A NOTCH BELOW

By Doug Walter

In homes 25 years old or older, I insist on stripping the bathroom down to the bare studs and joists to see what's there. Overkill? I don't think so.

From years of experience, I've grown accustomed to seeing joists severely compromised, either by leaks over many years from tubs and especially toilets, or from plumbers who looked at framing members as obstacles in the way of their getting pipes from point A to point B. Owen Sechrist, of Ruby Construction, LLC, in Lancaster, Pa., says, "It is my personal belief that plumbers share certain genetic traits with beavers." He also recommends doing "a full gut" in any major bathroom upgrade.

The project presented here is all the justification needed to follow that recommendation. **PR**

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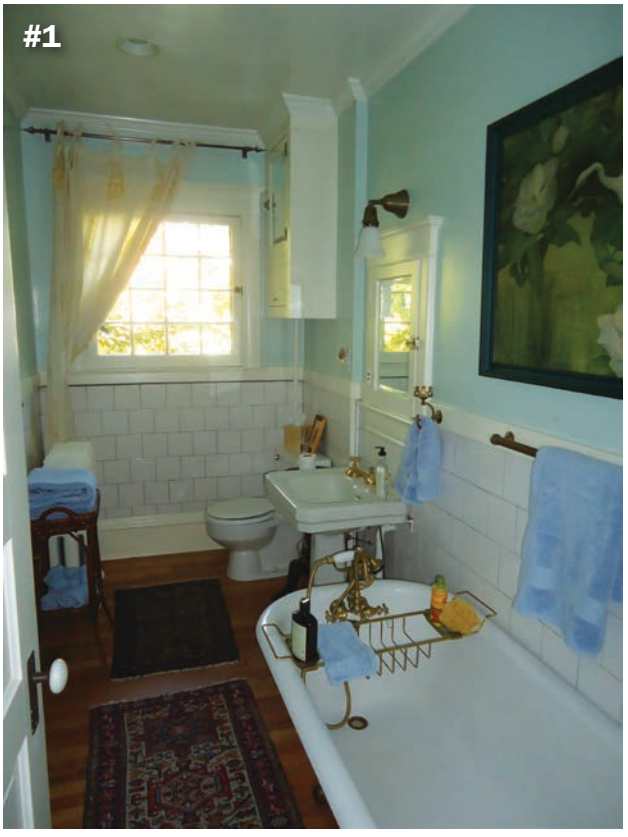
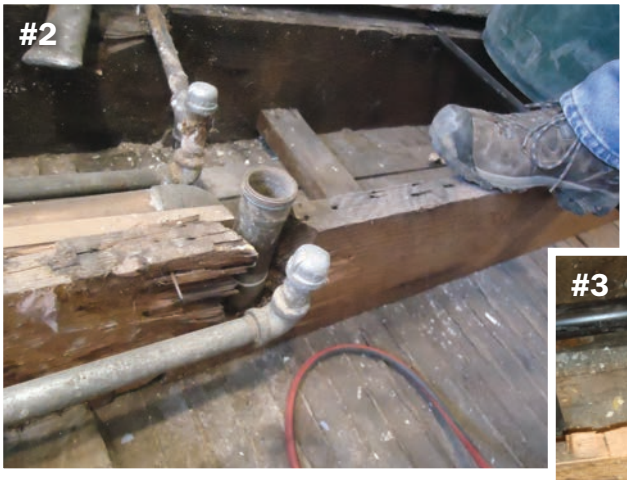


