North America Construction

Preventing water damage during construction projects

Insurance loss data over the past 10 years shows that water damage has become a leading cause of Builder's Risk claims. Whether from external sources (rain, ground water, flash flooding, etc.) or internal sources (water escape or fluid release), water damage has a significant impact on a construction project.

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In addition to the physical loss, water damage usually impacts the project schedule. In this era of increasing deductibles, accelerated schedules, and contract penalties, even relatively small water incidents
can result in large losses. Although higher deductibles generally reduce insurance premiums, contractors may face an unexpected expense when water damage occurs. In addition, water damage incidents may have a negative effect on the contractor's ability to obtain repeat business from an unhappy owner.

So, what can you do about it? It's all about prevention. The best protection from water losses is through taking proactive measures to avoid water damage.

Prevention is the best protection, and prevention requires a plan

Early in the process of starting a project, contractors should review the specific water damage exposures presented by each project as described in the following paragraphs. Methods to mitigate and reduce these exposures should be developed and funding for them included in the project budget.

Ground water and weather related events are typically a concern early in the construction project during excavation and foundation activities. Preventing these types of losses requires analysis of the unique exposures presented by each project site. Increased attention to early site grading and provision of storm water drains to divert

water away from the building can help prevent flash flood, erosion and subsidence claims. Ensuring redundant capacity for dewatering systems (i.e. generators, pumps, etc.) can prevent losses caused by equipment failure.

Water intrusion and water escape become primary concerns once the building structure is complete and the MEP systems and finish materials are being installed. After the building is dried-in, almost every water event will result in a significant loss because of the accumulation of value and schedule impact. At the same time, preventing water damage becomes more difficult because work inside the building is not readily visible, more trades and workers are involved, and there are multiple sources of water.

Water intrusion usually results from weather or external sources of water entering through the building envelope. In high rise buildings, building envelopes may have required openings for hoists and cranes that can be difficult to seal. Before the envelope is complete, and where exterior openings are unavoidable, installing temporary closures (i.e. tarps, panels, etc.) and temporary flashing or curbs, such as water dams, around all interior floor openings will help keep water from migrating to other floors via gravity.

Sources of water escape

Water escape usually results from the processes used to install, test, and fill internal building systems. Some potential sources of water escape are:

- Domestic water distribution system and fixtures
- Roof drains and storm drain leaders (piping)
- Sanitary sewer system
- HVAC fluid systems (chilled water or refrigerant piping)
- Fire suppression risers and piping

In addition to the "system" sources of water above, the following trades may also create potential sources of water escape:

- Spray fireproofing (water for mixing)
- Interior masonry (water for mortar mixing and wet saw)
- Flooring and tile (water for wet saw and mixing grout)
- Painting and wallcovering (paint, water for mixing and application)
- Swimming pool, spa, and stucco (water for mixing materials and filling the pool)
- Hoses used to convey water

One method for preventing water escape is controlling access to water sources. This can be accomplished through the inclusion of isolation valves allowing water to be shut off to specific areas within the building or a master shut off for the whole building. Automated valves and flow switches are also available to control and monitor water flow in a structure. A traditional Lock-Out, Tag-Out program can be adapted to ensure that water supply valves are used to control flow in the building. Adding control valves may incur additional cost, particularly if the building design is already complete, which must be weighed against the potential costs of a loss.

Water damage prevention tools

The most effective and least cost methods to prevent water losses once a building is enclosed are enhanced vigilance (inspections) and subcontractor management that focus on water exposures. We suggest using two complementary tools, shut down inspections and wet work permits, to help project teams prevent water losses.

> **"We suggest using two complementary tools [to prevent water damage]: shut down inspections and wet work permits."**

Shut down inspection

To maintain awareness and provide a structured system for inspection of water hazards and the condition of protective measures, we suggest project teams create a project specific "shut down" inspection checklist and implement shut down inspections once the structure is complete and interior work begins. The items on the checklist may need to be revised as the project progresses toward completion. Project staff should be assigned the responsibility for walking the building and completing the checklist before leaving the site (after all trades have completed work). The responsibility can be rotated among the staff as necessary. This can be an excellent opportunity for training and teaching younger staff members to be aware of hazards and exposures (what to look for). Depending on the exposure level and progress of the work, the "shut down" inspections should be performed daily, but not less than weekly and whenever storms are forecast. Multiple staff members may be assigned discrete segments of the building on larger projects. Here are some suggested items to include in a "shut down" inspection checklist:

- Dewatering or sump pumps are "on line" (generators fueled, if applicable) discharge hoses are connected
- Verify that roof drains are clear with strainers in place
- Verify roof drains are connected to temporary or permanent drain piping
- Ensure any material stored on the roof is secure and tied down

- Verify that roof hatches and doors are shut and secured
- On each floor, verify exterior openings are sealed and temporary protection is secure
- Moisture sensitive building materials are covered and elevated (on dunnage) off the floor
- Check all wet work permit locations (see below) to make sure hoses are disconnected and drained, water supply is shut off at the riser or nearest control valve, and all waste water has been removed from the building
- Last look at Hot Work locations (no fire exposures)
- Check bathrooms and riser closets, make sure no water is running

Notification protocols and updated call lists should be maintained so the "inspector" knows who to call if there are any issues that require immediate correction. Valve locations should be marked on each floor (i.e.; signs, wayfinding placards, and visual markings) so valves are easy to find and are clearly labeled.

