

ALLANA BUICK & BERS

Making Buildings
Perform Better

**HCCA:
Retrofit Fire
Protection Systems**

Presented by:

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OVERVIEW:

- 37 years experience with the engineering and operation of building mechanical systems.
- Initial project investigation, the supervision of field monitors and technicians, sampling and testing analysis, quality assurance, construction documents.
- Managing and monitoring all aspects of building construction with special attention towards the replacement and upgrade of:
 - Building HVAC systems
 - Plumbing and Piping Systems
 - Fire Protection Systems
 - Energy Management Systems
 - Solar Thermal and Solar PV systems
 - Energy Audits



Objectives

- **High-Rise Fire Safety Checklist**
- **City & County Codes**
- **NFPA Standards**
- **Sprinkler Systems**
- **Fire Pump**
- **Stair Pressurization Fans**
- **Sprinkler Retrofit during Cast Iron Replacement**
- **Standpipe Systems**
- **Challenges to Retrofitting a Fire Protection System**



High-Rise Fire Safety Checklist

- Install smoke alarms near sleeping areas
- Frequently check for accumulation of combustible materials
- Check for possible ignition sources
- Keep exit ways unobstructed
- Periodically check that lights are in working condition
- Fire extinguishing equipment should be in good working order and unobstructed
- Report all hazards to the building management



Safety-Checklist: Household Fire Extinguisher

- NFPA 10 – Standard for Portable Fire Extinguishers
- Select multi-purpose extinguisher, which is not so heavy and easy to handle
- Install fire extinguishers in accessible locations
- Extinguisher should be tested and labeled by an independent testing laboratory
- Fire extinguisher should have ABC ratings
- Typical rating for household usage: 3-A:40-B:C
- Operating an extinguisher, remember the word **PASS**
- **P**ull the Pin
- **A**im Low
- **S**queeze the lever slowly
- **S**weep the nozzle from side-to-side
- **I**nspect annually



City & County of Honolulu Codes

- **Revised Ordinances of the City and County of Honolulu (ROH 1990)**
- **ROH 1990 Chapter 20 - Fire Code of the City & County of Honolulu**
- **ROH 1990 Chapter 20 - 2012 National Fire Protection Agency (NFPA) 1 Fire Code**
- **Waive Plan Review fee if Fire Sprinkler system installed in compliance with NFPA 13**
- **Bill 69 CD1 – Amends ROH CHPTR 20 to require that all high rise buildings be protected throughout by an approved automatic sprinkler system installed by January 1, 2030**



NFPA Standards

NFPA 13 – Standard for the Installation of Sprinkler Systems

NFPA 14 – Standard for the Installation of Standpipe and Hose Systems

NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 72 – National Fire Alarm & Signaling Code

NFPA 92A – Standard for Smoke-control

Systems Utilizing Barriers and Pressure Differences



Fire Protection Systems & Devices

- Fire Sprinklers
- Alarms and Signaling
- Supervised Control Valves
- Stairwell Pressurization Fans
- Fire Pump
- Standpipe Systems



Types of Sprinkler Systems

- **Wet Pipe System**
 - Most common type of system
 - Used where there is no risk of freezing
 - Required in high-rise, multi-story buildings
 - Uses automatic design which discharges water immediately from sprinklers opened by heat from fire
- **Dry Pipe System**
 - Pipes are filled with pressurized air rather than water
 - Used where there is a risk of frost damage
- **Deluge System**
 - Used in places considered high hazard: power plants, chemical storage, processing facilities
- **Pre-Action System**
 - 2-step process



Fire Sprinkler Systems

- **Reliable fire protection method**
- **Costs less than \$2/sq. ft. in new buildings and approx. \$10/sq. ft. in existing buildings**
- **Head A - Has a glass bulb filled with liquid which expands then heated**
- **Head B - Has two metal plates soldered together. Solder melts, releasing the plug**



