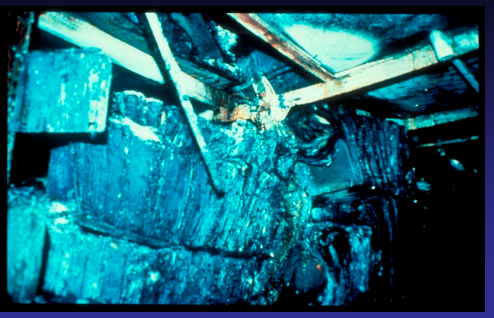
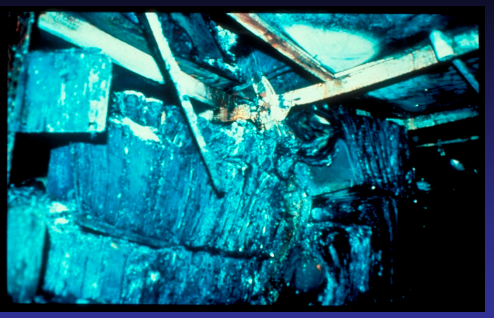





# Fire Protection:

# An Historical Overview

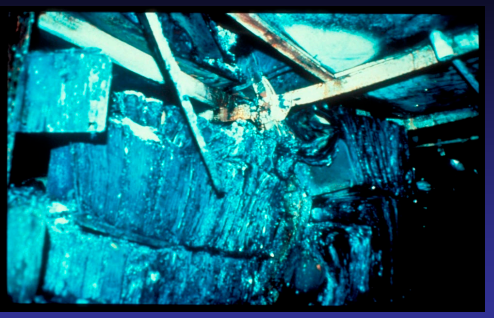
J. Andrew Wilson
Associate Director for Fire Protection & Safety
Smithsonian Institution




## 22nd Annual Preservation Conference

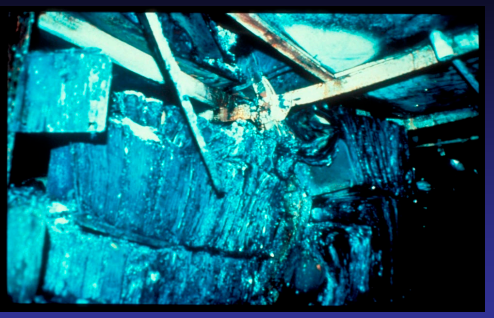
Cultural properties and assets have been damaged or destroyed by fire for thousands of years.

- Library of Alexandria
- Library of Congress – 1814; 1851
- Smithsonian Institution – 1865; 1970; 1976
- Canada's Stonewall Museum - 2007
- South Korea's Namdaemun Gate - 2008





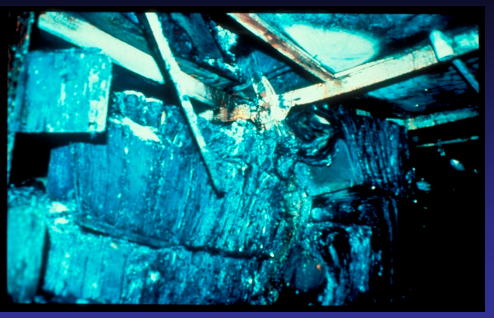

# What Has Been and What Can Be Done to Preclude Future Losses to Our Cultural Heritage from Fire?





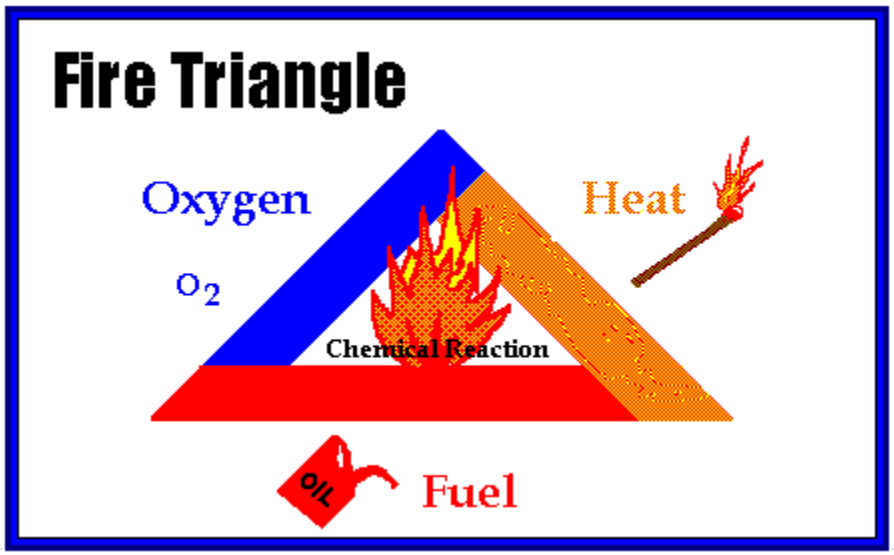

Historically, means to control unwanted fires can be broken down into three general areas:

