ATWATER PLACE

Water Leak Mitigation

Strategies for reducing leaks and insurance costs

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An online, commentable version of this document is at:
https://docs.google.com/document/d/16NDCPoCZS5vMKD0Fi8gNAebKjbMesx0kjk-vZS8cDtI/edit?usp=sharing

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Summary

As our building ages more residential water leaks will occur. The damage may not be limited to the unit where the leak originated, but to neighbors as well. In addition to major costs and inconvenience to the unit owners, there is data to indicate the financial impact to the COA could be significant. For example, our insurance premiums and deductibles will continue to rise. Moreover, individual owners can be held liable for water damage to neighbors that originated from their unit. Preventing leaks is one of the few controls we have over rising insurance costs.

Since residential systems are in the owner's unit and are the owner's property, the COA can not mandate leak sensors or other systems. After careful review of the risks and mitigation options, we recommend that, after an information campaign designed to educate and incentivize owners to install a leak detection system, the Board adopts a strategy of strongly advising owners/residents to install leak detectors at the very least, and preferably full shut-off systems. Although doing anything is better than doing nothing, unlike the concept of "herd immunity" that is relevant to the COVID19 pandemic, risk reduction is significantly diminished by any non-participation. Thus, 100% compliance should be the goal and a plan should be developed to promote and encourage adoption.

Recommendations

- Residents should always shut off their water if they're going to be gone for more than a day or so (automated shut-off valves are a big help with this).
- Residents are strongly encouraged to install leak detection systems
    - Residents should, at the very least, install leak detectors.

    - Automatic shut-off systems combined with leak sensors offer the best protection, and are more expensive, but still reasonable..
        - See the cost-comparison chart for example system costs.
    - Provide installation resources for systems - share info, websites, etc
    - Get Dave Waterman or someone similarly trained on installing detectors
    - Get several vendors to install automatic shut-offs
- To help prevent sewer clogs:
    - **Garbage disposal use should be discouraged**. Food waste easily clogs sewage lines and causes back-ups.
    - When used, run enough water to flush waste all the way down
    - A&E is investigating pre-emptive cleanouts/inspections of lines.
- We should consider a preliminary sample unit inspection (10 units), paid for by the COA.
    - Approximate cost: $1,500 (NW WaterStop's price ~$140/unit)
    - Allowed for by our bylaws/rules
    - Get bids from other vendors - not just NW WaterStop (potential conflicts).
    - What would they look for?
    - Just residential units, or inspect common areas, too?
- Undertake public (owners and residents) information sessions
    - 70% of condominium insurance claims nationally arise from water damage
    - ***100% or our insurance claims are due to water damage***
    - We have already experienced water damage, and as the building ages, the risk will increase
    - Early detection systems are available at low cost, that are highly effective at minimizing damage
    - Unit owners may be financially liable for damage that a leak originating in their unit causes to neighbors
    - The costs of insurance for the association are increasing, and adoption of early detection systems and practices can dampen the rate of increase and downstream effect on our COA dues
    - Consider contracting with an independent professional to annually inspect all units for condition of leak detection system if installed or for evidence of leaking around fixtures

Background

Recently, we've had several water leaks which have caused damage to multiple units - the costs for this run into the hundreds of thousands of dollars per incident. Leak sources have been broken refrigerators, overflowing sinks/toilets, and other reasons.

This not only inconveniences the unit owners while their units are being repaired, it drives up our insurance premiums and deductibles. The higher COA deductible requires the unit's owner to pay much more than previously (was $10,000, now $25,000, will increase to $50,000). It's in the best interest of the owners to reduce the risk of leak damage as much as possible. If we have too many water damage claims, our building deductible will go up as well as our rates. The deductible could go to as high as $100,000 if we have too many claims - and most personal

policies won't pay that high, so you're on the hook for the remainder if the leak comes from your unit.

Other condos are encouraging owners to install leak detection systems. The Atwater needs to do something similar.

