

# Verdugo Fire Academy

## Ventilation: Anatomy of an Opening

### Part 2



CSFM Unit L  
FFFS Chapter 14



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### **VENTILATION** Anatomy of an Opening

A ventilation opening is a specific opening that is utilized to remove concentrations of heat, smoke and toxic gases from a structure, and/or redirect the travel of fire.



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### **VENTILATION** Anatomy of an Opening

There are Offensive and Defensive Operations in Ventilation



We will look at them both...

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**VENTILATION Anatomy of an Opening**

Offensive ventilation operations should be located:



- As close to the fire as possible
- As soon as conditions permit
- Usually accomplished by creating an opening in a roof as close to the seat of the fire as possible

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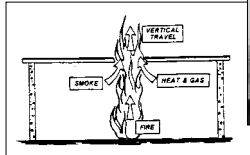
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**VENTILATION Anatomy of an Opening**

Offensive ventilation is an aggressive approach to ventilation.



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**VENTILATION Anatomy of an Opening**

OFFENSIVE OPERATIONS =

1. Save Lives.
2. Improve environment for Rescue and firefighting
3. Reduce Property damage caused by the extension of fire though lateral spread or the mushrooming effect

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**VENTILATION Anatomy of an Opening**

**DEFENSIVE OPERATIONS =**  
Parking Lots

- Normally placed away from the seat of the fire or ahead of an extending fire to minimize horizontal extension
- Should be considered after offensive ventilation openings have been initiated, completed, or have **NOT** been able to be initiated.



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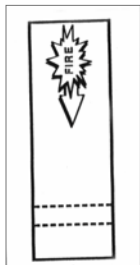
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**VENTILATION Anatomy of an Opening**



Defensive ventilation opening placed away from the seat of the fire. Example: Trench Cut

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**Types of Ventilation Openings**

Three basic types of ventilation openings

- Natural Openings
- Heat openings
- Directional Openings



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## Types of Ventilation Openings

### • Natural Openings

- Used for speed
- Minimize structural damage
- Only used in close proximity to the fire



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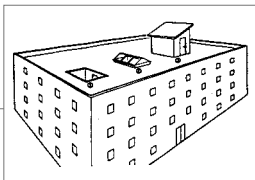
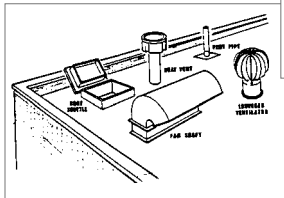
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## Types of Ventilation Openings

### • Natural Openings



Skylights, Roof Scuttles, Elevator House, Air Shafts, Penthouses, Ventilators

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## Types of Ventilation Openings

### • Natural Openings



Skylights indicator of floor plan: Residential = hallways  
Industrial=manufacturing area  
Some over: stairways, air shaft



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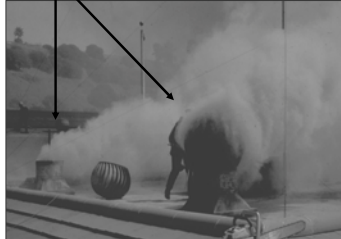
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### Types of Ventilation Openings

- Natural Openings... note: Ventilators are designed to remove heat, they are 30% more efficient when the turbine is in operation.



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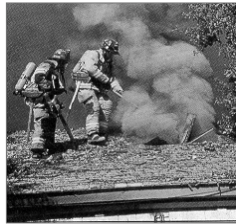
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### Types of Ventilation Openings

- Heat Openings
  - Openings over a fire (or as close to the seat of the fire as possible)
  - Offensive Operations
  - When cut by firefighters are call "HEAT HOLES"
  - Vertically channel a fire and exhaust contaminants from a fire up and out of the building.



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### Types of Ventilation Openings

- Heat Opening



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### **Types of Ventilation Openings**

#### **• Directional Openings**

- Are openings placed ahead of a horizontally traveling fire
- Used to control the spread of a fire by changing its horizontal direction to a vertical direction
- Usually considered defensive operations
- Referred to as “Strip or Trench Cuts”

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### **Types of Ventilation Openings**

#### **• Directional Opening**



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### **Types of Ventilation Openings**

**To adequately ventilate any building a ventilation opening must be commensurate with the amount of heat and smoke/gasses to be ventilated**

- A rough starting point is 10% of the area to be ventilated or a 4X8 hole
- PRACTICAL approach: if contaminants are venting under pressure, the ventilation opening needs to be enlarged or additional openings initiated
- As long as contaminants are venting under pressure, keep enlarging the ventilation opening!