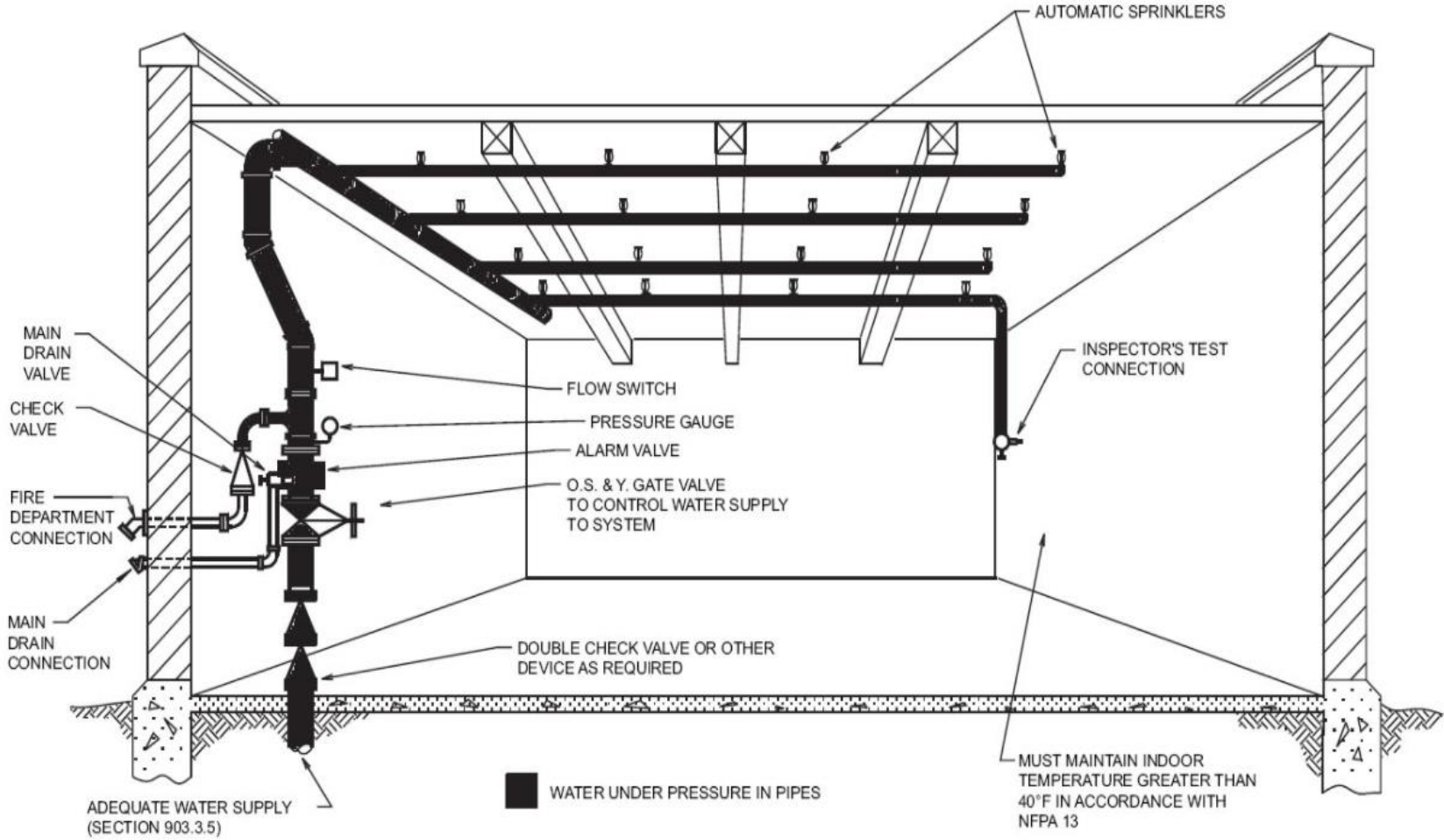
Sprinkler Head A



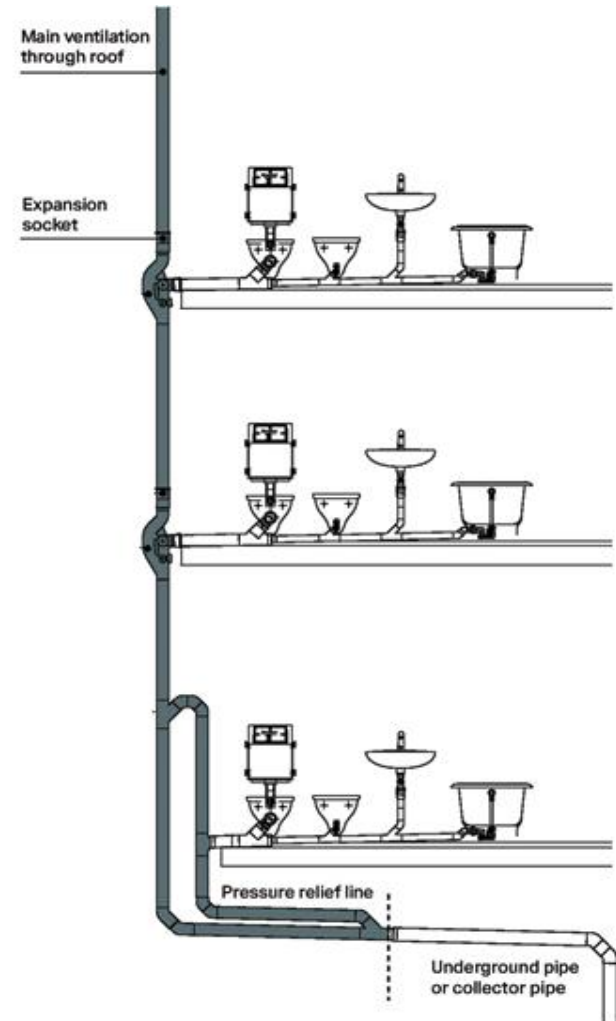
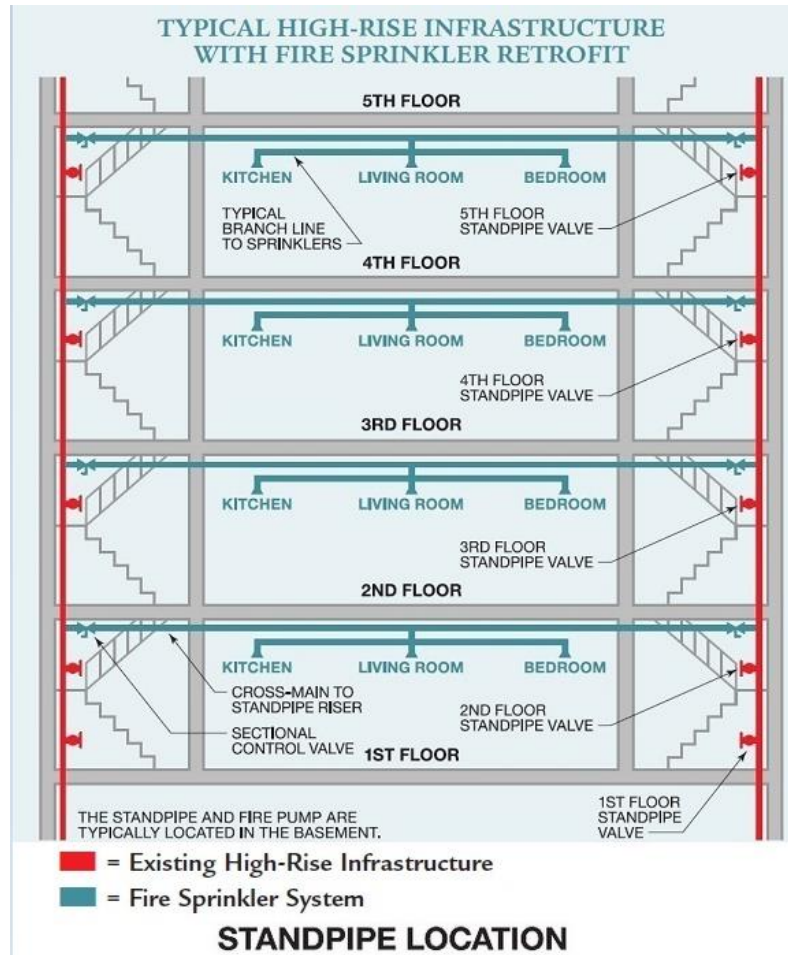
Sprinkler Head B



Sprinkler System Layout



Sprinkler System / Cast Iron Waste Piping



Sprinkler Retrofit During Cast Iron Replacement

- Perhaps less inconvenience to residents
- Potential exists for combined scope of work savings

- Fire sprinkler system pipes are laid out horizontally as compared to vertical cast iron waste piping
- Different contractor crew staffing
- Different location for risers



