



# Wet and Dry Floodproofing for Business

While it is a “best practice” to locate your business outside flood-prone areas, in most Vermont communities it’s not practical or possible to locate or move a business to a flood safe location. In these cases, there are a range of floodproofing options to consider. Floodproofing typically involves a combination of building modifications and site improvements to reduce flood damage. While floodproofing does not eliminate all flood risks, it can help reduce the risk to a manageable level and may reduce insurance premiums.

## Why it Matters

Flooding can occur anywhere with little or no warning and with devastating effects. In fact, every Vermont town has experienced flooding and the state has had at least one federally-declared disaster in 21 of the past 25 years. Given these odds, business should take a proactive role in understanding the risks and exploring floodproofing options as a way to reduce the odds and severity of future flood damages and to enable flooded businesses to recover and resume operations sooner.

## Floodproofing Options to Protect Buildings

There are a number of ways to protect your property from flood damage, reduce losses and bounce back more quickly.

### ➔ Elevate Your Building

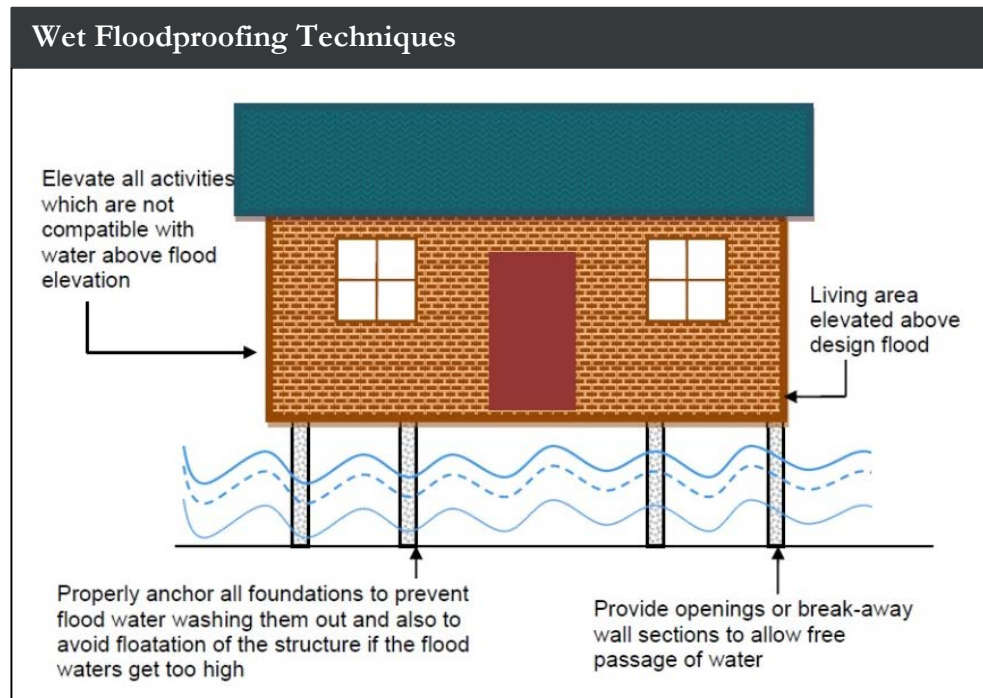
In some cases, the most effective way to reduce or avoid flood damage is elevate the habitable part of the building. Elevation involves raising a building in place so that the habitable space is located above the anticipated height of flood waters. Buildings are lifted off their foundations with hydraulic jacks and then replaced on top of a new or extended foundation. Obviously, lighter wood-frame buildings are easier and often cheaper to raise than masonry buildings. To account for flash flooding or higher than expected flooding levels, experts recommend increasing the safety margin against flood damage by raising the building elevations more than one foot above FEMA’s Base Flood Elevation (BFE) the location.

