



By Rebecca Quinn, CFM

Everywhere you look you can find something about changes to the National Flood Insurance Program triggered by the Biggert Waters Act (BW-12). I'm not going to comment on the matter of increasing rates so that every insured property eventually pays for flood insurance based on actual risk.

Today I want to talk about reducing risk. It's past time for us all to take a good look at what can be done to reduce exposure to flood damage. BW-12 just reinforces the merits of doing that. Actually, prior to BW-12 there was little incentive to simply "reduce" risk, because the best insurance rates are reserved for buildings that meet or exceed the NFIP minimum requirements. But now that rates are going up, and more older buildings will eventually be actuarially rated, it makes sense to look at reducing risk, especially if doing so can lower the cost of flood insurance.

Floodplain managers know that buildings that were built before a community's first Flood Insurance Rate Maps were issued, got policies written with "discounted" rates (sometimes referred to as subsidized rates). What a lot of us didn't know is that any older building that just happened to be elevated high enough, and just happened to have the right type of foundation, can have a policy written with actuarial rates if the owner submits an Elevation Certificate that documents the building conforms to the minimum requirements. Conform to the whole shebang: first floor at or above BFE, equipment and utilities elevated, flood-damage resistant materials, and walls of enclosures have flood openings (or are breakaway walls in Zone V). Turns out if older homes conform to all of the minimum requirements, then actuarially-rated policies can cost less than "discounted" policies.

There's been a small but growing effort by some community officials, homeowners associations, and knowledgeable consultants and contractors to modify older homes so that they qualify for actuarial rates, or even just lower rates. Just as important as that objective is that modified or retrofitted buildings are much less likely to sustain damage the next time Mother Nature comes calling! I wonder, with all the attention on BW-12 and rising rates, if we have forgotten about a myriad of benefits in reducing exposure to flooding?

For the past two decades a great deal of time, attention, and funding has gone into buying out or elevating flood-prone homes. I've always been a strong proponent of these projects, having managed Maryland's mitigation grant program long before the current FEMA grant programs were authorized. There haven't been many times in my career when I knew my job had more positive impact than in the late 1980s. After yet another flood in Baltimore County prompted the owner of a house in the floodplain to call me early one Monday morning. "On Friday I still wasn't happy about having sold my house to the county, but on Sunday when I drove by and water was halfway up the wall again, I changed my mind." We can bandy about theory and benefit-cost analyses all we want, but that's a true measure of the good work we do. But I digress ...

Yes, we all know that acquisition is the only way to completely eliminate flood risk, and that elevating homes on fully compliant, new foundations is a great idea to reduce exposure to flooding. The last time I

saw FEMA's numbers, thousands of homes had been acquired or elevated using federal grant funds, and thousands more have been elevated or demolished using Increased Cost of Compliance (coverage that's part of NFIP policies on buildings in mapped special flood hazard areas). But let's be realistic: given the millions of buildings in the nation's floodplain, there's no way that reliance on those funding sources will significantly reduce the nation's overall exposure to flood risk any time soon. Similarly, decades of experience has shown that the expectation behind the Substantial Improvement and Substantial Damage requirements hasn't played out – there are millions of older buildings that just haven't had improvements or repairs that hit the 50 percent trigger, and millions more that are unlikely to sustain Substantial Damage by flooding.

That's a long-winded lead-up to today's topic. Let's talk about just one way that risk of flood damage can be reduced for some homes and, along the way, the cost of flood premiums might also be reduced.

Let's talk about modifying crawlspaces to reduce vulnerability to flood damage to buildings located in Zone A (Zones A, AE, A1-30, AO, and AH). The way to do this is to modify crawlspaces so that they conform to the minimum requirements. Please remember that each building needs to be examined to determine exactly what needs to be done, and that this summary is just that – a summary. I hope this column is enough to get you thinking.

Elevated Home, Noncompliant Crawlspace (or enclosure). Several years ago, a study for FEMA documented the results of field surveys of buildings that were supposedly built to meet the minimum requirements. One of the most important conclusions was that for the most part, local officials and builders had been getting lowest floors properly elevated. The not-so-good news was that plenty of enclosures below those elevated buildings failed to comply, often because of insufficient flood openings. And a large number of those noncompliant enclosures were crawlspaces.

