



Water Damage Mitigation Strategies in the Healthcare Environment

North Carolina Healthcare Engineers Association Spring Conference

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Agenda

Water Damage Risk Assessment

Pre-planning / Emergency

Mitigation and Response

Overview

Where do you begin?



Know Your Risk

Business Impact Analysis for your facility, operations, or equipment.

- Is the building and its contents highly susceptible to water damage?
- Will damaged areas interrupt or stop normal operations?
- Will damaged equipment be difficult to repair, restore or replace?



Know Your Risk

Additional items to consider include...

- Interior finish, furnishings and fixtures
- Unheated building areas
- Building equipment at or below street level
- Proximity to roof level
- Building age and updates



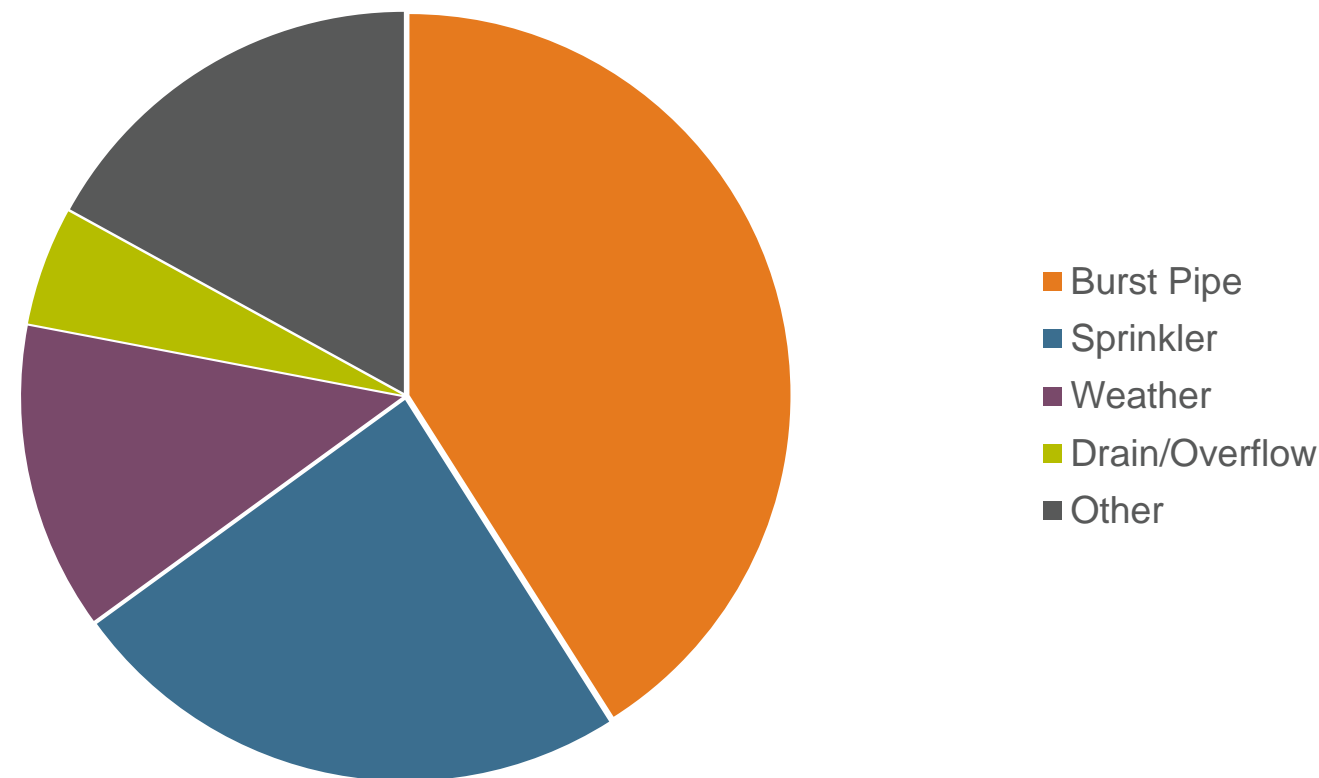
Sources of Water Damage

A Deeper “Dive” into Water Damage

Water damage claims reviewed to identify “root causes”

- 41% Burst Pipe
- 24% Sprinkler
- 13% Weather
- 5% Drain/Overflow
- 17% Other

Water Driver Causes



Causes of Water Damage Losses

Contributing factors to water damage losses:

- Delayed shut-off (valve location and identification)
- Inadequate drainage
- Improper design
- Insufficient or displaced insulation
- Human error



