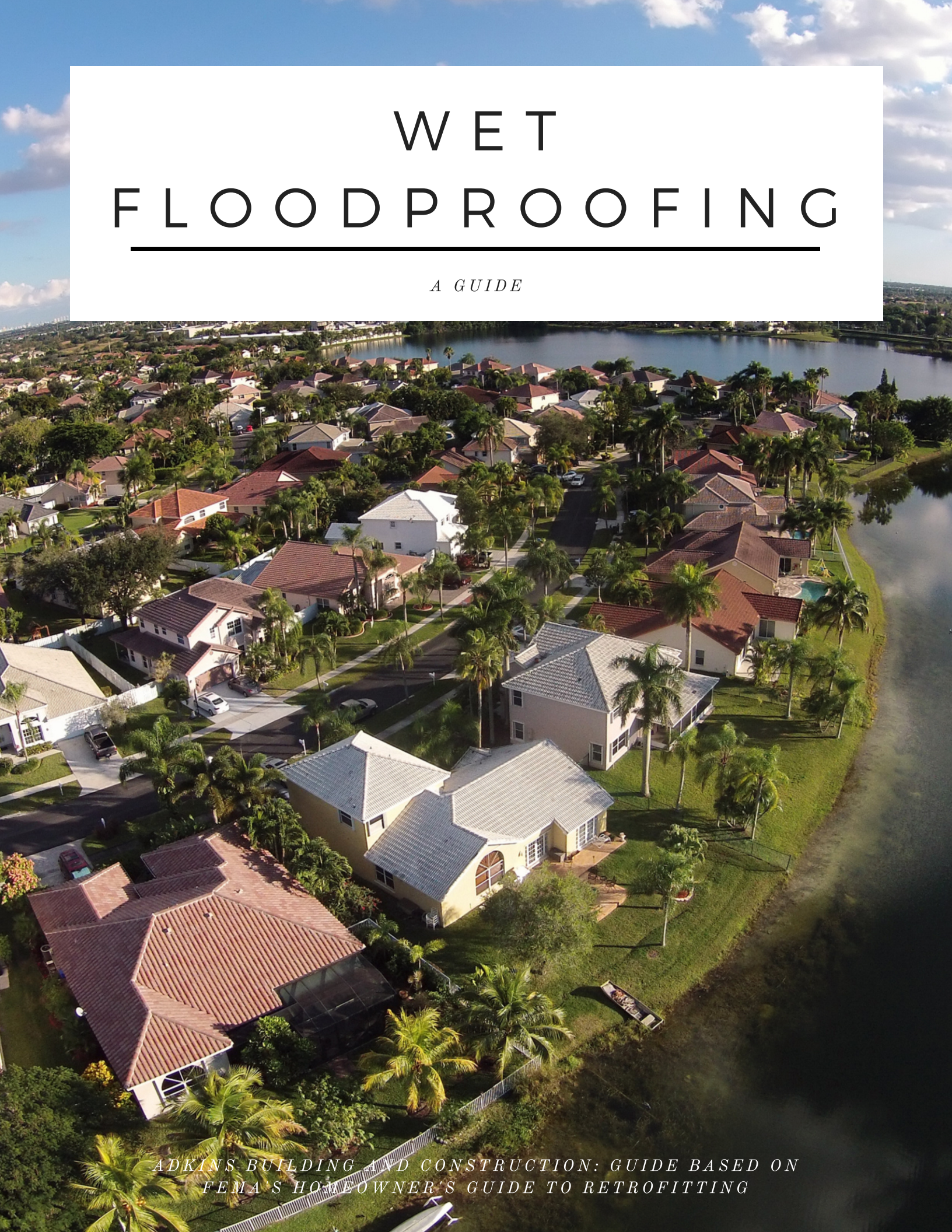
WET FLOODPROOFING

A GUIDE



ADKINS BUILDING AND CONSTRUCTION: GUIDE BASED ON FEMA'S HOMEOWNER'S GUIDE TO RETROFITTING

INTRODUCTION

This guide describes two types of floodproofing: dry and wet. As its name implies, dry floodproofing prevents the entry of floodwaters. In contrast, wet floodproofing allows floodwaters to enter the enclosed areas of a house. The advantage of wet floodproofing is that if floodwaters are allowed to enter the enclosed areas of the house and reach the same level as the floodwaters outside quickly, hydrostatic pressure, including buoyancy, is significantly reduced. Consequently, the loads imposed on the house during a flood and the probability of structural damage might be significantly reduced. Wet floodproofing is usually utilized to reduce damages to enclosures below elevated buildings, walkout-on-grade basements, below-grade basements, crawlspaces, or attached garages. It isn't practical for areas that are to be used as living space.

Successful wet floodproofing involves the following:

- ensuring that floodwaters enter and exit the house
- ensuring that floodwaters inside the house rise and fall at the same rate as floodwaters outdoors
- protecting the areas of the home which are beneath the flood level from damage caused by contact with floodwaters
- protecting service equipment outside and inside the home
- transferring materials stored below the Flood Protection Elevation (FPE)

This section describes the adjustments that must be made to a home for a wet floodproofing project. It discusses the main considerations regarding wet floodproofing.

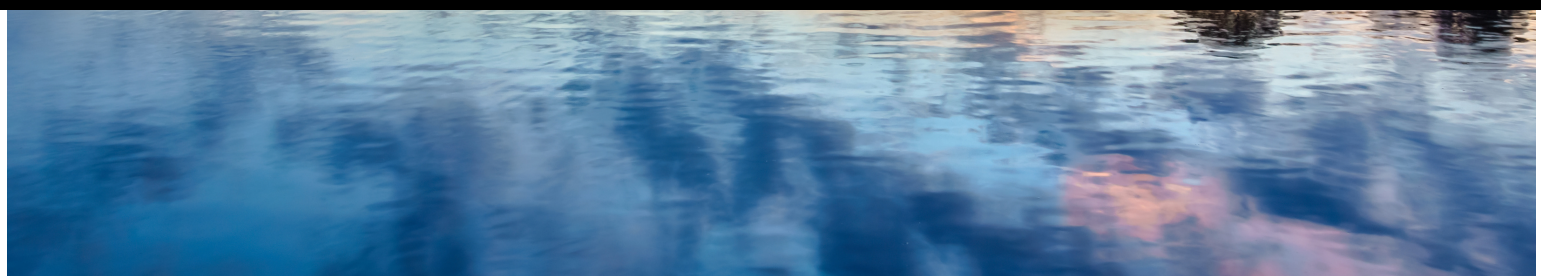
CONSIDERATIONS

FLOOD PROTECTION ELEVATION