A significant consequence of that noncompliance is risk of damage, which is reflected in the fact that flood insurance policies on those buildings are rated with the floor of the crawlspace (or enclosure) as the lowest floor. This makes policies much more expensive than they would have been, had the crawlspaces and enclosures fully complied with the requirements. My guess is many builders and local officials are unaware that if they don't pay attention to the details, owners will bear the burden by having to pay much more for insurance.

The solution? Easy – identify the noncompliance and fix it. If the problem is insufficient flood openings, either remove non-engineered openings and replace them with engineered openings, or add more openings. Of course, other aspects of the crawlspace or enclosure may also be noncompliant. The discussion below covers those aspects. The final step is to submit documentation to the insurance company so that the policy can be rewritten to reflect the compliant enclosure.

Older Home, Nonconforming Crawlspace. For this discussion, I'm not talking about raising existing buildings on new or extended foundation walls, so let's not worry about how high the floor is above the crawlspace. The whole point is that risk of damage is reduced if crawlspaces are modified, even if the floor above the crawlspace just happens to be below the base flood elevation. And, under BW-12 if the building is going to be rated actuarially anyway, if the crawlspace is modified and an Elevation Certificate provided to the insurance company, an actuarially-rated policy based on the elevation of the floor, even if it is below the BFE, is likely to cost less than if the owner does nothing.

First, a quick look at the NFIP requirements for enclosures below elevated buildings in Zone A (including crawlspaces), also found in the International Code Series and thus in virtually all state and local building codes:

- The foundation walls must have flood openings to allow floodwater to automatically flow in and out so that unequal hydrostatic pressure does not cause structural damage to the walls.
- The interior grade must be at or above the exterior grade along one side, otherwise the crawlspace meets the definition for a basement, which is “any area of the building having its floor subgrade (below ground level) on all sides.” The reasoning behind this requirement is also related to hydrostatic pressure, as well as minimizing the amount of water that can’t readily drain away.
- Equipment must be moved to be at least as high as the level of the floor above the crawlspace.

Install New Flood Openings, or Install Proper Openings, in Crawlspace Walls. Flood openings are required so that floodwaters can automatically flow in and out in order to minimize unequal hydrostatic pressure that can lead to structural damage. The number and location of flood openings is specified in regulations and codes, along with the amount of net open area required for non-engineered openings and certification requirements for engineered openings. Rather than attempt to summarize all the guidance on openings, I’ll just refer you to FEMA’s Technical Bulletin 1, *Openings in Foundation Walls and Walls of Enclosures*.

If foundations walls don’t have any openings, or doesn’t have enough openings, holes can be cut and flood opening devices installed. It isn’t that complicated for a contractor with the right tools to remove several concrete blocks or cut holes in poured concrete foundation walls. The best reason to consider engineered openings, especially for retrofit projects, is because fewer holes need to be cut in the walls. Our colleagues at SmartVent have been able to help many homeowners do just that, sometimes lowering the annual cost of flood insurance by thousands of dollars: <http://smartvent.com/pdfs/flood-vent-retrofit.pdf>. It’s not a big leap to realize that this also makes homes much more marketable.



Modify the Interior Grade of the Crawlspace. Under normal conditions, the soil on the inside of a foundation wall balances the soil pressure on the outside of the wall. Under flood conditions, we assume the soil inside continues to balance the soil outside (ignoring what are probably minor differences as the outside soil gets saturated a little sooner than the inside soil, and thus is heavier until floodwaters begin to spill through the flood openings). But if the soil inside is below grade along the lowest side, then as water rises against the outside of the wall, it is unbalanced until water begins to spill in through the flood opening.

To raise the ground surface of the soil on the inside of a foundation wall so that it is at or above the ground surface all along one wall, enough soil needs to be added so that the surface of the newly placed soil is somewhat above the exterior soil level, to account for settling (otherwise it could settle enough to still be below the exterior grade). Should it be compacted? Ideally, yes, but that can be difficult in crawlspaces with little headroom. But if the newly-placed soil is only a foot or so deep, then adding a

couple extra inches to account for settling should suffice. Also, if the trench excavated for the footing was not backfilled when the building was constructed (thus the grade adjacent to the inside of the foundation wall is well below-grade), then the trench should be backfilled with at least an attempt at compaction – and then add some extra soil to account for settling.