Fire Pump

- **NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection**
- **Needed for high-rise buildings for which local municipal water system cannot provide sufficient pressure to meet hydraulic design requirements of the fire sprinkler system**



Fire Pump

- **Part of the sprinkler system's water supply**
- **Powered by electricity and diesel**
- **Pump is either connected to public underground water supply piping or a tank reservoir**
- **Pump provides water flow at a higher pressure to the sprinkler system risers and hose standpipes**
- **Fire pump starts when the pressure in the sprinkler system drops below a threshold**
- **Pumps should be power independent of local electricity and must be connected to an emergency generator**



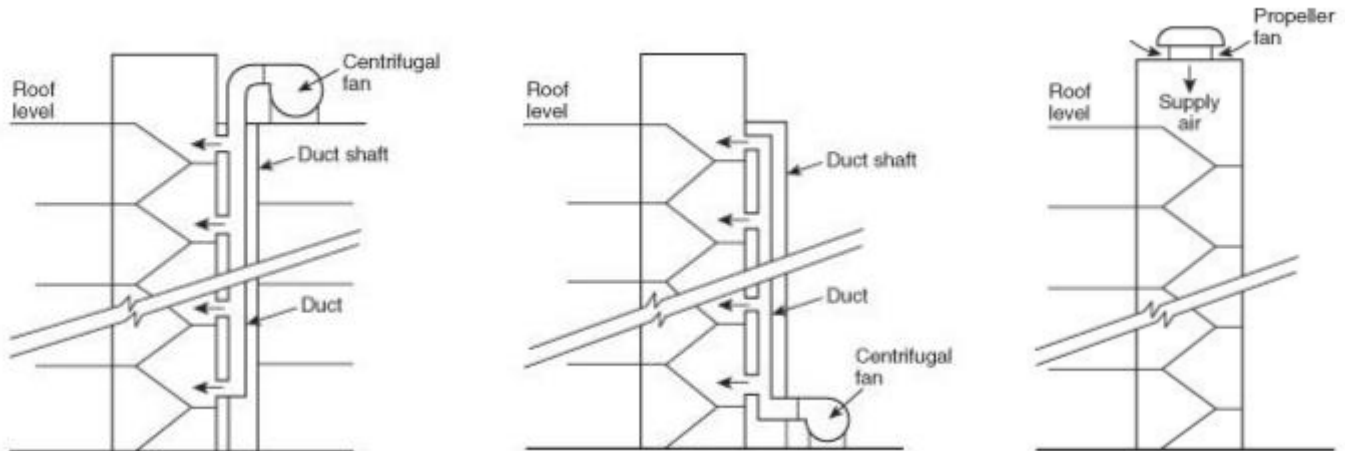
Stair Pressurization Fans

- **NFPA 92A – Standard for Smoke-control System Utilizing Barriers and Pressure Differences**
- **During firefighting process every second is precious**
- **Pressurized staircases keep exit routes smoke free in an event of fire**
- **Mechanically driven fresh supply air into each protected space to maintain higher pressure than the fire zone**
- **Needs relief path**



Stair Pressurization Fans cont.

- Pressurization fans must be connected with emergency generator
- Pressurization fans can be located at ground level, roof level, or any location in between
- Propeller fans should be used with windshields



Dry Standpipe Systems

- **NFPA 14 – Standard for the Installation of Standpipe and Hose Systems**
- **Built in a vertical or a horizontal position to which fire hoses can be connected**
- **Dry Standpipes can only be used by firefighters**
- **Dry standpipes are to be tested every five years**



Wet Standpipe Systems

- **NFPA 14 – Standard for the Installation of Standpipe and Hose Systems**
- **Built in a vertical or a horizontal position to which fire hoses can be connected**
- **Wet Standpipes are filled with water and pressurized at all times**
- **Wet Standpipes can be used by building occupants**



Challenges to Retrofitting

- **Space for fire booster pump**
- **Existing water service may not be adequate for fire sprinkler**
- **Existing emergency generator may not be adequate for stairwell fans and booster pump**
- **Existing structure conditions and considerations**
- **Parking structure beneath tower may also require fire sprinklers**
- **Fire alarm system improvements**
- **Stairwell pressurization fan integration**
- **Distribution piping integration within building**

