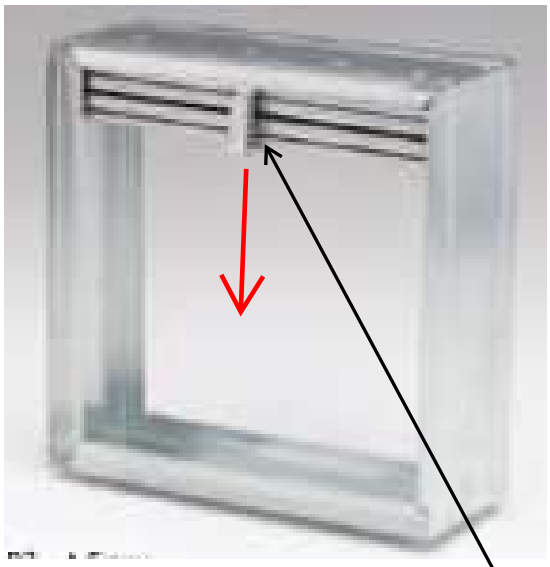
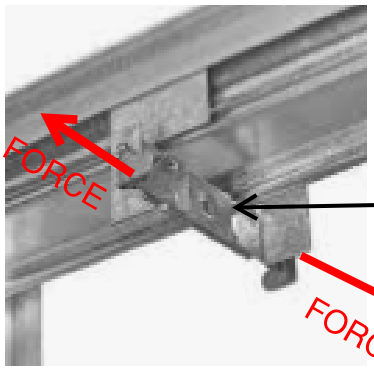
(1) How do **Fire Dampers** (FD) work?





FUSIBLE LINK

"HEAT RESPONSIVE DEVICE"

HEAT

FORCE

FORCE

ULC 33

~~ULC S505~~

Solder is Eutectic Metal (Lead & Tin Alloy)

Eutectic Metal

Solder transitions from solid to liquid (no softening of metals)

ULC-S112 (Canada)
UL 555 (USA)

S112 → NORMAL 74C
MIN 71C
MAX 100C (STATIC)
MAX 177C (DYNAMIC)

STATIC FD vs DYNAMIC FD

BCBC → 30C above max temp

VERTICAL VS HORIZONTAL ORIENTATION

(2) How do **Smoke Dampers** (SD) work?

ULC-S112.1 (Canada)
UL 555S (USA)

SMOKE DAMPERS (SD) VS FIRE / SMOKE DAMPERS (FSD)

no FPR
not necessarily dynamic

FPR
only dynamic

3.1.8.11. Installation of Smoke Dampers

use only FSD

1) Where smoke dampers are used as a *closure* in an air-transfer opening, they shall be installed in the plane of the *fire separation*.

Fire Separation

FSD

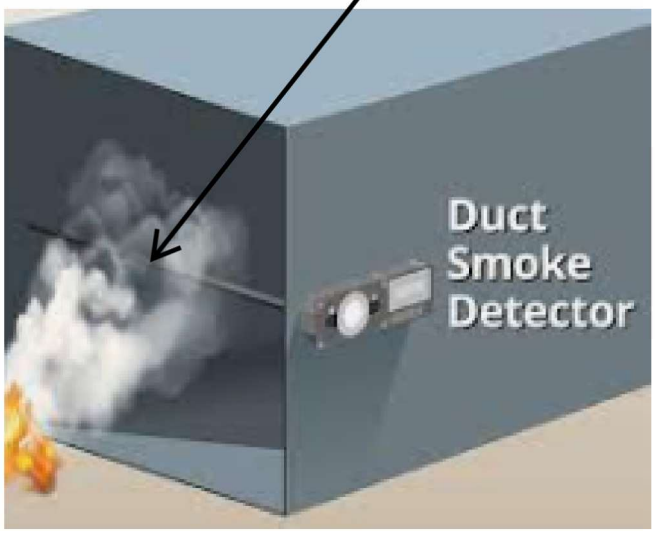
Actuator

AIR FLOW

Direct Connection
(not connected to
fire alarm system)
???

