Condo Water Damage Risk Analysis – Draft – Ideas and Notes
September 5, 2018 -- Bill Brandt

Water Committee – Fran, Tom and Bill
Appointed by the Condo Board at the regular meeting on August 23, 2018
Purpose of the Water Committee:

Study and report findings to the Board
Make recommendations for consideration of the Board
Other actions as requested by the Board

Condo Risk Assessment for Appliances

Construction of our condo building was completed in 2007, therefore the original appliances and fixtures (collectively water components) in the condo units are now eleven years old. The purpose of this document is to analyze the effect of age and use, the likelihood of the appliances failing in a way that causes damage to the condo or the building, the impact of various types of failures, and steps that may be taken by individual owners or by the condo association to reduce those impacts. The document is organized by room and by component in each room. Equipment failures are categorized into minor failures that can cause damage over time if not correctly, and catastrophic failures that can cause major damage in a very short time if not corrected immediately.

Building construction basics

The condo building has 6 floors of units, organized into "stacks". Each condo layout is exactly like the layout of the condo above it and below it (if applicable). The stacks are identified by the last 2 digits of the 3 digit apartment number – the first digit identifies the floor of the apartment. One stack of apartments is 110, 210, 310, 410, 510, and 610. All of these apartments have exactly the same layout in terms of kitchen location, bathroom location, laundry closet location, mechanical closet location, etc. Therefore all kitchens are directly over or below the kitchen in the apartments above or below. That is to say that all kitchens in a stack are directly over and under one another. The same is true for bathroom, toilets, laundry closets, etc.

Each floor of the condo building has a 6 inch thick concrete slab floor. The concrete slab floor of each apartment is also the concrete slab ceiling of the apartment below. The top of the slab is finished with wood flooring for the upper apartment, the bottom of the slab is finished with plaster for the ceiling of the lower apartment. Therefore there is generally no space between the ceiling of each apartment and the floor of the apartment above. However, building plumbing requires that pipes be located below apartment floors. To accomplish this with the concrete slab floor, a false ceiling is built into each apartment in rooms that require plumbing. A false ceiling is built in the kitchen, the bathrooms, and the laundry room. The plumbing for the fixtures in these rooms is hidden in the false ceiling (under the concrete floor) of the apartment below. In other words, if the ceiling wallboard in the kitchen of apartment 310 is removed, it would reveal

the pipes that service the kitchen in apartment 410 above, under the concrete slab floor of apartment 410. The same is true for the ceiling in the bathrooms and laundry closet. In addition to the plumbing for the unit above (410), the false ceiling contains components for the current apartment (310) including AC ductwork, fire sprinkler pipes, electrical wires, bath fan venting, dryer venting, and other related building components. Other features of the building include metal stud construction and 5/8 inch sheetrock walls and false ceilings. The AC/water heater closet in each unit does not have a false ceiling or a finished ceiling coating, which reveals the sheet metal on which the concrete slab floor of the unit above was poured.

The 6 inch thick concrete floor is water impermeable. Water leaks in a unit will travel along the floor of the unit until a path downward (a hole in the floor) is found. Then the water will enter the unit below and once again, travel along the floor until a path downward is found. Therefore, it is hard to know, when water found in a unit, which nearby unit and where in that unit, the source of the water is located. For this reason, several water sensor detectors should be employed in various strategic locations.

Recessed light fixtures cannot be installed on the concrete slab ceiling.

The concrete slab for the floor above is supported by structural gauge metal studs located around the perimeter of each apartment, which are attached to the concrete slab of the floor below.

The AC/water heater closet houses the AC blower and the hot water heater for the apartment. The AC Freon pipes for the units below each unit run through the back of the AC/water heater closet. A condensation drain pipe, which also serves as a hot water heater overflow pan drain, also runs through the mechanical closet. Units at the bottom of each stack do not have water heater pan drains due to a required plumbing "trap" that extends above floor level making drain pipe access higher than the pan.

