

Risk Topics

Reducing Water Damage During Construction September 2015

At The Zurich Services Corporation, we are committed to helping customers mitigate losses and get back to business quickly. This risk topic helps identify water damage exposures and provides important loss control information to help prepare for a common type of loss – water damage.

Introduction

It is Zurich's experience that the leading cause of losses in construction can be attributed to water damage. This Risk Topic provides important information on loss control, tips and checklists to help prepare for a common – and potentially devastating – type of loss. Use the program's steps and recommendations to develop a loss control plan to help protect from disruptive and potential expensive losses.

Discussion

Based on Zurich's loss data, the leading cause of loss during construction is attributed to weather and water damage. A review of Zurich's Construction Property Loss Data highlights the problem.

5 Year Severity/Frequency Comparisons 2010 thru 2014		
Hazard	Severity	Frequency
Weather	41%	23%
Fire	19%	8%
Collapse	13%	4%
Water/Plumbing	7%	14%
Equipment	5%	14%
Theft & Vandalism	4%	26%
Explosion	3%	<1%
Workmanship	1%	3%

Miscellaneous	1%	8%
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Preventing these losses and taking quick and effective action when leaks or weather-related water damage occurs can help to reduce the number and size of losses. Water damage may originate from a number of sources:

- Domestic water lines and systems
- Drains and drain lines
- Sewage systems
- Cooling and heating piping and radiators
- Sprinkler piping
- Flooding

Guidance

Complete the following checklists as indicated. Use them to help identify the risk for liquid damage, detect problems, check for preparedness and help in the response to any leaks that occur. Zurich recommends that you:

- Complete a checklist for each project or each building or phase of construction.
- Prepare a written plan that details what to do in the event of a leak or water damage. Assign overall responsibility to a person in authority to oversee the process.
- Review this plan as construction progresses but no less than monthly.
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Action Item	Yes	No	Notes
1. Is there a written plan detailing what to do in the event of a leak or water damage?			
2. Is the plan reviewed for changes and discussed at staff meetings at least monthly?			
3. Has the "Checklist for Valuable Equipment Areas" been completed for all areas containing high-value or long-lead equipment?			
4. Is the "Checklist for Valuable Equipment Areas" reviewed during the planning or design stage for new construction or renovation projects?			
5. Is someone immediately available at all times with authorization (24/7 days) to call and bring in necessary crews to repair the problem?			
6. Is there a list of responders who will			

	be available to respond 24/7?			
7.	Are those responding to a leak aware of the location of valves?			
8.	Do those who respond to a leak have access to the site?			
9.	Are pipe diagrams or "as-built" showing the locations of all the valves readily accessible? (Note 1)			
10.	Are valves placarded or tagged for easy identification?			
11.	Is the cause of any leak analyzed to determine if it was an isolated occurrence or a symptom of a system wide problem?			
12.	Is there a lockout/tagout procedure in place when valves are shut on liquid-carrying systems under repair or modification?			
13.	Is there close monitoring of work that may affect piping systems under repair or modification?			
14.	Are there any liquid storage tanks or vessels (hot water, condensate, boilers, fuel oil, etc.) inside the building, mechanical penthouse or on the roof? (sprinklers, water, etc.)?			
15.	If so, is there a dike around the tank or vessel, and/or drains to contain or effectively carry away leaking fluids? Are dikes required around fuel tanks?			
16.	Are there any floor openings or cracks through which a leaking fluid may pass and damage areas below? (Note 2)			
17.	For basement areas, are there any water mains, sprinkler mains or liquid utility piping entering through the walls or floor?			
18.	Is there any evidence of leakage or seepage through the wall or floor openings? If so, indicate repair schedule.			
19.	Is an underground plan of these mains immediately available, showing the location of shutoff valves (in case an underground leak occurs and water flows through the wall or floor opening)? (Note 3)?			
20.	If any part of the property is			

exposed to potential flood, is there a formal flood emergency plan or similar flood preparation plan?			
21. If your project is in an earthquake-prone area, has your automatic sprinkler system been surveyed by a sprinkler system professional to determine extent of vulnerability for leaks? (Note 4)			
22. Are roofs inspected regularly (minimum weekly or after severe storms) to check for damage or deterioration such as cracking, splitting, blistering, separation, holes or other potential source of leaks?			
23. Are there any roof leaks or evidence of ponding on the roof? If so, indicate reasons and the repair schedule.			
24. Are roof-mounted cooling towers inspected regularly, and are cooling tower basins "watertight?" (Note 2)			
25. Are there any areas directly adjacent to the building where rainwater can accumulate during heavy rains? Large landscaping planters built next to grade wall and windows are an example where water can pond and find its way into the building.			
26. Is a daily walk through performed at the end of each day? See walk-through checklist.			