Causes of Water Damage Losses - Interior

A “Deeper Dive” into Water Damage

There are a myriad of interior causes for water damage. Some of the causes we have seen include:

- Design errors
- Improper installation
- Normal wear and tear of installed systems and equipment
- Improper modifications or additions to installed systems and equipment
- Lack of preventative maintenance
- Budget restrictions on predictive replacement
- Seasonal factors (freezing temperatures)
- Facility modifications
- Damaged domestic plumbing along with fire protection sprinkler piping
- Damaged or deteriorated roofing systems
- Blocked or inadequate drainage piping and related systems



Causes of Water Damage Losses - Interior

Healthcare Specific

There are a myriad of interior causes for water damage specific to the healthcare industry. Some of the causes we have seen include:

- HVAC Condensate Pans and Drains (especially above OR's)
- Chilled water piping (aging infrastructure/poor installation)
- Dialysis Departments (back flush cycles—use of empty patient rooms)_
- Ice Machines, Coffee makers
- Sprinklers (inadvertent breaking)
- Concealed attic sprinklers (non-heated combustible construction)
- Clogged sewage (use of wipes)
- Public restrooms (vandalism)
- Construction (grip and rip)
- Roof leaders (use of no-hub couplings)
- PTAC Units (Just don't go there!!)



Causes of Water Damage Losses - Exterior

Roofing Facts

The National Roofing Contractors Association (NRCA) has classified “undesirable” ponding water as standing for more than 48 hours, although ponding can pose a threat in even shorter time spans.

Since a 1–inch deep pond weighs 5.2 pounds per square foot, the additional weight of the load may pose a threat to the structural integrity of the building.

“Proactively maintained roofs last an average of 21 years compared to an average lifespan of 13 years for reactive maintenance.”

- BUILDINGS

Annual maintenance cost is about 1 percent of the cost of a roof replacement. You can spend 10 cents per year per square foot on maintenance, or \$10 per square foot or more for a roof replacement.

Over the 80-year lifespan of a building:

- A well maintained roof will likely be replaced three times.
- A poorly maintained roof will likely be replaced five times – a 40 percent increase in replacement costs.



Source: BUILDINGS (https://www.buildings.com/news/industry-news/articleid/13887/title/commercial-roof-maintenance-a-proactive-approach#_ednref1)

Causes of Water Damage Losses - Exterior

Roof Inspections

A failure involving any roof system components can cause leaks, resulting in:

- Insulation integrity
- Rot or deterioration
- Mold or vegetation growth
- Ponding or water retention



Causes of Water Damage Losses - Exterior

Periodic roof inspection can check for:

- Condition of roof covering
- Improper drainage
- Debris accumulation
- Flashing and coping
- Snow build-up*



Flood Waters and Surface Water Run-off



Causes of Water Damage Losses - Exterior

Flood Facts

The National Flood Insurance Program (NFIP) reports that one foot of water in a 1-story building causes content damage averaging **27 percent** of the total cost to replace.

At 2 feet, the average cost is **52 percent**.

Structural damage is also much greater than many people contemplate. A one-foot flood can cause damage equivalent to **16 percent** of the single story structure value.

When the depth of flooding increases as high as 2 feet, the damage is estimated to be **29 percent** of the structure value.

Flood Waters

Planning and Preparation

Water may enter your building from storm water runoff, or known flood exposures such as rivers, streams or other bodies of water.

If your building is near a body of water or in a designated flood zone, you must develop a plan to reduce the exposure and to safeguard your property from the rising waters.

The FEMA web site provides advice in regard to flood preparation and mitigation (www.ready.gov/floods).

Surface Water Run-off

Planning and Preparation

Even if your building is not near a body of water or in a designated flood zone, it may still be at risk to surface water runoff.

Awareness and preparation items can include:

- Observe run-off and channeling during heavy rain
- Note changes in topography or adjacent exposures (new construction)
- Observe drainage, discharge and accumulation from your property
- Seasonal review (e.g. fall leaves, winter snow, summer construction, spring thaw)

Flood Waters and Surface Water Run-off

Historic experience / Loss Lessons

- Separation of materials from floor surface
- Periodic drain inspection and clearance (Set up in PM system)
- Changes to drainage areas (diversion, barrier walls)
- Flood response and mitigation plan

Pre-Planning, Mitigation, and Emergency Response Considerations

A graphic showing a close-up of an "Emergency Checklist" form. A red highlighter is pointing to the title. The form has a blue header with the text "FLOOD • FLASHFLOOD • EARTHQUAKE • FIRE". Below the title, there is a red square icon with a white letter "T" and some text that is partially obscured but appears to say "The next time disaster strikes, you may not have much time to... Please review...".