Duct Smoke
Detector

Duct Sampling Tube

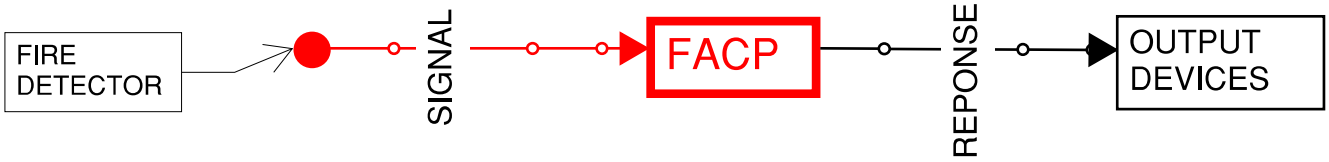


3.1.8.7(2) → 3.1.8.11(3) → 3.2.4.10(1)

(FSD --> 3.1.8.11) (Smoke Det --> down stream of FSD)

3.2.4.10. Fire Detectors

1) *Fire detectors* required by this Code shall be connected to the fire alarm system.

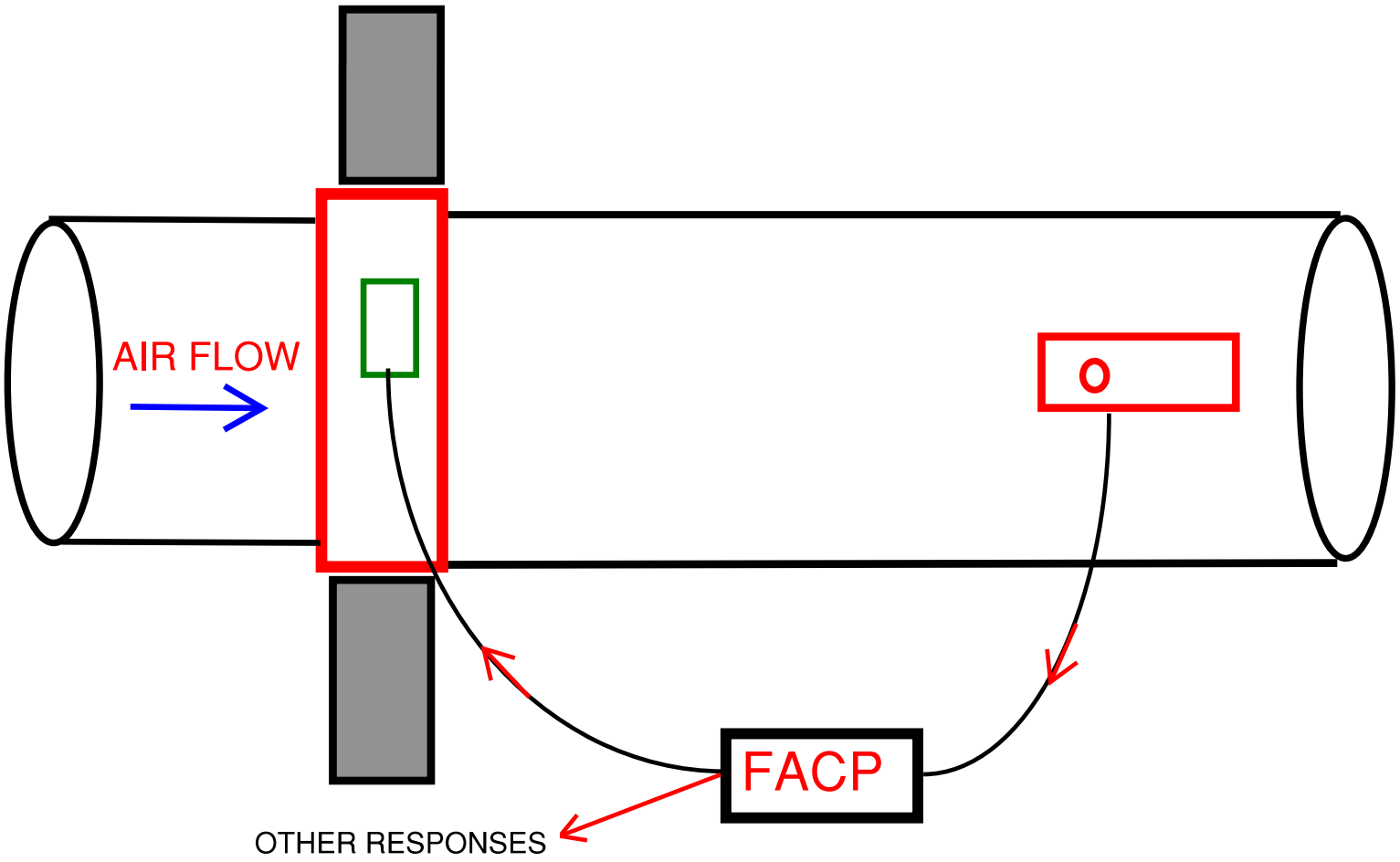


S524

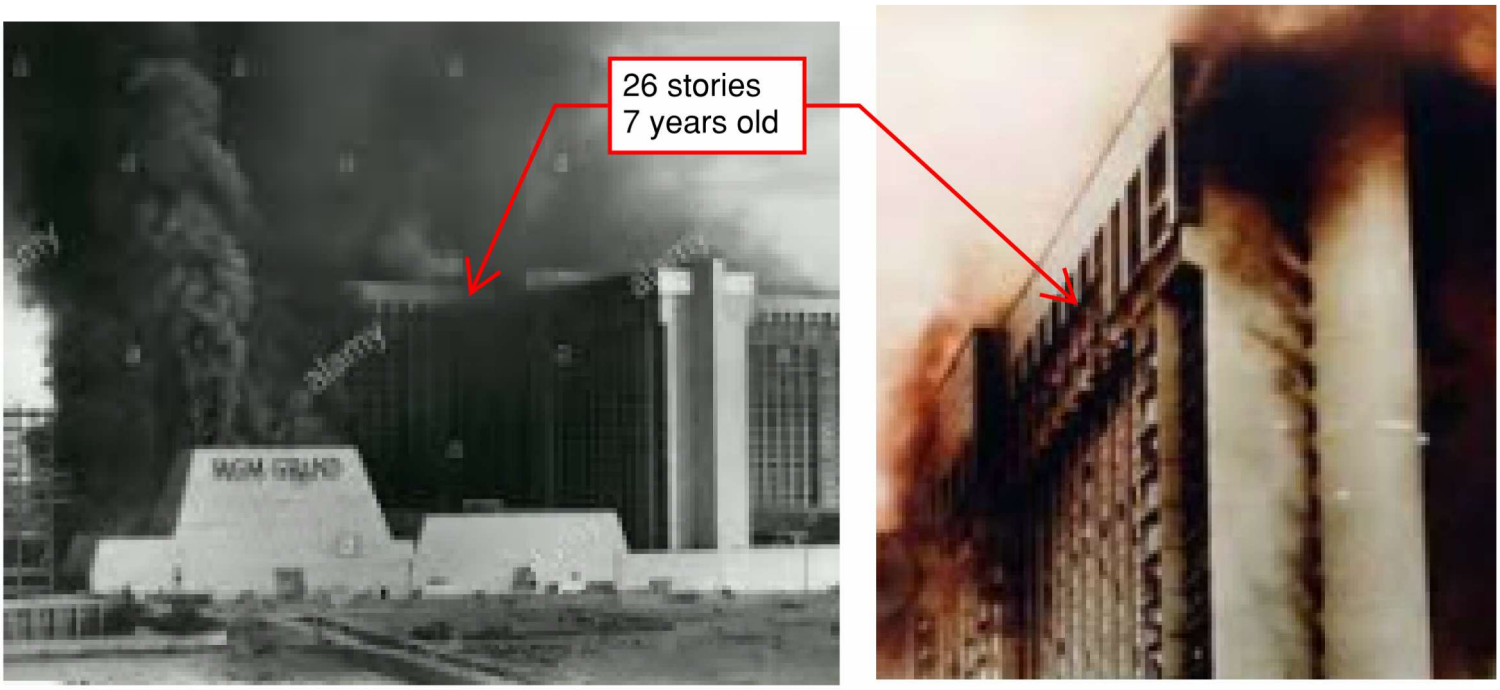
devices.

