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The Power of Water: How to Prepare and Protect Your Business from Floods

Each year, the United States suffers hundreds of millions, or even several billions, of dollars in flood damage. Small businesses, which are the economic and often social engine of many communities, can be the most adversely affected by floods. What's more, flash flooding is the leading cause of weather-related deaths in the U.S.—causing an average of about 200 deaths annually. Flood waters also can carry with them a range of health and environmental problems.

Topography and weather conditions play a prominent role in the impact different types of flooding have on specific locales. The following are some examples of specific types of flooding.

- Rising water may be the greatest risk to inland areas away from a river bed after a heavy snow pack begins to melt or a heavy rainfall.
- Moving water is a serious risk in areas near rivers or in coastal storm surge areas because it creates significantly larger lateral forces on a building.
- Overtopping, breaching or opening of dams, levees, and other flood control mechanisms, which are designed to divert the flow of water to provide protection, can lead to flood damage that may be more significant than if the levees were never installed. The Mississippi and Missouri River floods of 2011 included breaches of levees, as well as controlled flooding by the opening of various flood gates on levees. The result was thousands of acres of farmland, crops, livestock and fish farms being destroyed to protect urban areas.
- Flash flooding can occur in every region as a result of slow-moving thunderstorms or excessive rainfall from any storm system.

- Large, slow-moving tropical storms can dump excessive amounts of rain on coastal locations and then move inland to continue the devastation, resulting in widespread flood damage.

Floods can occur anywhere, often with little or no warning, and with devastating consequences. Protecting the bottom line in order to remain open, or to re-open quickly after a flood disaster, requires taking steps now to prevent or reduce flood damage should your business be in the path of rising water.

With that in mind, this article provides a brief overview of issues that small businesses must address to reduce the likelihood of flood damage and to prepare financially and operationally should a flood occur. Many of the topics covered here involve complex issues that are best addressed by hydrological, engineering, regulatory or insurance experts; the goal here is simply to outline the basics in order to help business owners understand why they need to mitigate against flood risk and some of the challenges they may face.

Tropical Storm Allison (2001): A Case Study in Flooding

Often businesses and homeowners let down their guard when a tropical weather system does not result in hurricane-force winds. Tropical Storm Allison is a good example of how rains associated with a tropical system can be equally devastating. The storm dumped approximately 32 trillion gallons of rain (enough to meet U.S. water needs for an entire year), according to the Tropical Storm Allison Recovery Project. This included 28 inches of rainfall during a 12-hour period just northeast of downtown Houston, and rainfall amounts ranging from 10, 20 and 30 inches in locations throughout the Southeast—earning Allison the infamous distinction as the costliest tropical storm in U.S. history.

Understanding Your Flood Hazard

There are several flood principles that should be considered in order to determine your facility's exposure to flood waters and the type of protection to be deployed:

- **Duration:** It is important to know if flood waters are expected to recede quickly or may be trapped due to the slope of the land. The longer a facility is exposed to flood waters, the greater potential for flood proofing failures due to a breach in the protection.
- **Depth:** flood waters greater than 3 ft. create hydrostatic pressure on walls that can cause cracks in masonry and greatly increase the potential of collapse to unreinforced masonry. When estimating the potential depth of flood waters, it's always best to include a safety factor to account for inaccuracies in the estimate.
- **Velocity:** As flood water velocity increases so does the pressure exerted on flood protection. River flooding can be very fast moving water at first and then may settle down. Coastal locations may be exposed to wave action from storm surge.

- **Water Condition:** Many times flood waters are dirty, brackish or contaminated with biological and chemical materials including waste water, sewage, pesticides, industrial waste, toxic and non-toxic chemicals, or oils. Debris that is churning in the water can impact buildings and flood protection systems, create breaches in the protection and cause extensive damage.

Location, Location, Location

Proximity to water is the No. 1 risk factor for flooding, but property owners should not assume being out of the floodplain will help you entirely avoid the possibility of flooding. It is always a best practice to locate your property as far away from bodies of water as possible. Flood maps available from the National Flood Insurance Program (NFIP) identify 100-year and 500-year flood zones throughout the United States. The flood zones also delineate participation in the NFIP, as well as permitting and other requirements that communities adopt in order to meet NFIP standards and qualify their citizens for lower flood insurance rates.

By definition, the 100-year and 500-year flood zones mean there is a 1 (.20) percent chance of flooding annually in an area based on topography and historical data; it does not mean that flooding will occur only once in a century (or 500 years). There also are other important points to consider:

- Floods can and very often do occur outside the 100-year flood zone. In fact, approximately 25 percent of all flood damages occur in relatively low risk zones commonly described as being "outside the mapped flood zone."
- Specific boundaries on some flood maps may be arbitrary or include inaccuracies. For example, a property lying just outside the 100-year flood zone is almost equally likely to be flooded as one just within.

- Obstructions or landfill can change the topography, storm-water drainage patterns, and flow of water over natural floodplains. Although permits are required for flood zone fill (and must be based on engineering assessments demonstrating “no impact”), it is possible that non-permitted work has occurred near your property.
- Floods show no respect for the estimated probabilities. As Federal Emergency Management Agency (FEMA) Director Craig Fugate observed following a spate of natural disasters, “It just seemed like it was back-to-back and it came in waves. The term ‘100-year event’ really lost its meaning this year.”