Laundry room

Each condo unit has a dedicated laundry closet that is equipped with a stackable washer-dryer. The original equipment was Whirlpool Twin Spin model LTE6234DQ3 (may not be the same in all condo units). Additionally, some residents have changed out the original units for new models. Because the equipment must stack and fit thought the closet doorway (34" wide by 80" high), there are limited options – many new stackable, full size units are too tall to fit through the closet doorway.

Risk Assessment Methodology

Remediation, avoidance, measures, reduction

1) Identify each water risk component (appliance or fixture) in the condos
2) Identify and characterize the failure points of each component

3) Determine the level of likely damage of each failure point (single unit, stack(s)) using prior incident reports when available
4) Determine the risk (i.e. the expected likelihood and consequences of specific types of failures on specific assets)
5) Identify ways to reduce those risks

Whereby the risks with the greatest loss (or impact) and the greatest probability of occurring are handled first, and risks with lower probability of occurrence and lower loss are handled in descending order.

For the most part, these methods consist of the following elements, performed, more or less, in the following order.

1. identify, characterize failure points
2. assess the vulnerability of critical assets to specific failure point
3. determine the risk (i.e. the expected likelihood and consequences of specific types of failures on specific assets)
4. identify ways to reduce those risks
5. Prioritize risk reduction measures based on a strategy
6. Measures to protect your unit and those below
7. Measures to protect your unit from those above

Types of Failures

1. Catastrophic– open water supply or sewer line – can quickly damage unit and lower stack units.
2. Major damage to single unit– causes significant damage to the unit, but not likely to affect other units.
3. Minor damage to single unit– not likely to cause significant damage to stack.

Causes of Failures

1. Building plumbing failure (not unit specific – failure of pipe in the wall)
2. Failure due to component repair or installation (multi-level condo specific considerations)
3. Component failure due to condition (aging fixtures)
4. Component failure due to user misuse (operator error)
5. Component failure due to user policy

Measures

1. Water main cutoff valves which are easy to use by resident, reliable, and tested.
2. Component inspections – like current sprinkler inspections – with recommendations for resident/owner.
3. Water pans under water heater and washing machine
4. Water pans with active drain lines when possible –and water leak sensors in any case
5. Water leak sensors under dishwashers
6. Water leak sensors in other strategic areas (under sinks and toilets and in ceiling above washers)

7. Use of stainless steel mesh supply lines for sinks and toilets – not white plastic lines
8. New AC units should include condensation line overflow cutoff sensors.

Apartment water appliances

Unit wide

Master water cutoff valve should be easily accessible and should completely turn off all water without allowing drips. New 90 degree ball-valves should be installed.

Bathroom

Toilets

Original toilets in all units were based on EPA 1992 mandated water use limits (low-flow). For the first low-flow toilets, manufacturers simply used smaller toilet tanks without regard to how well the toilets flushed or the impact to sewer lines. More recent toilets have been redesigned to meet EPA standards as well as flush better. Note: my toilet was manufactured in May 2004.

DeKalb County in Georgia pays $50 to $100 per toilet to homeowners who buy low-flow toilets, up to three toilets per home. From https://home.howstuffworks.com/low-flow-toilet4.htm

Cold water supply line and cutoff (test cutoff and remind residents of its use)

Sinks

Under sink A) waste line air admittance valve
Two water supply lines (hot and cold) (test cutoff and remind of its use)

Tubs and Showers

Kitchen

Sink
Dishwasher

Laundry

Washer
Hoses

Air Conditioner
Water heater
Building pipes common

Notes on toilet leak from http://restorationeze.com/water-damage-from-a-toilet-overflow/

() water travels down the exterior wall, soaking your insulation
() water wicks up the bathroom wall, ruining the drywall (and potentially affecting any electrical wiring housed inside the wall cavity)
() water gets trapped under your bathroom cabinets

() water drips through the subfloor and soaks the space in between your first and second floor