Emergency Checklist

he next time disaster strikes, you may not have much time to... Please review...

Pre-planning & Emergency Response Considerations

While most facilities have emergency plans that address fire, severe weather and other likely emergencies, water damage is often overlooked.

All good preparedness begins with pre-planning & a written Emergency Response Plan:

- Facility Condition Assessments
- Source Identification
- Hazard Vulnerability Assessment for all sources
- Identify high hazard exposure to critical or high values equipment
- Incorporation of flow control/monitored moisture sensing technology in new and existing facilities
- Procedures for Prompt Notification of Key Personnel
- Training of Key Personnel/Maintenance
- Maps and drawings identifying piping and source valves
- Clean-up Resources available onsite
- Call-tree – Contractors/Abatement companies

Pre-planning and Emergency Response Considerations

Flood Waters and Surface Water Run-off

Other considerations can include:

- PM for water handling equipment (sumps, pumps, vacuums)
- Predictive replacement schedule for water handling equipment
- Back-up power to critical equipment
- Reprogramming elevators to upper floor overnight

Plumbing Failure Insights

Some startling numbers regarding small diameter piping

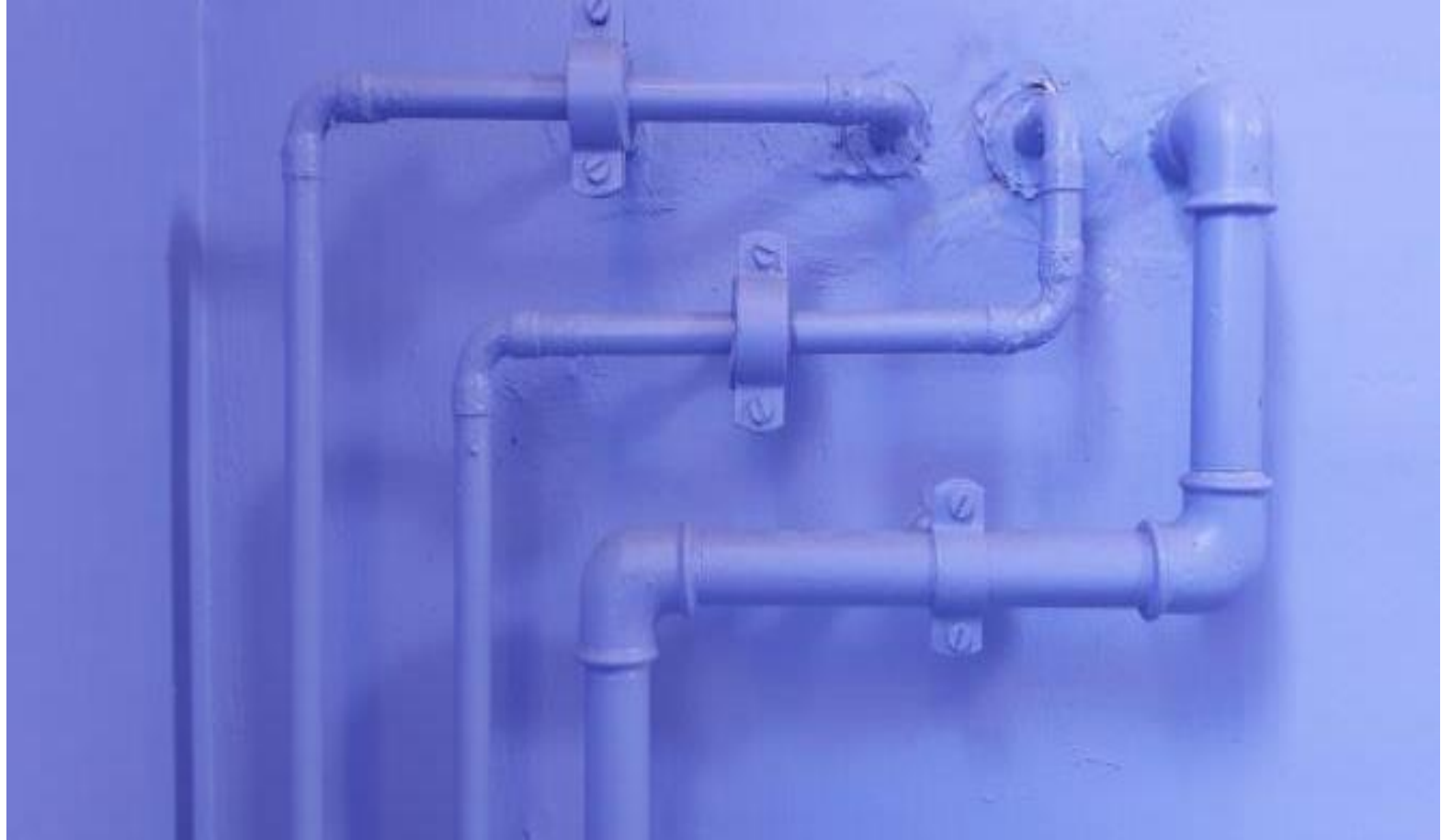
- A 1-inch diameter supply line flows **almost 4 times more water than a half-inch line.**
- A broken 2-inch supply line flows over 125 gallons per minute at 55 psi — **this amounts to 2,500 gallons in 20 minutes.**
- In high rise structures, it is likely that **multiple floors will be impacted** when these types of plumbing failures occur



