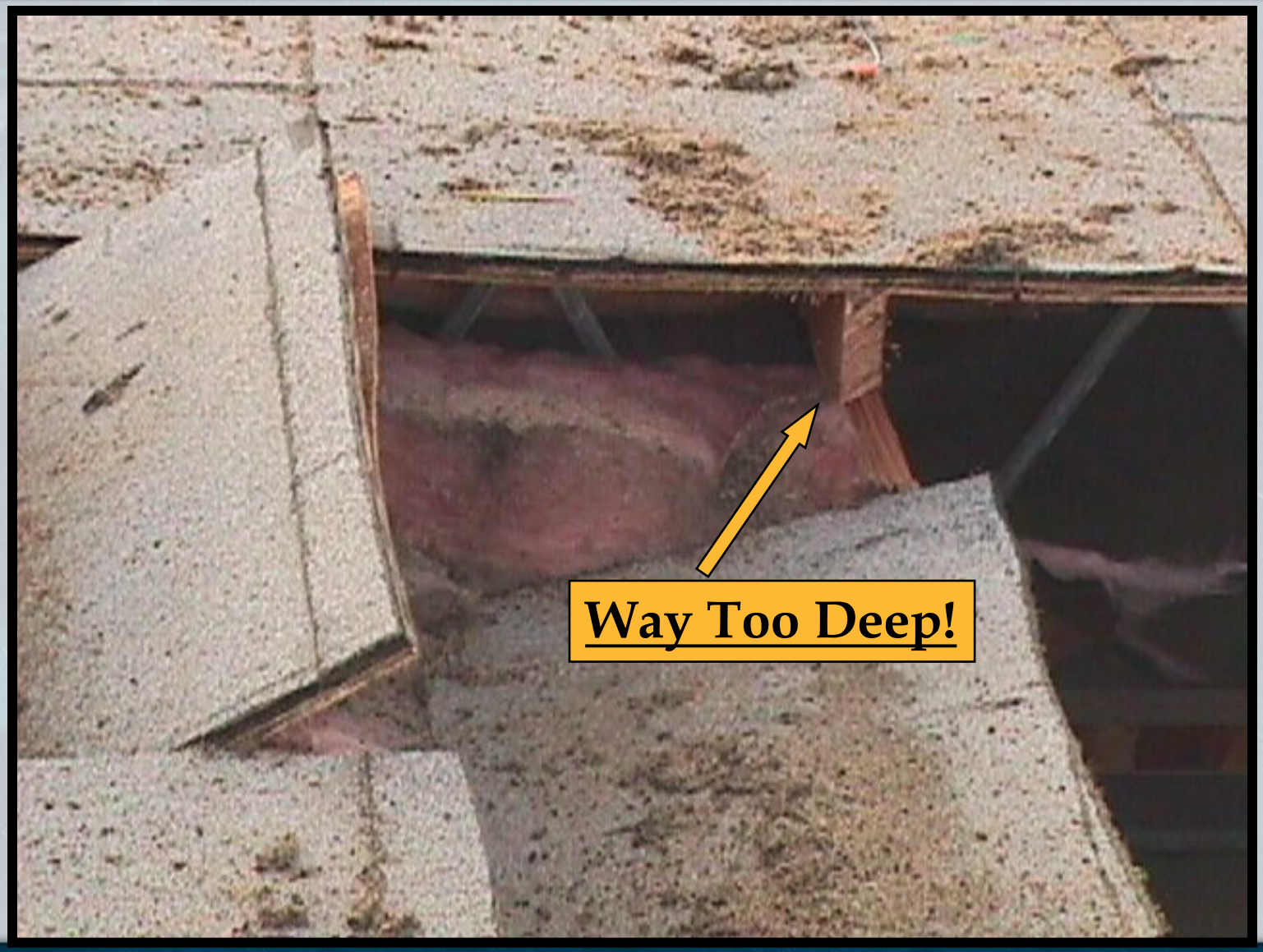
Roof Ventilation Cuts

- Standard 4’x4’
  - ID cut & Finish Head cut (# 1 & 2)
  - Far cut (# 3)
  - Bottom (# 4)
  - Near cut (# 5)



Roof Ventilation Cuts

Roof Ventilation Cuts



Roof Ventilation Cuts

ALWAYS stand on support members!

Cutting Pitched Roofs

Roof Ventilation

Steeply

pitched roofs require the use of a roof ladder for ventilation operations

Photo courtesy of A. Ciscone

Place

the roof ladder on the windward side of the area to be ventilated

Cutting Pitched Roofs

Roof Ventilation