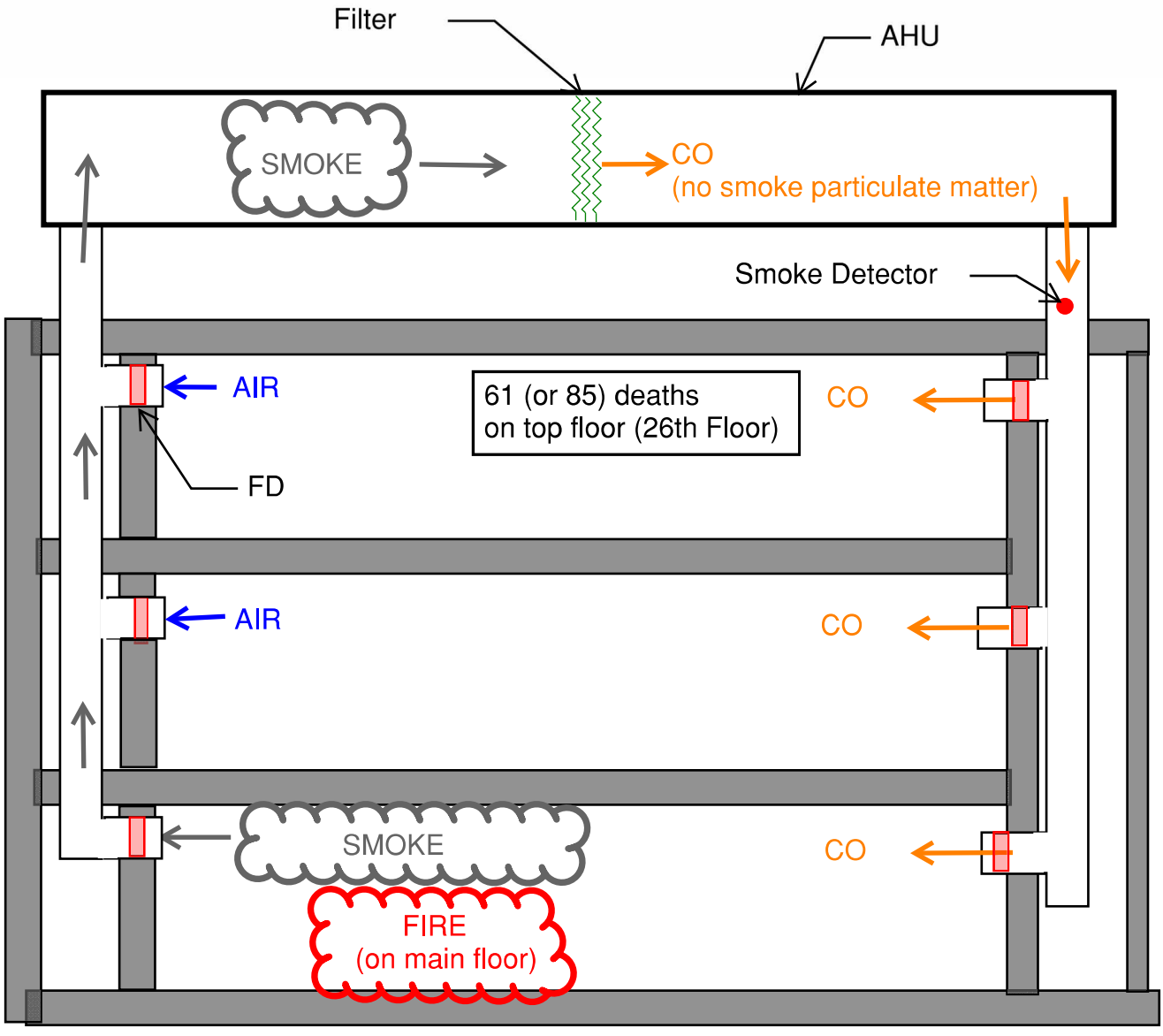
3.3 *AIR DUCT TYPE SMOKE DETECTOR* – A *fire detector* designed to activate when the concentration of airborne combustion products in an air duct exceeds a pre-determined level.

3.4 *AIR SAMPLING TYPE DETECTOR* – A *fire detector* designed to activate when the concentration of