### DEFINITION

Base Flood Elevation (BFE) is the calculated elevation to which floodwater is anticipated to rise during the base flood. BFEs are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. The BFE is the regulatory requirement for the elevation or floodproofing of building. The relationship between the BFE and a building’s elevation determines the flood insurance premium.

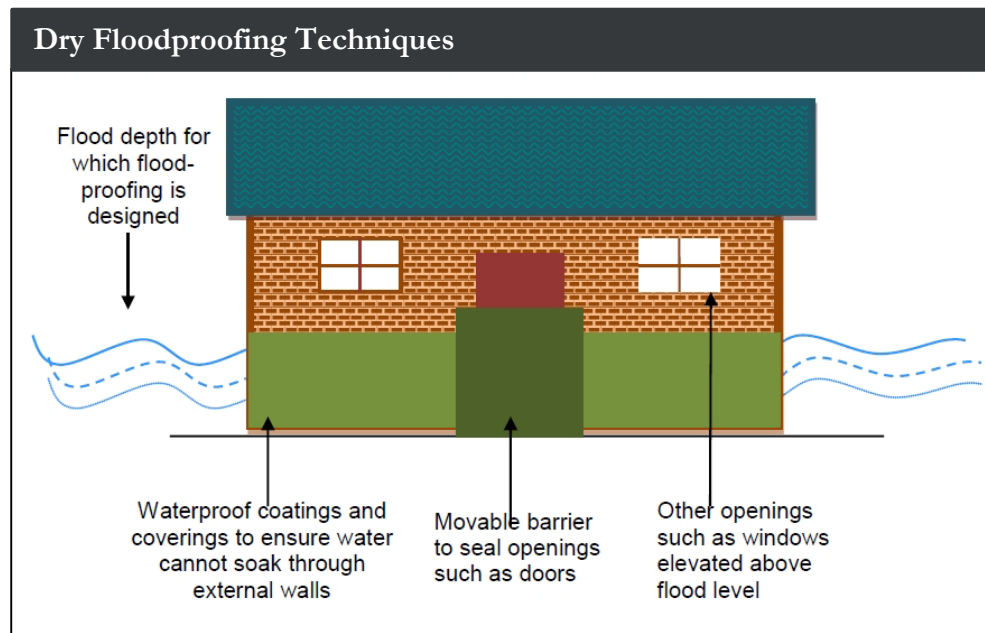
### ➔ Wet Floodproof Your Building

Wet floodproofing includes a variety of techniques that allow flood water to enter a building without damage to the building and its contents. Buildings must be anchored to the foundation and must have flood vents, or permanent openings, that allow water to flow in and out of the building without damaging the foundation. Vulnerable items, such as utilities, equipment and inventory are typically relocated to higher parts of the building or protected in place. Building materials resistant to flood damage, such as concrete and gypsum wallboard are used for those parts of the building that will be flooded. Automatic shut-off valves are installed on sewer and fuel lines and well casings are sealed to protect them from contamination. Fuel and propane tanks are also anchored to prevent them from being swept away and potentially creating additional damages to the property or downstream.



### ➔ Dry Floodproof Your Building

Sealing a building to prevent water from entering is called “dry floodproofing.” Dry floodproofing involves sealing building walls with waterproof materials or coatings to make the building watertight. This technique can only be used when the walls and foundation floor are strong enough to withstand the pressure and strength of the floodwaters. Removable barriers are installed to seal off doors, windows, and other openings to keep the water out. An interior drainage system must also be installed to collect water that leaks through the water barrier materials and shields. This system typically requires a sump pump and a portable generator to allow operation during a power failure. It may only be suitable for heavy masonry buildings constructed of block, brick or reinforced concrete and is usually only used for non-residential buildings. For a margin of safety, a standard dry floodproofing design typically extends at least one to two feet above FEMA’s Base Flood Elevation (BFE) for the location.