Notes:

1. Liquid-carrying systems may include sprinkler systems, hot and cold water piping, chilled water lines for cooling, hot water lines for heating, condensate piping, sewer lines, drain lines, fuel oil piping, etc.
2. Floor openings often occur around penetrations made for pipe and conduit. Seal the open space around the pipe or conduit to prevent passage of a liquid. Often, these are penetrations in concrete floors that are required to be fire-stopped anyway. Use a W-Rated fire-stop product that produces a tight liquid seal. A fire-stop is a UL-listed fire-resistive material used to fill holes in fire-rated floors and walls. Some types resemble caulk.
3. Accurate drawings of the underground water mains are important in a large complex with private mains. A leak may occur in an underground pipe near a building. There may be a control valve in the basement or just outside the building. Closing this valve may not stop the leak if the break is upstream of the valve and the water is flowing along the outside of the pipe, then into the building. A plan showing the location of all valves in the system will be needed to quickly locate another valve to shut and stop the leak.
4. Sprinkler pipes and heads often break during earthquakes as a result of swaying fixtures or ceiling tile systems. Breaks or leaks also occur if the sprinkler pipes are not adequately braced per the latest code. In

these situations, breaks or leaks occur from excessive pipe swaying or when pipe movement is not in sync with the building's movement. It is also important to ensure that the guidance not only addresses the physical controls but also the administrative controls that are needed to ensure that the physical controls are in place and functioning.

When adding or moving valuable equipment, use the Checklist for valuable equipment areas to reduce the chances of potential problems.

Checklist for valuable equipment areas

Recommendations:

1. Complete for each valuable equipment area.
2. Prevent potential problems by reviewing while planning/designing new construction, renovation projects or relocation. Even a small amount of water or other liquid falling on valuable equipment may result in total shutdown until it has been cleaned, tested and recertified. It's critical to identify sources of water or other liquids located immediately above valuable equipment areas. Once identified, analyze the potential for leakage and wetting. Take measures to eliminate, reduce or protect against possible leaks. Basements are the least desirable locations for valuable equipment.

Action Item	Yes	No	Notes
1. Are there any water lines, drains or other liquid piping in the ceiling directly above the valuable equipment?			
2. Do these lines contain fittings, valves or other devices with connections above the equipment?			
3. If they cannot be removed or relocated, what can be done to determine their integrity?			
4. Is there any evidence of leakage? If yes, indicate repair schedule.			
5. On the floor directly above the valuable equipment room, are there any bathrooms, slop sinks or other rooms with fixtures or equipment containing water, steam or other liquids			
6. Is there any evidence of leakage? If so, indicate repair schedule.			
7. Are locations of shutoff valves noted by fixtures or on a floor diagram?			
8. Are shutoff valves marked and easily accessible?			
9. Does the floor directly above the valuable equipment area contain any			

poke-throughs (penetrations) for conduit, pipe, cabling etc., through which water can flow down onto the equipment?			
10. If yes, are the open spaces well sealed to prevent water penetration? If not, indicate repair schedule.			
11. Is a spill response kit or cart, including plastic sheeting to cover and protect equipment, readily available?			
12. Has the entire staff, including all workers, been trained to report any type of liquid leak to the GC/CM for immediate attention?.			
13. If actual leakage or the potential for leakage onto the equipment exists, are attendees instructed to immediately shut off power (if safe to do so) to electrical equipment and protect equipment with plastic sheets?			
14. For a valuable-equipment area located in the basement, are there any water mains, sprinkler mains, liquid utility piping entering through the walls or floor?			
15. Is there any evidence of leakage through the wall or floor openings? If so, indicate repair schedule.			
16. Is an underground plan of these mains immediately available, showing the location of shutoff valves? (in case an underground leak occurs and leakage occurs through the wall or floor opening)			
17. For areas that are unoccupied periodically, are there any water sensors on the floor or excess humidity sensors available to provide an alarm to a constantly attended position?			

New Construction or Renovation

- Locate valuable equipment on floors at or above grade. This includes diagnostic and treatment equipment, telephone equipment rooms and computer centers.
- Designers should route all liquid-carrying systems away from ceilings over critical and valuable equipment.
- Locate valves in readily accessible areas. Consider adding valves if needed to help improve response time in isolating a leak.
- Label valves to identify purpose and the zones or areas each valve controls.
- Waterproof the floors above areas containing critical and valuable equipment. Completely seal all openings around floor penetrations made for conduit and ducts and other utilities.