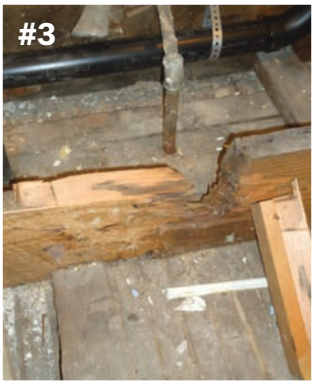
Double Whammy

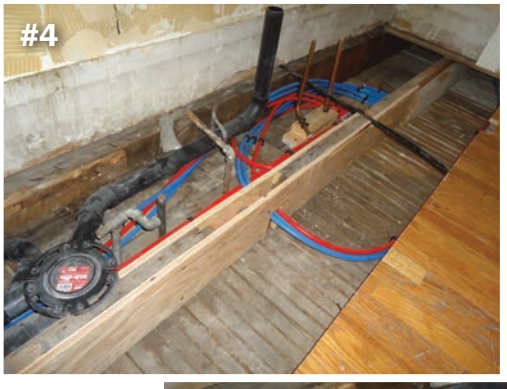
The bathroom pictured **(#1)** is in a lovely Denver Foursquare built in 1906 that had one remodel done, probably in the 1920's, judging by the fixtures. When that remodel happened, the drain location for the new tub was slightly different from the tub it replaced (which still resides in the backyard and is used as a planter). Working from above, the plumbers hacked about two-thirds of the way through the roughcut 2x10 joist, and also notched the bottom nearby to run wiring **(#2)**. That left about 2 inches of useable cross section to carry the load. Leaking around the drain had eaten away another 10 inches along the top of the joist **(#3)**.

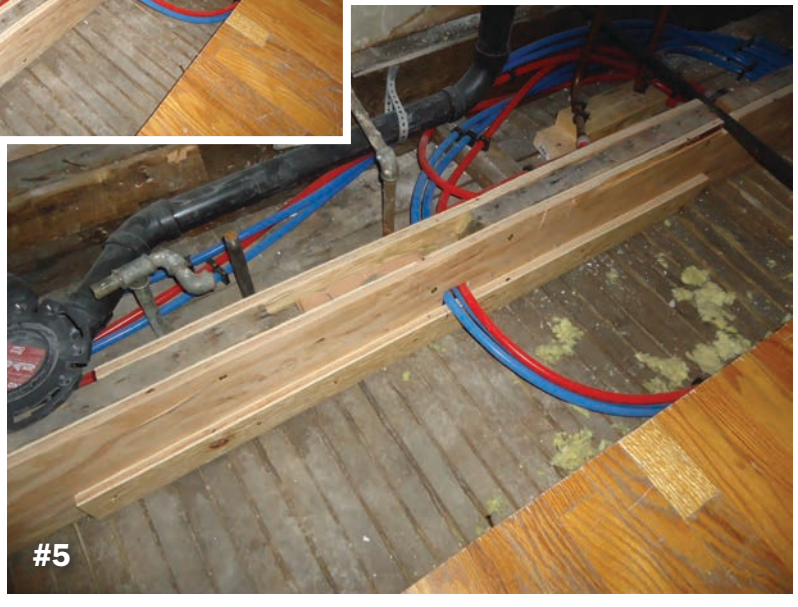
For years, this joist had been directly under a cast iron tub (weighing approximately 330 pounds) that regularly held 60 gallons of water (weighing 8.3 pounds per gallon, or 498 pounds), and a bather (say 200 pounds). Really, it was kind of a miracle that the tub and bather didn't end up in the dining room below!

The joist under the tub in this old bathroom had all but lost the battle with two natural enemies: leaks and trade contractors with recip saws. There's a lesson in the fix, too.









Fixed and Fixed Again

The contractor's fix was to install two ¾-inch plywood gussets: a 4-footer on one side, and an 8-footer on the other. However, they couldn't resist the urge to use the old notch for the new supply lines, so they notched the bottom of the gusset **(#4)**.

Structural engineer Megan Sudik, principal of Dossey Sudik, was then called to "bless" the fix. Although she agreed that the gusseted joist was in far better shape than when they found it, she directed the contractor, Consolidated Construction Management, to add two ¾x3½-inch gussets for 8 feet along the bottom of the both sides to reinforce the tension side of the joist where most of the bending would happen **(#5)**.

If You Don't Know, Ask

When asked how the compromised joist had held up so long, Sudik repled "Fortunately there are a lot of redundancies in wood framing that we can't account for by strict calculation, and that is what had been going on here."

Sawn or engineered joists can be notched and drilled, but there are specific rules governing where and by how much. For instance, if the joist size is controlled by moment, you need to stay away from the middle of the span. But if the joist size is controlled by shear, you want to work in the middle of the span and stay away from the ends. There is almost no way the carpenter on the job will know that.

When in doubt, call your engineer.