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### Size of Ventilation Openings

The size of ventilation openings should be governed by the following 3 factors

- Type (offensive/defensive)
- Ease of removal
- Location



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### Size of Ventilation Openings

#### Type (offensive/defensive)

Ventilation openings that are cut over a fire (offensive) are usually square or rectangular

(defensive) openings are usually long and narrow



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### Size of Ventilation Openings

#### Ease of Removal



The Ventilation openings created should enhance the ease of removal

This does not imply that the opening should be small; they should be easy to open

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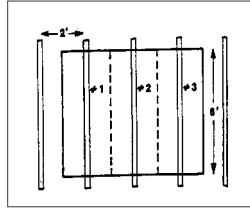
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### Size of Ventilation Openings

Decking material is difficult or impossible to remove when nailed to multiple rafters. If 2 additional cuts (dicing) are made (dotted lines), in addition to four perimeter cuts, the opening would be changed from one large section of decking to 3 smaller section of decking



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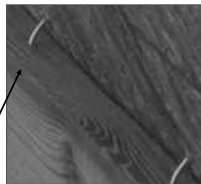
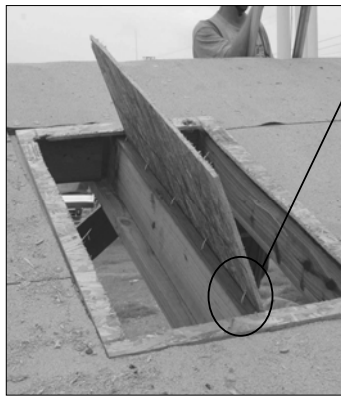
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### Size of Ventilation Openings



It is easier to remove decking that is nailed to one rafter (center rafter cut) than multiple rafters.

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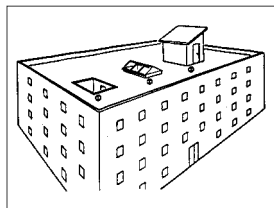
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### Location of Ventilation Openings

- The location of an opening is based on the following 3 things...
  - Natural Openings
  - Offensive or Defensive Operations
  - Building Construction



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## Location of Ventilation Openings

Review...

- **Natural Openings**

Natural openings are “in place” prior to the arrival of firefighters at a structure fire. However, they should only be used when properly located in relation to the fire or contaminants to be ventilated

- **Offensive or Defensive Operations**

Offensive operations will initially place an opening (square or rectangle) as close to the seat of a fire as possible, and defensive operations will initially place an opening (long and narrow) ahead of an extending fire

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## Location of Ventilation Openings

### ■ Building Construction

The type of construction of the building will play a major factor in determining the location of a ventilation opening...

The type of construction = TIME. Based on the type of construction you can make decision on where, when and how.



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## Things to remember...

### Determining where to ventilate...

- ✘ Location of fire
- ✘ Safest, highest point on the roof
- ✘ Direction of wind
- ✘ Existing exposures
- ✘ Obstructions
- ✘ Extent of the fire
- ✘ Note: If the fire has been burning for more than 20 minutes the roof should be considered unsafe

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**Things to remember...**

**Procedures**

- Coordinate with ground and attack companies
- Use existing openings
  - Skylight
  - Monitors
  - Stairway door
  - Scuttle hatches
- Cut one large hole rather than several small
- Extend blunt object to break out ceiling
  - If the roof is too deep for your pike pole what can you do?



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**Things to remember...**

**Safety Precautions**

- Two means of escape
- Wind Direction in relation to exposures
- Weight on the roof
- Cutting main structural supports
- Work with the wind to your back
- Guard opening to prevent falls into the building



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**Things to remember...**

**Safety Precautions** continued

- Maintain communication
  - Work with suppression companies
- Watch for spongy roofs
  - Sound roof
- Overhead obstructions
  - Wires
- Firm footing
  - Roof ladder for support
- Appropriate PPE
- Watch for concealed spaces



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## **Ventilation**

You are only getting the basics.

Truck work take time to master.

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