All finishing and construction materials in the home parts that will be permitted to flood have to be resistant to damage caused by direct and possibly prolonged contact with floodwaters. Living areas contain floor and wall coverings and other finishing materials, furniture, appliances, and other things that are easily damaged by floodwaters and costly to clean, fix, or replace. Thus, wet floodproofing is practical just for parts of a home not used for living space, such as a basement according to the National Flood Insurance Program (NFIP) regulations, walkout-on-grade basement, crawlspace, or attached garage. The FPE (including freeboard) should not be higher than your lowest finished floor.

If your FPE is above your lowest finished floor elevation, then you need to look into at least one of the other retrofitting methods described in this guide, such as elevation. Most elevation methods incorporate the essentials of wet floodproofing. These methods raise the living space above the flood level and permit floodwaters to go into the regions of the home beneath the living area.

HAZARDS&POST-FLOOD CLEANUP



Hazards

Wet floodproofing protects a home or other building from the effects of hydrostatic pressure. However, it doesn't protect it from additional flood hazards, such as the force of flowing water, the impact of ice, erosion and scour, and other debris. If you have seen signs of these dangers in previous local floods, or if your local officials affirm that your property may be affected by these hazards, you should consider an alternative retrofitting method, such as relocation or elevation on an open foundation. One should also note that wet floodproofing a home does not change its vulnerability to damage from high winds or earthquakes.