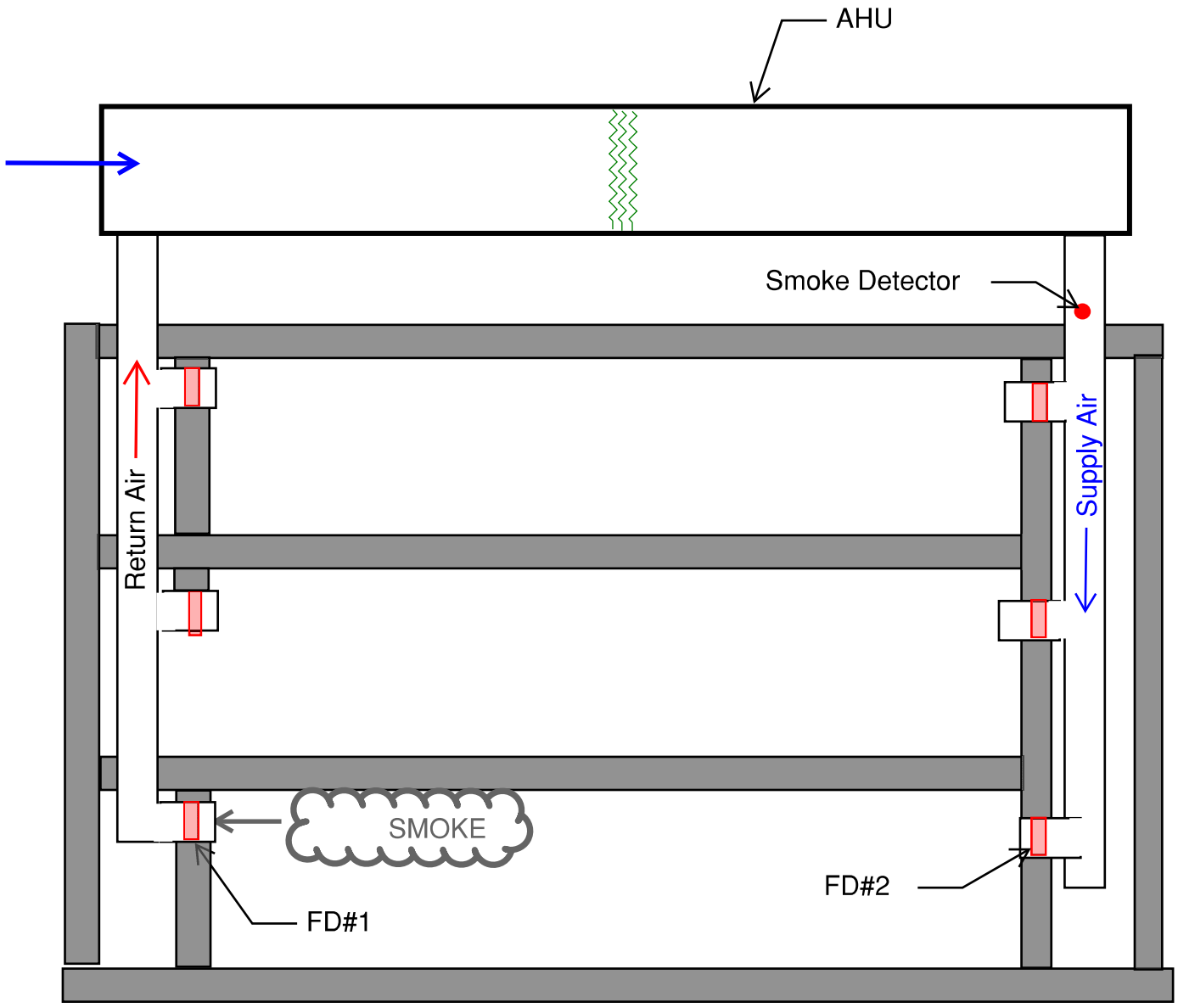


(3) Why are Smoke Dampers now required?





Common Pre-2018 BCBC Design



4 Scenarios

(1) FD#1 does NOT close & AHU operates
smoke & CO pushed throughout building
fresh air is supplied to fire floor

(2) FD#1 does NOT closes & AHU stops
pathways of smoke to other floors / fire compartments (thru ducts)

(3) FD#3 closes & AHU operating
fresh air is supplied to fire floor

(4) FD#1 closes & AHU stops (usual design intent)
pathways of smoke to other floors / fire compartments (thru ducts)
until FD#2 also closes

(4) Smoke Control Strategies

3.2.4.12. Prevention of Smoke Circulation

1) If a fire alarm system is installed, an air-handling system shall be designed to prevent the circulation of smoke upon a signal from a duct-type *smoke detector* if the air-handling system