History of Residential Leaks

Residential leaks are anything in the unit that leaks - refrigerators, sinks, toilets, etc. These are often not caught until other units have reported damage. Leaks in residential units are the responsibility of the unit's owner, and even with insurance, the deductibles can be high. Total costs of multi-unit damage run into the hundreds of thousands of dollars - all of which drives up our insurance rates.

Sources

Refrigerators

Several of the Sub-Zero refrigerators have had leaks recently which caused damage to multiple units. Repairmen have commented that these model-years were prone to such problems.

The problem part seems to be a valve which is mounted in the wall of the unit (see picture below). The part can be replaced (cost ???), but Sub-Zero requires a certified technician to do the removal/installation (~$350).

Sink Leaks/overflows

At least one unit has replaced their hardwood floors due to a sink leak. Since there was no damage to other units, CMI was not aware of this. Other overlows have happened, but did not affect other units.

Toilet Overflows

This has happened at least once that we know of. Multiple units were affected by 40 minutes of running water.

Other

Sewage line back-ups have happened, and one occurrence was able to overflow the kitchen sink. Improper disposal use (i.e., putting the wrong stuff down the disposal) can quickly clog lines and cause backups. In this case, shutting off the water does nothing, as it's not coming from your unit.

Mitigation Strategies

The Water Leak Mitigation Subcommittee looked at several ways to minimize the possibility of leaks.

Hose Replacements

As part of the overall strategy, A&E had recently directed that all washing machine rubber hoses not recently replaced should be replaced with steel-braided or nylon-braided hoses.

There are other hoses supplying water to sinks, dishwashers, refrigerators, and toilets, however; these are already steel-braided hoses. It's possible to replace them, but there are risks. Toilet valves are notorious for leaking if disturbed. Moving refrigerators and dishwashers carries the risk of damaging the appliances, flooring, and fixtures - and there is a non-negligible chance of *causing* a leak while doing all these changeouts.

Therefore, we do not recommend replacing water hoses for toilets, dishwashers, or refrigerators. If these units are being serviced or replaced, then a new steel-braided or nylon-braided hose should be installed. Most installers do that as part of installation..

Leak Detection

Modern sensors make it easy to detect leaks. There is a wide variety of costs, from $250 (just sensors) to $6,000 (professional installation with automatic water shutoff), depending on what amount of protection you want.

All leak detectors work on the same principle - metal contacts on the sensor get wet and trigger the device. Some detectors use a cable "tail", where the entire tail is the sensor. These are able to cover a wide area (like under washing machines, etc).

Standalone Detectors

Very much like smoke detectors - these don't need to be connected to anything, and an alarm will sound when it gets wet. **However, if no one is there to hear it, it does no good**.

These are pretty cheap if you can find them ($10-$15 each). Because they aren't "smart", you can't tell how much battery life is left, you must change the batteries annually, or else find out your detector didn't detect a leak because the battery was dead.

Note: Honeywell and most others have discontinued these models in favor of smartphone-based models. They're hard to find now.

"Smart" Detectors

These systems rely on smartphone apps to control them. This allows them to notify the owner via text message, smartphone alerts, and email if desired, as well as audible alarms.

A big plus with the smartphone-based detectors is that you can see the battery capacity for each sensor, so you'll know when the batteries need to be replaced.

A comparison of several "smart" leak detectors is found here:
Evaluation of Water Leak Detectors .

Actions when leaks are detected

So, what happens when one of these sensors detect a leak? Depending on the brand, you can do pretty much anything you want.

Some of the responses are:

- **Sirens** - Some systems come with an audible alarm. YoLink allows sirens to be added if desired. I've done this an it's pretty easy (and loud)
- **Notifications** - Most systems only notify via smartphone (text, alerts) and email.
- **Integration with external systems** - YoLink is the only system I've looked at which integrates with Alexa, Google Assistant, and IFTTT. This lets you do almost anything when triggered.
- **Automatic Shut-Off Systems** - Once a leak is detected, some systems allow the water to be shut off. This requires some sort of actuator or replacement of the ball-valve which controls the water flow. Since we have both cold and hot water pipes coming into units, both need to be able to be remotely closed.

