



Effects of Long and Short Duration Flooding on Building Materials

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There are major differences in the overall impacts on building material related to flood duration. Discussed below are some qualitative effects of long-duration versus short-duration flooding.

Materials that are in “prolonged contact” (at least 72 hours as defined by FEMA technical Bulletin 2-93) with floodwaters may be effected very differently than materials in short-term contact. The effects of prolonged contact with floodwaters can vary by material. Typically materials classified by the U.S. Army Corp. of Engineers as not being “flood-resistant” are destroyed with short-term inundation. Some typical materials in this category are asphalt tile, carpet, chipboard, enamel felt-base floor covering, wood flooring, gypsum board, and most types of insulation used in residential construction. Though these materials are typically destroyed with limited contact with water, the effects of long- term inundation can significantly increase the problem. First, many non-flood-resistant materials are very porous. This characteristic makes them hydrophilic and ideal for wicking effects. For example, if insulation in the floor of a home is only inundated several inches, wicking action can “draw” water and moisture up into the sub-floor (usually non-flood-resistant) and flooring surface. Gypsum products, often used for interior walls, can also be very hydrophilic. If the bottom of the wall is inundated for a prolonged period of time, it can result in more of the wall being saturated. These materials are also great for supporting mold and other fungi which can cause cosmetic damage as well as creating a health hazard. Long-duration or “ponding” floodwaters can also contain many contaminants that can also be destructive to materials.

Long-duration flooding can also damage materials that are relatively flood-resistant and would not be damaged in short-term contact with floodwaters. These can be structural

components such as floor joists and exterior sheathing. Most structural lumber used in construction is not pressure treated and is not classified as flood-resistant by Tech. Bulletin 2-93. As non-treated wood gets saturated with water, it swells. After the water recedes, the excess moisture trapped in the wood fibers is released causing the wood to shrink back to its original size. This causes several problems. One common effect is “nail popping”, or the wood pushing the nail out resulting from the swell-shrink cycle. This can be combined with the effect of the sheathing or sub-flooring to warp as the force created by the “warping effect” of the sheathing cannot be held by the nailing. Another problem of long-duration inundation is rot and decay resulting from the saturation of the wood fibers. This alone can effect the structural components and lead to a loss of structural integrity. One aspect of this type of damage is that it might not be apparent for weeks, months or even years after the inundation. Probably the most costly difference in short- vs. long- duration flooding is the accessibility during and after inundation. A factor in the efficacy of flood repair is *time*. For example, mold growth increases as time passes. Ideally, if saturated materials that support mold growth (such as carpet, insulation, or non-treated wood products) are removed and/or dried immediately (24 to 48 hours) after inundation, damage may be localized to those materials. If the materials are left in place, they promote mold and fungi growth on materials that would be relatively undamaged. Mold also creates a major health issue and has to be removed by a professional which causes longer displacement time, thus increasing cost and impact to the resident.

Displacement is the time a resident cannot

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stay at their home and requires alternative lodging. In short-duration flooding it is possibly for a resident or contractor to immediately assess and repair flood damage. In long-duration flooding, as some cases in the 2004 Hurricane Season, it was six weeks before residents could even get to their homes to assess damages. By that time the damages are far worse than they would be during the same level of short-term inundation and will require more time to repair.

Structural lumber may be salvageable after long-duration flooding, but it may require several weeks or months to dry. The lumber must be exposed to dry, and if the floor joists are saturated, the sub-flooring cannot be replaced until the joists are dry. This makes the home inhabitable until the repairs are performed.

In conclusion, flood duration is a major factor in analyzing the costs and impacts of a flooding event or any future flooding event. Additionally, the cost and impact of displacement for several weeks or months versus several days can play a major role in the overall impact and cost of damage.

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