Plumbing Failure Insights

Delay Means Damage! Time is of the Essence.

- Do you know the location of all fire protection water supply and domestic water supply valves?
- Do you exercise them?



Pre-planning and Emergency Response Considerations

Mitigation Preparation

- Establish a Reporting System w/ Investigation Protocols to track water damage related events
 - Identify recurring events
 - Prioritize events
 - High Risk/High Loss event
 - Regulatory required
 - Track spending
- Investigations with fundamental causes identified resulting in changes to Policies, Processes, & Procedures
- Remedial Actions to Correct Deficiencies
 - Wet Pipe and Dry Pipe automatic sprinkler specifications and assessments
 - Dialysis Equipment repairs
 - Minimum requirements for location of Dialysis Equipment during flush cycle

Pre-planning and Emergency Response Considerations

Mitigation Preparation (continued)

- Established system agreements with contract environmental services
- Established guidelines for minimum flood mitigation equipment/ inventories and site locations
- Updated minimum construction Facility Standards for new facilities
- Reviewed Preventative Maintenance procedures for risk-specific contributors to water damage
(Ex: air handling unit condensate pan drains)
- Performed Facility Condition Assessments to identify infrastructure past its useful life. (Water, Sewer, roofs)
- Implementation of Flow Restriction and remote monitoring devices

Pre-planning and Emergency Response Considerations

Cold Weather Preparation

- Building envelope and insulation
- Mechanical systems and equipment readiness and reliability
- Automatic Fire Sprinkler protection ITM (dry pipe systems, heat sources, low point drains)
- Supplemental or stand-by equipment availability
- Temporary modifications to building or interior finish
- Adequate maintenance on water / liquid handling systems and equipment

Pre-planning and Emergency Response Considerations

Preventative/Responsive

- Continued Facility Condition Assessments (Plumbing, fixtures beyond useful life)
- Incorporate flow control/monitored moisture sensing technology in new and existing facilities
- Developed current one-line drawings of water supply lines indicating all shut-off valves
- Implementing system-wide review on restricted use of cloth wipes and system-wide implementation of toilet screens/traps for those patient care facilities that continue to use wipes
- Use of devices by facilities maintenance to minimize fire sprinkler water flow damage during inadvertent flow

Pre-planning and Emergency Response Considerations

Tools of the Game



Flow Sensing/Control Device



Toilet Wipe Trapex



Moisture Sensing/Control Device



Sprinkler Shutgun

Pre-planning and Emergency Response Considerations

Responding to Water Leaks and Overflows

- Procedures
- Procedures
- Procedures

It is important to develop procedures to ensure the **reporting of all leaks or blocked drains** and prompt corrective action is taken. Small events can grow into large high-valued loss events quickly.

Pre-planning and Emergency Response Considerations

Restoration

- Maintain comprehensive water intrusion Facilities Management/Emergency Management written response plans
- Include water damage and prioritize types of events in each facility's Emergency Management Hazard Vulnerability Analysis (HVA)
- Response plans should contain:
 - Call tree for internal response and for external vendor/engineering response
 - Location of facility response equipment and supplies based upon HVA (such as leak diverters, piping supplies, wet vacuums, etc.)
 - Building water supply line diagrams with the location of shut-off valves (that have been exercised and maintained)
- Annual review and updates of the Response Plan for effectiveness and ensure it is all inclusive based upon actual events
- Continued use of event tracking notifications to facilitate a change agent process



Questions

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Thank You