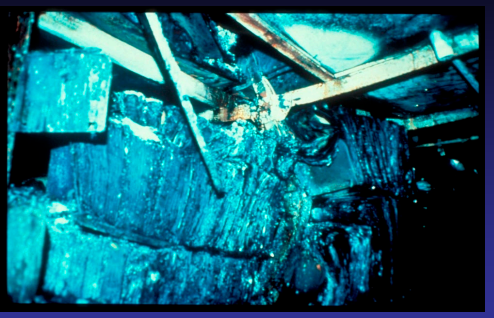
- fire prevention
- passive fire protection (construction)
- active fire protection (automatic detection & suppression systems)






**Fire Prevention** = Working the Fire Triangle



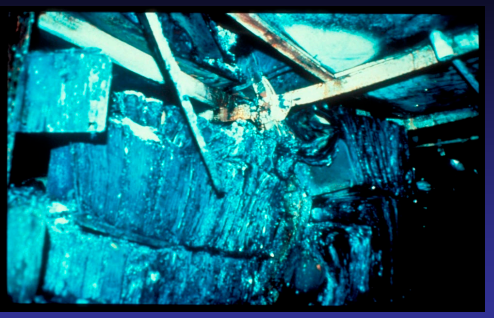





Oxygen - Makes up about 21% of the air we breathe. To sustain a fire, a ratio of > 16% of oxygen is needed.

Fuel - Can be any combustible or flammable material, and may be a solid, a liquid, or a gas. Almost anything we put into a building.

Heat - Open flames, hot surfaces, sparks, friction, chemical reaction, electrical energy.