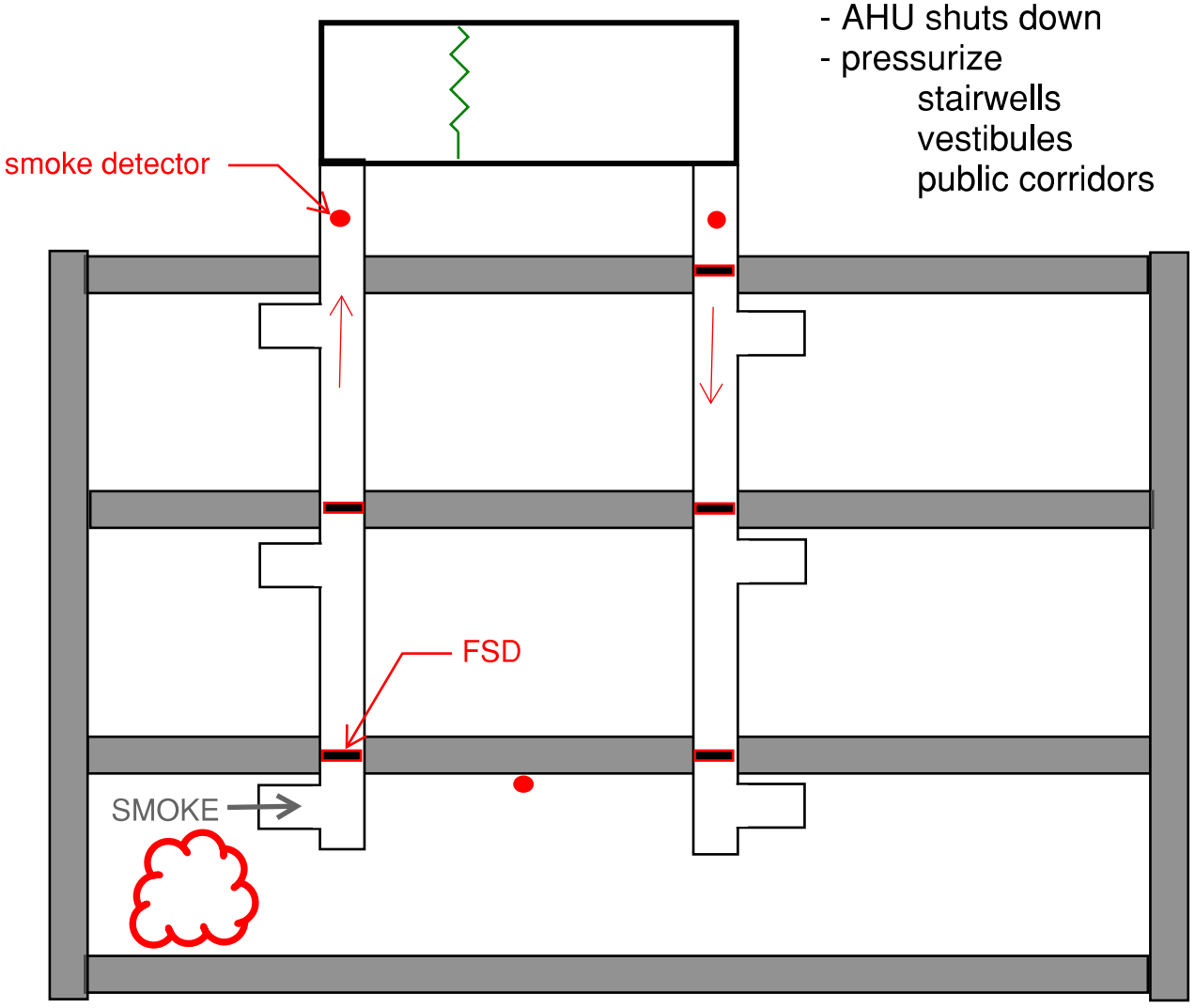
a) serves more than one *storey*,

b) serves more than one *suite* in a *storey*, or

c) serves more than one *fire compartment* required by Sentence 3.3.3.5.(2).