Automatic Shut-off Valves/Controllers

Automatic shut-off systems can be added to many brands of leak detector systems. There are two types, one attaches to your existing shut-off valve and the other replaces it.

Actuators for existing shut-off valves

These attach to the existing valve and turn the handle. Click here for an example.

Pros:

- Works with existing valve
- Don't need to shut the floor's zone water off to install
- Don't need a plumber to install

Cons:

- Might not fit in all units (see below)
- Some use hose clamps to attach, instead of clamping on the valve body - if the plastic pipe is clamped, it could rupture. ONLY models which clamp to the valve body are acceptable for use.

NOTE: Using two of these require that the pipes must be at least 6" apart - any closer than that and the handle from one will hit the other line's actuator and prevent it from closing. If this is the case, then you will need motorized shut-off valves. Some units have enough distance between the wall and the valves such that the lower line can be moved downwards enough to accommodate 2 actuators - only a qualified plumbing vendor should attempt this.

Example product: YoLink: $210 on Amazon

Motorized shut-off valves

Basically, this is a motorized addition/replacement for the existing shut-off valve which can be controlled by the system. Click here for an example.

- May require manifolds to be relocated/replaced (the manifold is what distributes water to all the different sinks, etc after the valve)
- Might not be possible to add this in addition to the existing shut-off valve, may have to replace it instead - this requires all water be turned off in the plumbing zone - potentially many floors).

Note: An important factor if this is installed is that it is greatly preferred to have this installed *after, and in addition to, the existing manual shut-off valves*

- This way, the water to the entire zone doesn't have to be shut off during the installation (in Doug Bullard's case, all of floors 16-23).
- It also leaves the existing manual shutoff valve for redundancy

Note: **Portland Mechanical has said they *can* install these**. Cost may be $500-$700 per line, depending on difficulty (mine is probably a worst-case pricing) - this will be updated when a formal estimate is received.

Example products:

- WaterCop $386 on Amazon
- YoLink $110 on Amazon

Preventing Sewer Back-ups

Sewer back-ups cause liquid in the sewer line to enter a unit via a sink or other outlet. The kitchen sinks are the most clog-prone, as food waste from disposals builds up - when this happens, the water can back up so much it will overflow the sink. Fortunately, the toilets have a different sewer line, so what backs up is just kitchen waste.

Minimize Disposal Use

Disposals are a source of clogs in building plumbing. Usage of disposals should be minimized - never dispose of meat, pasta, etc. by putting it down the disposal.

- Coffee grounds
- Grease/fats - Grease and fats (even when disposed of warm) will condense when they contact the cold pipes, and cause buildups which can clog the line
- Pasta/Potato peels - anything with starch - it's sticky & expands
- Oatmeal
- Eggshells
- Fibrous vegetables (celery, etc)

Routine Inspections or Cleanings

The A&E committee is investigating if we should schedule regular inspections/cleaning of the sewer lines.

Mandates

The subcommittee checked with the COA's lawyer and, since residential systems are in the owner's unit and are the owner's property, the COA can not mandate leak sensors or other systems.

However, the COA *can* still strongly recommend owners to install something, and provide help and resources. This should be supported by an education and awareness campaign to enhance adoption of the recommendations by emphasizing the benefits to the owners, individually and collectively.

Comparison of Options and Costs

Atwater Units and Number of Sensors

Here is a link to a Google Sheets workbook where all Atwater units are listed by their building floor plan, and how many sensors would be needed (no as-built unit would need more than 11 sensors). Atwater units and YoLink water leak sensors

There are also columns for pricing the YoLink system, which can be adjusted as the prices change. This sheet can easily be copied and have another system's data input.

How is the number of detectors needed per unit determined?

A typical leak detection system configuration is a hub with 9 sensors. Some units may have a few more or less sensors, depending on the number of sinks, etc.

- Hub/controller
- Sensors with tails
    - Refrigerator
    - Dishwasher
    - Washing machine
- Sensors w/o tails
    - Guest sink
    - Guest toilet
    - Master sink (x2)
    - Master toilet
    - Kitchen sink

Other locations

- Waterbeds - place one between the mattress and the liner

Typical Costs

Costs range from ~$200 to ~$6000, depending on the configuration. Automatic shut-offs are highly desirable, and although they increase the cost, the investment is still reasonable and demonstrably cost-effective..