Wet Work Permit

To maintain project team awareness of the trades working with water inside the building, we suggest implementing a "Wet Work Permit" program once the building is enclosed. A WWP program will help the project team keep track of water damage exposures and focus attention on the systems and trades that require diligent supervision to prevent water damage losses.

Similar to a "Hot Work" permit system, a "Wet Work" permit system requires subcontractors to submit a simple form advising the controlling contractor whenever their work involves piping, water or other fluids. The permit should list the scope of work, location of work, the amount of water involved and mitigation measures if water escapes. The sample wet work permit (see page 4) provides a simple, yet effective way to track water use, ensure that subcontractors are implementing adequate risk mitigation techniques, and facilitate inspections to minimize the risks of water damage.

We suggest that a single individual (Superintendent, Project Engineer, MEP Coordinator, Quality/Safety Manager) be given responsibility for reviewing, approving, and tracking all permits issued. Permits should be completed electronically or in duplicate with the subcontractor, posting one copy in the field (if printed documents are used). The original copy should be maintained in the contractor's office and closed after the final inspection is completed. We suggest limiting permit duration to one day or, at most, one week but limited to a specified area of the project. The idea is to limit the scope of the permit so the location of work is known and there is more control of the exposure to water damage.

The responsible person should let all project staff know each day which trades have active permits and the work locations so more frequent inspections take place. Closing inspections should be completed before leaving the site each day (see "Shut Down Inspection" section on page 2) to verify that all water sources are shut off at the riser or source, hoses are disconnected and drained, no leaks are occurring, waste water has been removed, and the work area is secure.

For permit applications related to filling or pressurizing fluid distribution systems (sprinkler piping, chilled water, domestic water), we also recommend:

- Require a visual inspection for open ports, incomplete couplings, or missing heads before starting to fill.
- Require air pressure testing before introducing fluid, even if there have been previous tests
- Require the subcontractor provide a "water watch" for at least two hours after the system or zone is under pressure to make sure there are no leaks.

By incorporating the Shut Down Inspection and Wet Work Permit tools into their standard practices, companies can reduce the potential for water damage losses. However, even when these preventive measures are implemented and executed, water intrusion and water escape incidents can still happen. When they do, companies should be prepared with response and mitigation protocols that will minimize the impact of such incidents.

For questions about this or any other safety matter, please contact your AXA XL construction risk engineer.

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Sample Wet Work Permit (Construction)

Project Name: _____ **Permit Number:**_____

Subcontractor: _____

Effective Date:_____ **Expiration Date:**_____

Work Schedule (hours when fluid is in use):_____

Location of Work (specify floor and area): _____

Building Systems Affected:_____

Type of Fluid being used: (water, ammonia, glycol, refrigerant, etc.) _____

Fluid being used for:(filling, mixing, lubricating, etc.)_____

Quantity of fluid involved:(approx. capacity of system or qty.) _____

Will hoses be used to convey water/fluid?..... ○ Yes ○ No

If so, have hoses been inspected for damage and pressure rating?..... ○ Yes ○ No

NOTE: Hoses must be disconnected and drained at the end of each shift/day

Will the work generate waste water? ..... ○ Yes ○ No

How will waste water be collected and removed? _____

NOTE: Waste water must be removed as needed and at the end of each shift/day

Are spill kits provided (by GC or Sub)? ..... ○ Yes ○ No

Are kits stocked\in place? ..... ○ Yes ○ No

Are all valves for the affected system identified and clearly marked in work area?..... ○ Yes ○ No

Are all crew members trained to locate and operate valves to stop fluid release?..... ○ Yes ○ No

Are floor/area drains in the work area connected and functioning?..... ○ Yes ○ No

Means to contain capture and remove fluid leak(s)? ..... ○ Yes ○ No

Periodic leak inspections are ○ Required ○ Not Required (Frequency: _____)

WATER WATCH is ○ Required ○ Not Required for _____ hours following completion

AUTHORIZATION

Subcontractor Superintendent:_____

GC Superintendent (or delegate): _____

RECORD OF PERIODIC INSPECTIONS

Inspector: _____ Date _____ Time _____

Inspector: _____ Date _____ Time _____

Inspector: _____ Date _____ Time _____

Inspector: _____ Date _____ Time _____

PERMIT COMPLETION AND CLOSURE

Date and Time work ended: _____

Final Inspection of work area(s) with no signs of leaking (Sub):_____

Final Inspection of work area(s) with no signs of leaking (GC): _____