LOCK DOWN STRATEGY

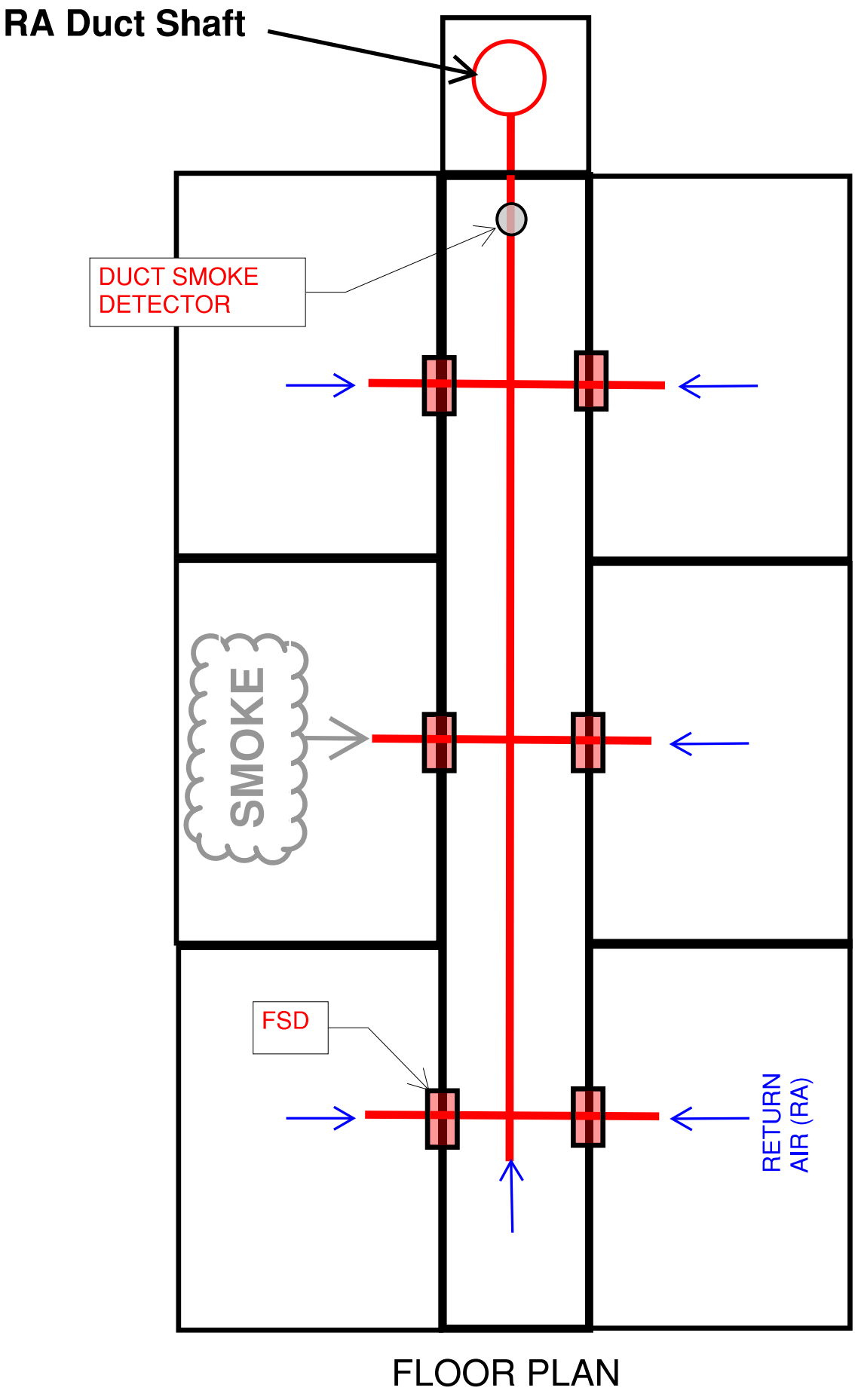
Upon Activation of FA (for whatever reason)
- Close all FSD
- AHU shuts down
- pressurize
  - stairwells
  - vestibules
  - public corridors



Other Strategies
- Isolation System (lock down fire floor only)
- Sandwich System (pressurize floors around fire floor)

BI should be asking - "What is the Smoke Control Strategy?"

(5) Is a Smoke Detector required at every FSD?



FLOOR PLAN

3.1.8.11. Installation of Smoke Dampers

3) Except as required by a smoke control system, smoke dampers and combination smoke/ *fire dampers* shall be configured so as to close automatically upon a signal from an adjacent *smoke detector* located as described in CAN/ULC-S524, "Standard for Installation of Fire Alarm Systems" within 1.5 m horizontally of the duct or air-transfer opening in the *fire separation*

a) on both sides of the air-transfer opening, or

b) in the duct downstream of the smoke damper or combination smoke/ *fire damper*.