“Dumb” sensors

These are like smoke detectors - they just sound an alarm, do not connect to smartphones, etc.

Although originally listed in the first evaluation, these are no longer easily available - they are not found on Amazon or other stores any more, and have been discontinued and replaced with smartphone versions. But the costs were around $20/sensor, so for 9 sensors it would be under $200.

“Smart” sensors

YoLink system

- Hub plus sensors: $200
- Adding automatic shut-offs: $420 extra
- Total for automatic shut-off system: $620

GoVee system

- Hub + 3 sensors for $50
- 5 pack sensors for $34
- No auto-shutoff valve available
- Total cost for just sensors: ~$120

NW WaterStop

We’ve only had one unit get an estimate from NW WaterStop, but it was the most expensive option.

- Controller plus sensors: $3400
- Adding automatic shut-offs: $2300 extra
- Total for automatic shut-off system: $5700

NW WaterStop uses the WaterCop system, and it is a managed system - unlike the others above, they do all of the installation, and includes a custom system design.

- A $55/year maintenance contract includes
    - Changing all of the batteries
    - A leak inspection
    - Verify that the system is in good working order

Although expensive, this is probably the best option for folks who aren’t tech-savvy and don’t wish to do their own installation and maintenance.

Comparison Table - Cost of Hub & 8 Sensors

	Orbit B-hyve	YoLink	Govee	Watercop Pro
Sensor battery life	1 year (1xCR2032)	5+ years (2xAAA)	~½ year (2xAAA)	3-5 years (2xAA)
Range (no walls)	300 ft - however, walls can limit this to 5-10 feet	¼ mile	300 ft	200 ft
Communication Protocol	Bluetooth	LoRa (Proprietary, "**Lo**ng **Ra**nge")		RF (Proprietary)
Max # of wireless sensors per hub	15	128	10	45
Waterproof	No	Yes	Yes	Yes
Integrates w/ Alexa/IFTT	No	Yes	Yes	No
Audible alert	Yes, but quiet	Extra (see below)	110 db	Optional
Cost (10 sensors)	$75	$117 Extra sensors: $18-$23 Siren: $25	Hub + 3 sensors for $50 5 pack sensors for $34 (need another hub beyond 10 sensors)	WaterCop 3/4-inch Valve and Three RF Sensors $405 Sensors - $61 each Full price: > $1195
Ball Valve Actuators	N/A	$420 (price for 2 external)	N/A	Actuator - $365
Motorized Ball Valves	N/A	$220 (price for 2, does not include plumber costs) - estimated ~$1500 for both lines	N/A	

How do I determine what to get for my condo?

Bare minimum

- **Install leak sensors - any brand**. Even if you are out of town, a smartphone alert will tell you if you have a leak, and you can call CMI to shut off your water.
    - YoLink: ~$200
    - NW WaterStop: ~$3700

Better

- **Install external actuators for water shut-off ball valves**.
    - Not possible in many units as the hot- and cold-water lines are too close together. If they can be moved apart by a qualified plumbing vendor, this will work.
    - Clutch pin allows manual operation of valve.
        - YoLink: ~$420 (does not include plumbing work)

Best

- **Install motorized valves**
    - Most robust, reliable solution
    - Allows manual shut-off as well as automatic
    - May require modification of the plumbing manifold
        - YoLink: $220, worst-case plumbing ~$2000
        - NW WaterStop: $2300 (in addition to $3700 above)

Glossary

- **Plumbing zone** - Rather than each floor having it's own shut-off valves, in the tower the water is controlled by zones - for example, to turn off the water on the 20th floor, the zone for that controls floors 16-23, so they would all be without water.
- **Manifold** - If you look at your shut-off valves, after the valve the water goes into a pipe with many smaller pipes coming out of it - each of these goes to a sink, toilet, etc. This is the manifold.