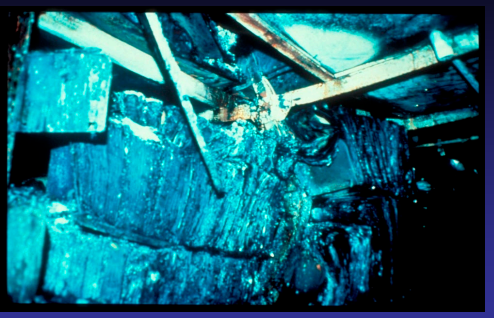





# **Passive Fire Protection**:

Structural fire protection – build to resist fire and prevent its spread

Compartmentalization – divide and conquer theory




## 22nd Annual Preservation Conference

**Building Codes** = Building safety (probably 70% relate to fire protection)

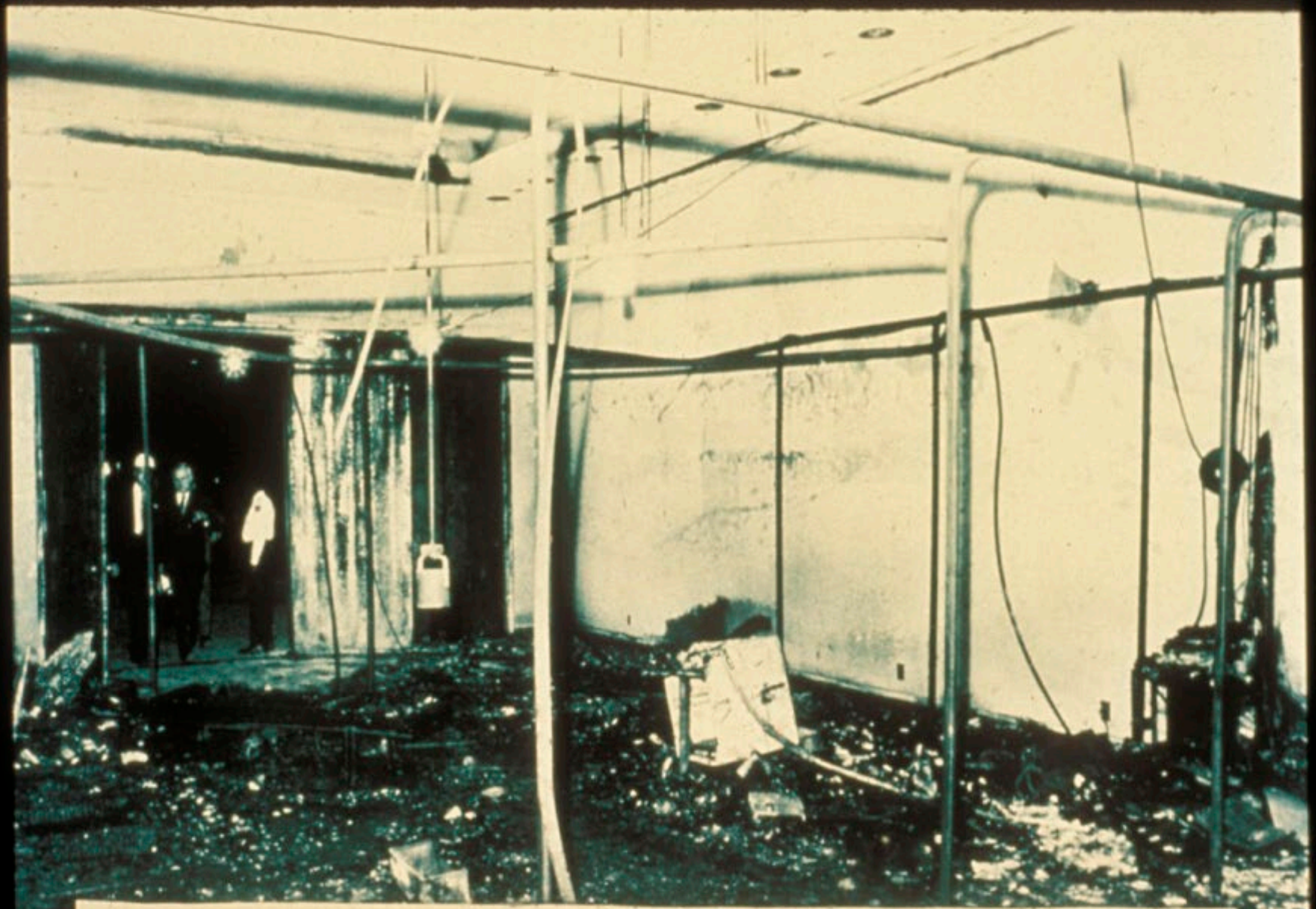
**Tombstone Legislation**: After practically any major fire, particularly those involving a large loss of life, building codes are changed in an attempt to preclude similar occurrences.

**Building Codes = BARE MINIMUM SAFETY STANDARD**

Code of Hammurabi: "If a builder builds a house for someone, and does not construct it properly, and the house which he built falls in and kills its owner, then that builder shall be put to death." – 1750 BCE