### ➔ Protect Your Basement

Even if the building is above the BFE or outside the floodplain, basements are prone to floods because water may flow into them. When the surrounding ground is saturated with water, basements may become wet from the increased water pressure exerted upon them. There are a number of additional measures business owners can take to reduce the likelihood and scope of basement flood damage. These include inspecting your basement for water leakage or entry, and correcting potential problems, such as re-grading the land to slope away from the building or caulking cracks, installing a sump pump or installing automatic shutoff valves on wastewater or other building infrastructure. It is critically important not to store valuable equipment, documents, or inventory in any crawlspace or basement where flooding is possible.

### ➔ Buyouts and Demolition

While not as common as the other options, removing flood-prone building and relocating a business to a flood-safe location is a permanent solution to a flooding problem. This is most often done after a major flood as an alternative to costly repairs. State and federal grant funding for a “buyout” may be available to cover some of the costs.

### Got Flood Insurance?

Careful implementation of the strategies above may qualify a business for lower insurance rates and premiums. While insurance does not prevent flood damage, it can protect your financial investment. Annual premiums for flood insurance can be expensive, and costs vary depending on the location, age, and elevation of the building. Nevertheless, the investment in insurance and the improvements necessary to be eligible for lower rates may significantly reduce your financial burden when flood damage occurs.

The National Flood Insurance Program (NFIP) coverage limits are up to \$500,000 for a commercial building, and up to \$500,000 to protect its contents. Additional insurance coverage for business interruption and may also be purchased to minimize losses and help speed business recovery. The best way to learn more about flood and other insurance benefits, costs, and options is to contact your insurance agent.

## Next Steps

Developing an appropriate strategy for protecting your business from flood hazards requires evaluation of the risks, technical considerations, costs, and personal preferences.

- ➔ **Local Floodplain Regulations:** Consult with your city or town planning or zoning officials, as well as consultation with VT Floodplain Program staff about local regulations and floodproofing options. If an existing building in the regulated floodplain has been deemed to have “substantial damage” after a flood or construction is proposed that would be a “substantial improvement” (costing more than 50% of the value of the building), regulations require that the entire building be brought into compliance with current floodplain development standards. Those standards typically require the floodproofing techniques outlined above. Other regulations may also apply to the project.
- ➔ **Assess the hazards and identify options:** A building owner should hire a professional engineer or architect who can help them determine what floodproofing options are feasible for their building. An owner should also consider the amount of warning time need to deploy various protective measures. For example, buildings in areas prone to sudden flash flooding may not be a good candidate for dry floodproofing because of the time required to prepare the barriers to repel the flood waters.
- ➔ **Assess the costs and benefits:** Some floodproofing options may be too costly and others may not provide the desired amount of risk reduction. The decision regarding a floodproofing project must also be based on the personal preferences and potential day-to-day impacts to the business. Other considerations in determining the type and extent of floodproofing include: safety of customers and employees, the amount of time it would take to get the business back up and running after a flood, the effect on flood insurance rates, ADA accessibility of the building, whether the structure is a considered to be a bona-fide historic structure and the time and staffing required to deploy flood protection measures.

As noted on the previous page, a building owner should hire a professional engineer or architect who can help them determine what floodproofing options are feasible for their building. They can also help the owner select a knowledgeable contractor and certify important application materials that can reduce insurance premiums.

## Funding Options

- ➔ **Hazard Mitigation Grants:** Private buildings and facilities are eligible for grants to floodproof buildings. [HMGP grants](#) cover 75% of a project’s cost and 25% of the work may be matched through donated hours or materials.
- ➔ **Vermont Economic Development Authority Emergency Flood Assistance Loan Program:** In the wake of disasters, VEDA often offers [emergency loans](#) to replace furnaces and other machinery and equipment and repair of structural damage and other costs directly related to flood damage.
- ➔ **Small Business Administration Disaster Loan:** Businesses of any size and most private non-profit organizations can apply for [Business Physical Disaster Loans](#) to cover disaster losses not fully covered by insurance. Floodproofing improvements are eligible costs.