- Pressure test pipe per code, witnessed by owner's representative, with all leaks properly repaired and the pipe retested. Do not seal off pipe in walls until tested and signed off.
- Provide secondary containment and drains in rooms containing fuel tanks, hot water tanks, other liquid-containing equipment and vessels.
- Consider installing water sensors on the floor for areas containing valuable equipment or under raised floors of computer rooms.
- Identify new construction/landscaping on adjacent properties, especially those being conducted at slightly higher elevations. Storm water runoff can be a major problem when natural water diverting factors such as grass are temporarily removed during a project. Debris from construction projects and landscaping can also clog storm drains in the area during exceptionally heavy rain events.
- Have a designated person walk the entire jobsite at the conclusion of each work day to determine that all water sources have been turned off and hoses drained.

Helping mitigate damage when leaks occur

- Turn off power immediately! Do not energize wet equipment!
- Rack down and shut off the cause of leakage.
- Cover up equipment if leaking continues from above.
- Begin removing the liquid.
- Remove as much as possible all wet items (anything that holds moisture).
- Begin cleanup and drying procedures immediately.
- Apply proper preservatives to equipment (note – material should not promote corrosion, conduct electricity or create a fire hazard).

Building

- Remove wet items such as carpeting, padding and ceiling tile, anything that holds moisture to an exterior location or cutoff dock area.
- Use all available and rentable vacuum equipment to eliminate water on floors as soon as possible. Also use squeegees and mops.
- Set up any available dehumidifiers (if outside temperature is greater than 60° F).
- Open any doors and windows to help reduce humidity (if weather is appropriate).
- Use fans to help circulate the air and assist drying. Open drawers and closet doors to enhance drying.
- Leave the heat on if damage occurs during a cool season. Utilize air conditioning if it occurs during a warm season (if available)

Equipment

- ❑ Turn off power immediately! Do not energize wet equipment!
- ❑ Do not reenergize equipment until authorized by qualified restoration personnel or manufacturer's technical representative.
- ❑ Open cabinet doors/sidepanels/covers/chassis/drawers – drain all water.
- ❑ Remove equipment to a cool, dry area after wiping down and eliminate as much moisture and contaminants as possible.
- ❑ Set up fans to move ambient air through equipment. Blow water out with clean compressed air (or preferably liquid nitrogen) and/or hair dryers or a PowerCat.
- ❑ Spray water displacement solvent on electronic components (such as contact cleaner, LPS 1 or alcohol/freon mixture).
- ❑ Wipe down and dry metal surfaces as soon as possible – use protective surface treatments to slow corrosion (CRC, LPS 1)

Spill Response and Pipe Repair Supplies

- ❑ Plastic sheets to throw over and protect equipment (should be immediately available in every valuable equipment area)
- ❑ Plastic bags to dispose of wet material
- ❑ Wet vacuums or other water removal equipment (commercial grade with effective GFIs, squeegees, mops, buckets)
- ❑ Portable pump(s) and hose
- ❑ Water displacing solvents for applying to electrical equipment (examples: contact cleaner, LPS 1)
- ❑ Preservatives for metal (examples: CRC, LPS 1) Towels for wiping up (assumed to be available)
- ❑ Absorbent socks, to contain and absorb spills
- ❑ Pipe clamps to place around and stop a leak (pipe repair kit)
- ❑ Diagrams of piping systems with valve locations highlighted
- ❑ Dehumidifiers (or ready rental source) Boots
- ❑ Portable dikes for diverting surface water away from below grade doorways and possible points of water entry. This would be necessary during unusually heavy rains, and especially if the hospital has a history of water accumulating near certain doorways, loading docks, parking ramps, etc.

Phone Numbers

Make emergency phone numbers readily available to management and the personnel responding to or overseeing the incident.

Examples of phone numbers that should be available include the project manager, subcontractors and sources for renting additional wet vacuums and dehumidifiers.

Conclusion

Use this programs steps and recommendations to develop a loss control plan to help protect your project from potentially disruptive and expensive losses. Work with your The Zurich Services Corporation risk

engineer to determine the most effective ways to apply the tools included here to help reduce your exposure to water damage.

Appendices

Wet Work Permit Example

Wet Work/Project Daily Walk Through

Water Infiltration and Mold Prevention Strategies for Contractors

The Zurich Services Corporation
Risk Engineering
1400 American Lane, Schaumburg, Illinois 60196-1056
800 382 2150 www.zurichna.com

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