



Risk Control

Water Damage Mitigation — A Guide for Emergency Planning

One of the first steps in developing an emergency action plan is anticipating both the type and nature of potential emergencies. While it is common for emergency plans to address fire and severe weather, all too often one of the most destructive and frequent type of an emergency event — water damage — is overlooked. In fact, a recent review of five years of reported property losses in buildings with finished spaces¹ found water damage losses were more frequent than fire, wind storm, lightning and hail losses combined.

Water can be one of the most destructive agents when released into a building — especially in buildings with interior finishes that are not designed for a wet environment. Water can cause hard floor surfaces to buckle, and ruin carpeting, ceiling tile and drywall, and even small leaks that aren't corrected can cause building materials to rot creating an environment for mold growth.

Understanding the sources of water damage losses and taking steps to address them before a loss can pay dividends in the long run.

Sources of Water Damage

There are three major sources of water damage for buildings. These include:

- Building systems that supply, remove, or use water (such as HVAC equipment).
- The building envelope including exterior walls, doors, windows and the roof. The primary purpose of the building envelope is keeping conditioned air inside and preventing water intrusion into the building.
- Water from outside sources or an unintended inside source. Managing and responding to surface water, back up of sewers and drains and flood hazards is a key risk control element for a property owner.

Causes of Water Damage Losses

A review of large water damage losses² reported over a 24-month period uncovered some compelling facts:

- 70 percent were from water supply lines (fire and domestic). Most of these were caused by burst pipes during cold weather.
- 10 percent were the result roofs that were either damaged by a storm, or were in poor condition prior to the loss.
- 5 percent were related to blocked drains or overflowing containers.

¹ Finished spaces include building with drywall, floor coverings, and insulation such as offices, hotels, retail educational and professional services

² Defined as a single water damage event valued over \$100,000

Several contributing factors to water damage losses were identified. These include:

- Delays in shutting off the water supply valves. In several losses, the water continued to flow until a maintenance engineer was called back to the site.
- Failure to properly drain dry pipe sprinkler system condensate prior to and during cold weather.
- Installation problems with dry pipe systems which allowed water to accumulate in low points without drainage.
- Attic insulation that was disturbed by a contractor and never properly replaced, allowing pipes to freeze.

A damaged water supply line can deliver tremendous volumes of water under pressure. Consider the following:

- 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 — which works out to 2,500 gallons in 20 minutes.

From the information above its clear preparing for a water damage emergency is important for any business.

Water Contamination Facts

According to the Standard and Reference Guide for Professional Water Damage Restoration (ANSI/IICRC S 500, 2015) one key aspect that impacts the extent of water damage is the type of water released.

- Clean water is typically from domestic water supply lines or rainwater, which contain limited microbial contamination.
- Grey water contains a varying degree of contaminants that may cause discomfort or illness in people or animals.
- Black water is highly contaminated and may cause serious illness or even death if consumed by humans or animals. Typical sources include sewage or rising floodwaters that may be contaminated with various chemicals.

Regardless of the source, even a small leak can result in the growth of mold in as little as 24 hours. As a result it is critical to have a prompt, effective response plan.

Know Your Risk

Effectively addressing water damage exposures in emergency plans starts with understanding the extent of the water damage risk for your operation. First and foremost, does your building contain operations that are highly susceptible to water damage, or do you have areas of the building with critical infra-structure or high value equipment? Examples include things such as:

- Food or pharmaceutical manufacturing or warehousing.
- Healthcare diagnostic or treatment equipment (MRI, CAT Scans, etc.).

- Data centers, transformers, electrical switch gear or elevator controls located below grade.
- Areas with ornate or extensive interior finish.

Other items to consider include:

- Is the building largely comprised of finished spaces using drywall, carpeting or wood floor coverings, suspended ceilings or other building materials susceptible to water damage (higher risk) or is there limited interior finishes (lower risk)?
- Does the building have piping in unheated attic spaces? Common examples include domestic water supply lines and sprinkler piping.
- Does the building have below grade spaces with important equipment or processes in those areas? Remember, water will always follow gravity, and for larger water damage events, most often ends up in the basement.
- Is the building single story or multi-story? A leak on an upper floor of a multi-story building will impact other floors below the water leak.
- How old is the building? Has the plumbing system been replaced and upgraded? If so, were old supply lines disconnected and drained (preferred) or capped and left in place creating an exposure in the fixture?