Now, can gravel be used instead of soil to raise the interior grade? Sure, the weight of the gravel will balance the weight of the exterior soil. Plus, it'll likely be a lot easier to place sand or gravel, especially if there's not much headroom.

We should add a caution that backfilling a below-grade crawlspace may not work if the surface inside the foundation wall has a non-structural concrete slab (often called a "rat slab"). If there is a slab, then drainage as flooding recedes needs to be considered. More than likely the presence of the non-structural slab won't trap water and floodwaters will drain anyway, avoiding unbalanced pressure against the inside foundation wall. But in these circumstances, owners should consult with an engineer or experienced contractor. Drainage holes can be provided in the slab before gravel or soil is placed.

I've had people question whether just a few inches below grade really is that much of a problem. While it may be a valid point when considering flood loads (just how much load is associated with only a few inches of water?), that misses two important points. The first point is compliance – if the inside of a crawlspace is below grade on all sides, it's a basement and basements are not permitted, period. It's very difficult to regulate grey areas, and much easier to say "below grade area not permitted" than to say "a little below is OK because the loads aren't that much different." The second point is insurance – if the Elevation Certificate shows the interior of a crawlspace to be below grade on all sides, the flood insurance will be rated higher.

Move Equipment. If equipment is left in the crawlspace, not only is it exposed to flood damage, but its presence means the best flood insurance rates won't apply. The solution, moving it to an elevation at least as high as the floor above the crawlspace, isn't always easy because there may not be enough area inside the home, and adding a small addition to house the equipment might take some work. But it can be done and has been done many times.

In Closing. The typical objection to even considering retrofits is concern about costs. Compared to elevation-in-place, modifying crawlspaces isn't likely to be a big-dollar investment. I appreciate that owners have to come up with the money to do the work. But when you consider the likely annual savings on flood insurance, the balance can quickly tip towards action. And remember, making homes safer and eligible for lower insurance premiums can be positive factors when it comes time to sell.

Other options for retrofitting buildings without crawlspaces can get complicated fast, but are still worth examining. Consulting with someone who really knows the rules is a good idea. Here are a few resources that might help with the deliberations:

- *Homeowner's Guide to Retrofitting*, FEMA P-312, <http://www.fema.gov/media-library/assets/documents/480>
- *Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A*, Hurricane Sandy Recovery Advisory 7, <http://www.fema.gov/hurricane-sandy-building-science-activities-resources>

- *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA 551, <http://www.fema.gov/media-library/assets/documents/10618?id=2737>
- *Floodproofing Non-Residential Buildings*, FEMA P-936, <http://www.fema.gov/media-library/assets/documents/34270>
- FEMA Technical Bulletins: <http://www.fema.gov/plan/prevent/floodplain/techbul.shtm>

Submit your own items or suggestions for future topics to column editor Rebecca Quinn, CFM, at rcquinn@earthlink.net. Comments welcomed!

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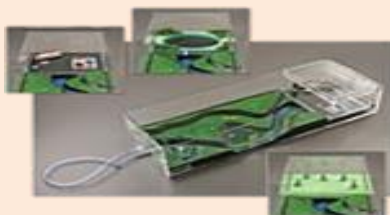
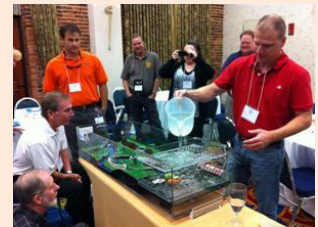


Happy New Year! A friendly reminder that 2014 chapter renewals were due Dec. 31. If your chapter has not yet renewed, be sure to get your renewal paperwork and payment to Kait@floods.org or fax: (608) 828-6319 to avoid a chapter benefit lapse. You don't want to miss out on any of the good things happening in 2014! If you have questions, give Kait a call at (608) 828-6325.



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