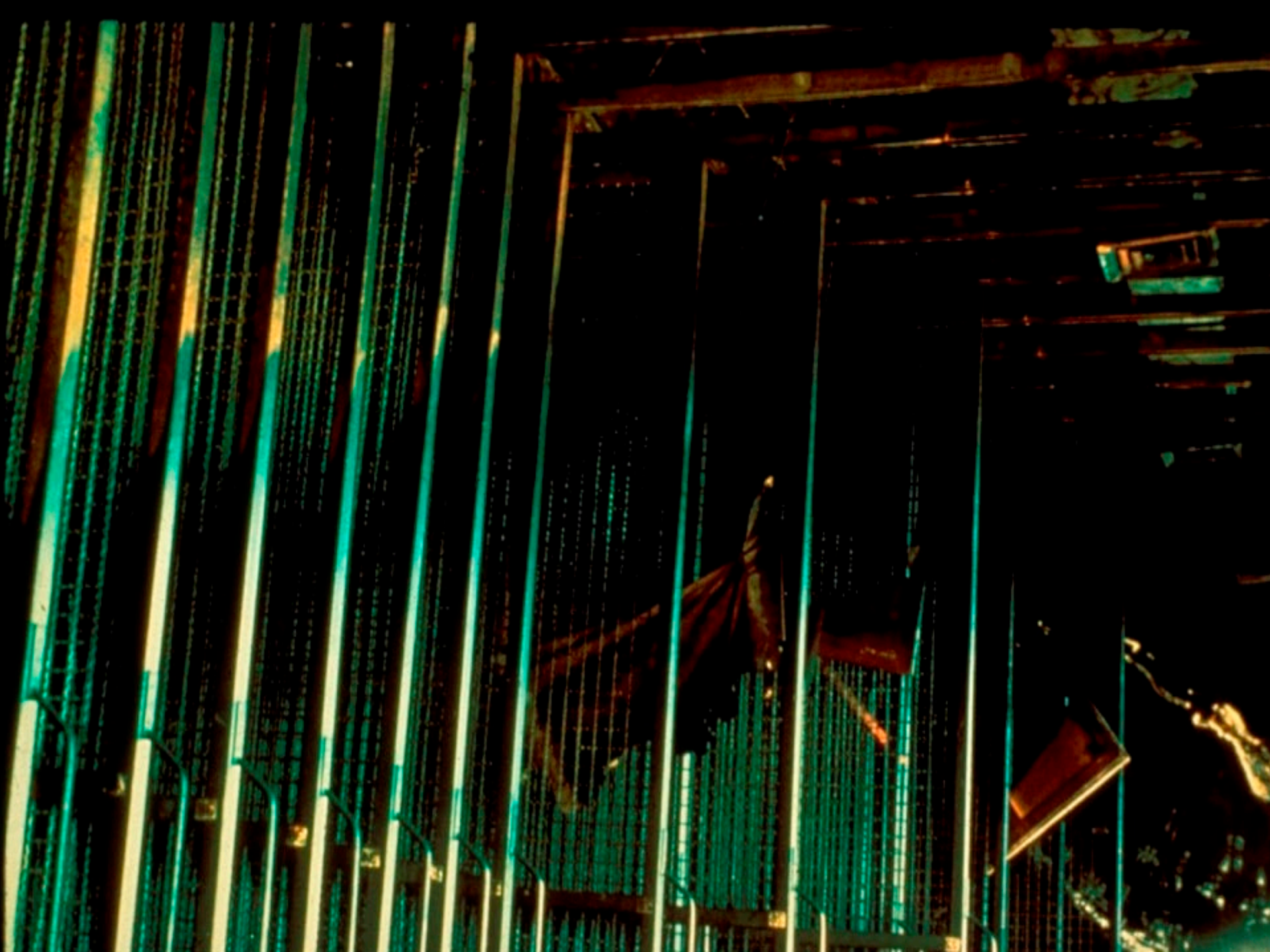
"If an architect designs a building, and it is constructed per design, and the building subsequently catches fire, then that architect shall be held accountable."

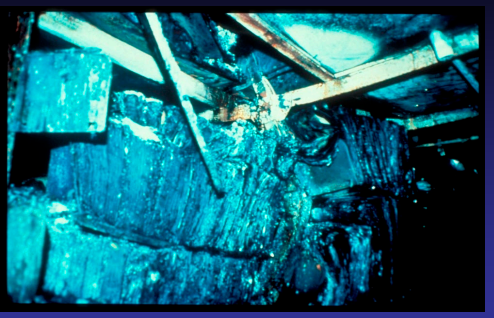
1 Shows the exhibit in use a few days before the fire. A young visitor is shown operating the IBM-2260 keyboard/display console. The visitors are watching the display panel, or the front of the exhibit "wedge". The "wedge" houses the IBM 1051 terminal, a television display, projectors, and associated audio, signal and electrical equipment.



# 3 Fire scene looking to the west, towards the fire doors that controlled fire spread into the numismatics and Glass Exhibits.


# 6 View of fire damage in the numismatics Hall, looking toward one of the computer exhibit hall doors. Despite the burn-off of combustible

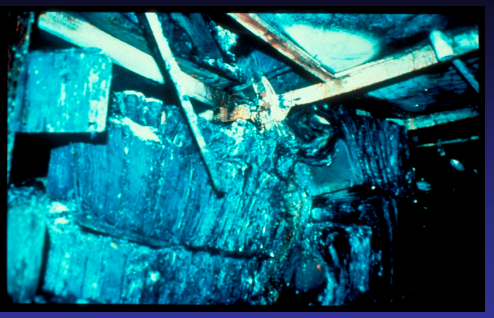







# Active fire protection

- Automatic fire detection systems
- Automatic fire suppression systems






# Automatic fire detection systems:

- Heat detectors – rate-of-rise; fixed temperature
- Smoke detectors – ionization; photoelectric; air aspirating; visual
- Flame detectors - visual