Emergency Planning Considerations

While most facilities have emergency plans that address fire, severe weather and other likely emergencies, water damage is often overlooked. Each emergency plan should have a specific section addressing water damage emergencies. When developing these plans, consider the topics listed below.

Critical Infrastructure or High Value Equipment

Buildings with critical infrastructure or high value equipment should conduct a water damage risk assessment of those areas. The focus of this assessment should be to identify water sources and determine specific steps that may minimize the possibility of a water damage event. Look for things such as:

- Water lines, drains or other liquid piping directly above the equipment or area.
 - Can these be re-routed or can barriers be used to redirect any water leaks?
 - What can be done to determine the integrity of water lines, especially those older than 25 years?
 - Are shut off valves for this area easily accessible, functional and clearly labeled?
- Floor penetrations above the area which could provide a path for water to flow.
 - Can these penetrations be sealed?
- For unoccupied spaces, can water detection devices be used to send an alarm to monitored location?

- Are spill response kits with common repair tools and plumbing parts readily available?
- Has the staff been trained on how to safely respond to a water damage emergency in these areas?

Cold Weather Preparation

Given the significant number of water damage losses related to cold weather, it is important to identify areas of the building that are difficult to heat or lose heat rapidly. This may require:

- Evaluating your building to find and fix problems such as missing or disturbed insulation (or too little insulation), broken windows, doors or louvers, or damaged or missing caulking or weather stripping.
- Servicing HVAC Equipment using a qualified contractor or the maintenance staff before the on-set of cold weather.
- Adding supplemental heating devices in select areas — if it can be done safely.
- Temporarily removing ceiling tiles to allow heat to enter susceptible, concealed spaces such as entry vestibules with sprinkler heads or piping.
- Ensuring dry pipe and low point valves are drained. See the following CNA Bulletins for additional information:

The Sprinkler System Freeze-up Prevention Guide

Dry Pipe Sprinkler Valve Heated Enclosure

Roof Inspections

Roofs on commercial buildings are complex systems of roof covering, flashing, metal work and sealants that together keep water out. A failure involving any of these components can cause leaks, resulting in:

- Deterioration of the insulation under the roof cover.
- Rot and structural damage.
- Mold growth and damage to interior surfaces.
- Ponding and water retention that over time degrade the roof cover and may even lead to collapse.

Conduct periodic roof inspections that check:

- The condition of the roof covering. Common problems include dry or cracked surfaces, cracked or loose seams, blisters or depressions, broken or missing shingles or bare spots in gravel ballast.
- Accumulation of foreign objects or debris.
- Roof drainage. Water should make its way off the building through drains, scuppers, gutters and downspouts. A blocked drain can allow water to accumulate during heavy rains, which may result in ponding or, in severe cases, roof collapse.

- Condition of roof flashing and coping. Metal flashing is typically used at the perimeter of the roof cover, and serves to anchor the edge of the roof cover and prevent water from gaining access below the roof cover.
- Roof areas susceptible to heavy snow accumulations to determine when snow removal may be required.³ Snow tends to drift around roof elevation changes, signs and roof mounted equipment.

In addition to self-inspections, inspections by a qualified roofing contractor may be required as part of your roofs warranty. For most commercial roofs, it is a good idea to have a roofing professional conduct and inspection at least annually.

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.

According to Buildings.com⁴:

- The lack of proper maintenance can cut the useful life of a roof in half.
- 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:
 - o A well maintained roof will likely be replaced three times.
 - o A poorly maintained roof will likely be replaced five times – a 40 percent increase in replacement costs.

³ Snow removals must be completed by roofing professionals trained in the process. Improper snow removal can damage the roof covering and, in some cases, increase the load on the roof and lead to collapse.

⁴ <http://www.buildings.com/news/industry-news/articleid/13887/title/commercial-roof-maintenance-a-proactive-approach>

Valve Identification Plan

In many commercial buildings, the location of domestic and fire prevention water control valves is an unintended, well-kept secret. Maintenance staff may know where the valves are located and the areas served, but these valves may be located in locked mechanical spaces not normally accessed by other staff.