The Importance of Elevation

When it comes to flooding there really is no better solution than adequate elevation, aside from choosing a location well outside of a 500-year flood plain. If such a location is not possible, the best way to increase the safety margin against flood damage is to raise the elevation of your building above the 500-year flood elevation. Flood-proofing your building is another option to reduce damage.

Through the NFIP, there is extensive regulation of floodplain development at the community level. Permits are needed for a wide range of activities including construction of new buildings, additions to existing buildings, and substantial improvement to the interior of existing buildings that are within the most hazardous flood zones.

Part of the permitting process involves whether your building site is higher than the base flood elevation (BFE), which is the elevation at which your property has a 1 percent chance of flooding annually, as indicated on the NFIP flood maps.

Major storms and flash floods can cause waters to rise higher than the BFE—therefore, it is always a good investment to build in a safety

factor several feet above the BFE. This safety zone is called “freeboarding.” For example, Insurance Institute for Business & Home Safety’s FORTIFIED for Safer Business Program™, a package of enhanced voluntary construction standards that greatly increase a new light commercial building’s durability and resilience to natural hazards, requires FORTIFIED buildings to be at least 3 ft. above the BFE or above the 500-year flood elevation.

There also are ways to retrofit your existing building so that it meets or exceeds BFEs. While only a structural engineer/design professional can determine what is right for your property, the options include raising foundation onto pilings or columns or adding landfill, as long as “no impact” floodplain requirements are met.

- When elevating a building so that the walking surface of the lowest floor is at the minimum elevation, areas under the BFE can be used only for parking and limited storage—under-floor bathrooms, utilities, and ductwork are not allowed.
- Equipment, utility connections and all interior utility systems including ductwork must be elevated above the BFE. In addition, fuel and propane tanks must be properly anchored, since they can become buoyant even in shallow water.

What Is “Dry Flood-Proofing”?

Sealing a building so that water will not enter is called “dry flood-proofing” or “flood-proofing.” Flood-proofing protects your building by coating the exterior with a membrane to prevent flood waters from entering. NFIP regulations allow flood-proofing as an alternative to elevation above the BFE for newly constructed or substantially improved non-residential structures only—new and improved homes must be elevated above the BFE to meet NFIP requirements.

It is important to determine whether dry flood-proofing will provide the protections your property needs before choosing this option. This also applies if your business is located outside the 100-year flood zone, but you want to invest in additional flood protection. Dry flood-proofing is a complex procedure that should be done by professional experts. If done incorrectly, it may not protect your property and can lead to decay, mold, or termite damage:

- As a general matter, dry flood-proofing is best suited to areas with clay soils where floods are short in duration and less than 3 ft. deep.
- Buildings in poor structural condition should not be dry flood-proofed, as the exterior walls will be under extreme pressure during a flood.

There are a variety of dry flood-proofing measures; a professional can help to determine whether any of them are right for your situation:

- Applying a waterproof coating or membrane to exterior walls;
- Sealing all wall penetrations including where utilities enter the building;
- Installing waterproof shields over all openings, including windows and doors;
- Anchoring the building to resist flotation;
- Strengthening walls to withstand flood water pressures and flood debris.

The Vulnerable Basement

Even above the BFE or outside the floodplain, basements are prone to floods because water may flow down into them. They also may have an increased hydrostatic pressure exerted upon them when the surrounding ground is saturated. Recognizing that elevation is the

best form of mitigation, there are a number of additional measures business owners can take to reduce the likelihood and scope of basement flood damage.

- Thoroughly inspect your basement and the surrounding property for evidence of water entry and sources of water flow and leakage.
- Correct potential problems—for example, extend and redirect downspouts, re-grade sloping landscape, and caulk any interior wall cracks.
- Basement walls should be designed to resist hydrostatic pressure.
- Use flood resistant materials where possible, including floor coverings, wall coverings, and wall insulation. Most flood resistant materials can withstand direct contact with water for at least 72 hours without being significantly damaged.
- Do not store valuable equipment, documents, or inventory in any crawlspace or basement where flooding is possible.

The “Green” Factor

In addition, there are steps you can take now to reduce health and environmental damage should a flood occur.

- Anchor fuel and propane tanks to prevent their being swept away. When they break away, the contents may leak creating fire, explosion and pollution risks that can adversely affect health and the environment.
- Install sewer backflow valves to block drain pipes from sewage back-up, which can occur if there is flooding in your area.
- If you are supplied by well water, protect your well from contamination. A licensed well drilling contractor can inspect your well and suggest improvements.

Financial and Operational Protections

The NFIP makes flood insurance available to commercial owners and renters. As is the case with residential property, costs vary depending on how much insurance is purchased, what it covers, and the property's flood risk. NFIP coverage limits are up to \$500,000 for a commercial building, and up to \$500,000 to protect its contents. Insurance coverage also may be available from private insurance companies, depending on your business's location, building and business characteristics, and property value. The best way to learn more about flood insurance benefits, costs, and options is to contact your insurance agent.

Finally, take steps now so that you can quickly resume operations should a flood or other hazard damage your property. Although flood insurance may cover losses to your structure and contents, many businesses that are severely damaged never fully recover financially due to the loss of management focus, employees, and market share. The Insurance Institute for Business & Home Safety's (IBHS) Open for Business® planning tool helps small- and mid-sized businesses resume their critical business operations and work processes and deliver the goods and services expected by customers or clients—consider it a vital part of your flood preparation planning and practice.

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