Since most water damage leaks occur on off hours when staffing is reduced or non-existent, even a well-designed valve identification plan is useless if the valves are not well marked or properly maintained, and if the staff is not trained on the plan and location of control valves and their proper operation.

An effective valve identification program consists of four simple steps.

1. Identify the valve that controls water supply to a specific area.
2. Apply a standard highly visible valve identification tag.
3. Exercise and lubricate the valve to assure proper operation. This should be done at least once a year.
4. Advise your employees of the program, identification method, and how to operate the various types of valves.

Other considerations:

- Label doors providing access to water control valves.
- Provide keys to these areas to designated staff working off hours.
- Determine when fire protection control valves can be safely shut off. This may require working with your local fire department on a plan to ensure fire is not present before shutting down the water supply valve.

Responding to Water Leaks and Overflows

- It is important to develop procedures to ensure the reporting of all leaks or blocked drains and prompt corrective action is taken.
- Ensure tenants and employees know how to report and respond to a water leak, blocked drain or overflow.
- Assign a high priority to investigating and correcting every reported incident.
- Create awareness that you take water damage prevention seriously.
- Publicize your reporting process, and make sure that leaks get immediate attention.
- If you have an identified exposure to sewer back up, the addition of a check valve in the affected line should be considered in order to prevent this type of exposure.
- Consider creating leak response kits with mops, absorbent pads, wet/dry vacuums, squeegees and wet floor warning signs.

Flood Facts

There is an extraordinary cost to repair damage arising from flood waters. 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 at 29 percent of the structure value.

(US Army Corps of Engineers Study)

- Establish an agreement with a water damage restoration firm. Make sure your plan includes authorization for staff to engage the outside resource when needed. This means immediate, emergency response 24/7.

Flood Waters and Surface Water Run-off

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

- During wet weather, note any changes in the amount or direction that water is taking on your site.
 - Changes in adjacent properties may unintentionally divert water towards your property.
 - Surface water runoff can often be managed by proper grading and use of a drain tile system.
- Add exterior drains to your preventive maintenance schedule. Pay particular attention to drains in areas such as loading docks, outside stairwells and other low lying areas.
- Ensure roof drains are directed to flow water away from the building.

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. Go to www.ibt.ca and www.ready.gov/floods.

If you have a history of outside water entering your building, consider the following:

- Are materials stored at least 4 inches off the floor?
- Have drains been cleaned or was there a video inspection to identify potential clogs or obstructions?
- Have exterior drains been provided or changes in slope created to redirect water?
- Have you identified the FEMA flood zone for your property?
- If you are in a flood hazard area, do you have a flood response plan?

Other Considerations

Make sure that your plan contemplates:

- Preventative maintenance for water handling equipment such as sump pumps, water heaters and water reuse and collection systems.
- Emergency power for critical pumps and dewatering systems.
- Replacement schedules for tank type water heaters. The Building Owners and Managers Association (BOMA) estimate the life span of a tank type water heater at 15 years.
 - Consider adding safety pans piped to drains under newly installed water heaters.
 - When located in finished spaces, water leak detection should be incorporated into the water heater installation.

Additional Resources

CNA has a flood preparation checklist to help prepare your facility for a flood. This checklist can be used as the basis for preparing to reduce your loss exposure from a flood.

Use the guidance in the CNA publication, *Before and After the Flood*, to guide your recovery effort.

Water damage can be costly. Follow the steps in this bulletin to help protect your bottom line. CNA offers a wealth of risk control solutions that can help businesses manage property related risk exposures and minimize business interruptions. Our associate business continuity planners can help you build the continuity plans you need to effectively manage through an event and get back to normal operations. From minimizing your hazards to maximizing your resources, we work with you to help your business succeed.

To learn more about how CNA's Risk Control services can help you manage your risks and increase efficiencies, please contact your local CNA Risk Control, or visit www.cnacanada.ca

Water Damage Prevention Checklist

Emergency Action Plan

Is emergency response to Water Damage included in the facilities emergency action plan?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Have sources of water been identified in buildings containing finished spaces, critical equipment areas, electronic equipment, main telephone rooms, computer rooms etc.?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are water control valves clearly labeled with the areas served and listed in the emergency action plan or are drawings available that show the location of shut-off valves (including valves above suspended/finished ceilings)?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Does the valve list include curb box valves at the Point of Connection to the incoming city supply?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
For water valves in locked or not easily accessible spaces, are doors labeled and key control granted to any managers, supervisors or maintenance staff who are on-site 24-7 or are responsible for emergency response?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Working with the local fire department, have specific procedures been developed addressing when water to sprinkler systems may be shut off?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is there an employee available around the clock with authorization to shut off water, and immediately engage professional cleanup and restoration companies?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Has authorized staff been trained on the proper location and operation of different types of control valves?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Does the emergency contact list include current contact information for local municipalities, responding staff, professional cleanup and restoration companies, etc.?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is this emergency contact list reviewed and updated at least quarterly?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Has the emergency plan been updated based prior water damage events or changes to the facility?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is a water damage response kit that includes clean up materials and common spare plumbing parts available?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Does the emergency action plan include provisions for supplemental heat or other procedures to address known "cold spots" during severe cold weather?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

Critical Infrastructure or High Value Equipment

Has a water damage risk assessment been completed on high value equipment or critical infrastructure? Examples include main electrical switchgear, elevator control panels, Chillers and boilers and medical diagnostic or therapeutic equipment.	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Do water lines, drains or floor penetrations place this equipment at risk in the event of a leak?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Can water lines be re-routed or can barriers be used to re-direct any water leak?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
If water lines cannot be re-located, have steps been taken to determine the integrity of these lines?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
For unoccupied critical spaces, can water sensing devices be used to send an alarm to a constantly attended location?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Has the staff been trained on how to safely respond to a water damage emergency in these areas?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are the critical equipment areas discussed with contractors before new construction, renovation or relocation projects begin?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Can elevators (high rise buildings) be programmed to remain at upper floors of the building during off-hours?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

Cold Weather Preparation

Have areas of the building that are difficult to heat or lose heat rapidly been identified and cold weather response plans developed?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Have supplemental heating devices for these areas been evaluated to ensure they are appropriate for the area and minimize the risk of other safety concerns?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is heating equipment serviced prior to the on-set of cold weather?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are low point drains for dry pipe sprinkler systems opened and checked for condensate before the onset of cold weather and periodically throughout the winter?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is a walk around of the outside of the building conducted before the onset of winter to identify and correct problems with the building envelope (door or window seals, broken windows, open louvers, etc.) and drainage from downspouts and scuppers?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
In northern climates, has a snow removal plan been developed for extreme snow loads? Note: Snow removal must be completed by roofing professionals trained in the process. Improper snow removal can damage the roof covering and in some cases increase the load on the roof and lead to collapse.	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

Roof Inspection

Is the roof covering free from obvious signs of damage such as dry or cracked surfaces, cracked or loose seams, blisters, depressions, broken or missing shingles or bare spots in gravel ballast?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Has loose debris such as leaves or tree limbs, construction materials, been removed?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are roof drains open and free flowing?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is metal flashing and coping securely fastened? Loose, separated or missing flashing, rust or other flashing deterioration should only be corrected by a qualified roofing contractor.	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

Plumbing Maintenance

Is there adequate budget in place for necessary building/plumbing maintenance?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is plumbing maintenance done on a preventive basis instead of as needed for older systems?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are licensed plumbers (or employees who are licensed plumbers) used exclusively for plumbing repairs and modifications?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Is maintenance staff aware of old plumbing, excessive corrosion, or presence of dissimilar metals?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are shut off valves exercised, lubricated annually to ensure that they will close?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are small leaks investigated and promptly repaired?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are the root causes of each leak analyzed to determine if it is preventable in the future?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

Employee Awareness

Is someone from management designated to track the weather and prepare for cold weather?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are housekeeping employees aware of procedures to take when any dripping, leakage, or clogged drain is noticed?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
Are security staff employees aware of procedures to take when any dripping, leakage, or clogged drain is noticed?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

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