Post-Flood Cleanup

Bear in mind that floodwaters are seldom clean. They usually carry debris, sediment, and corrosive or toxic materials such as solvents, oil, sewage, pesticides, fertilizers, and other chemicals. Allowing areas of a house to flood expose those areas to whatever is in the floodwaters. Cleaning a wet floodproofed home post-flood may consequently involve not just removing mud but also disinfecting, washing, and decontaminating walls, floors, and other surfaces. That is just another great reason wet floodproofing is improper for places used as a living area and, in certain conditions, why it may be inappropriate for any part of a house.

MODIFICATIONS REQUIRED FOR WET FLOODPROOFING

WET FLOODPROOFING REQUIRES VARIOUS ADJUSTMENTS TO YOUR HOME.

Installing Openings

The most significant part of a wet floodproofing job is installing wall openings that will allow the entry and exit of floodwaters. The openings have to be installed in foundation walls and garage walls as appropriate, below the expected flood level. The objective is not simply to allow the entry and exit of floodwaters but also to ensure that the water level inside the house rises and falls at roughly the same rate as water levels outside. Hydrostatic pressures inside and outside are continually equalized. Significant differences in the interior and exterior water levels allow unequalized hydrostatic pressures and therefore defeat the purpose of wet floodproofing.

When the number and/or size of openings in foundation walls are inadequate (A), interior flood levels cannot rise or fall as fast as exterior flood levels. As a result, hydrostatic pressures, as indicated by the horizontal arrows, are not equalized. When the number and size of openings are adequate (B), interior and exterior flood levels rise and fall simultaneously, and hydrostatic pressures are equalized.

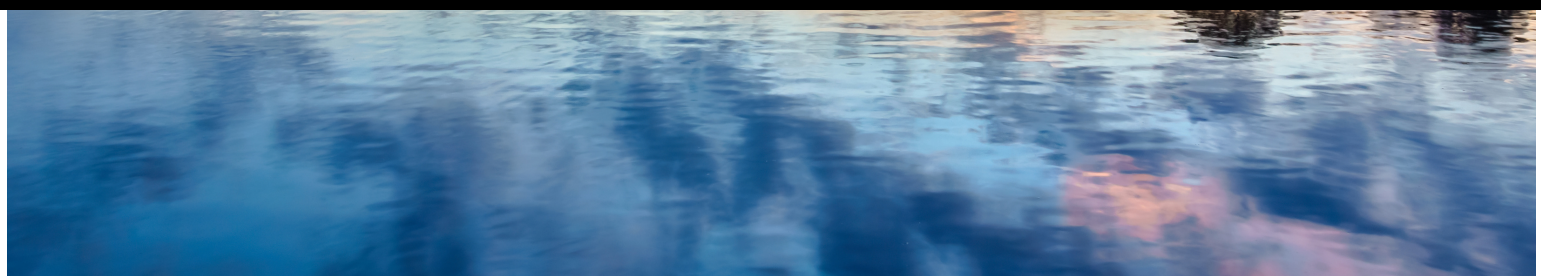
For equivalent water levels to be maintained, the size and number of openings must be adequate. Otherwise, when floodwaters are rising and falling, water will not flow into or out of the house fast enough. The number of openings required and size will depend on the rate of rising and falling of the floodwaters and the size of the area permitted to flood. Generally, the faster the rates of rise and fall and the bigger the flooded area inside the home, the larger the size and number of openings required.

Suppose you're wet floodproofing regions below the BFE in a considerably damaged or considerably improved home. In that case, your community's floodplain management ordinance or legislation will ask that you install openings in the outside walls of any enclosed areas below the BFE. The minimum requirements are:

- You have to provide at least two wall openings for every enclosed area. You can't put both openings in the same wall.
- If your home has more than one enclosed area, you must install openings in the exterior walls of each enclosed area so that floodwaters can enter directly from the exterior.
- The total area of all openings for every enclosed area has to be equivalent to 1 square inch minimum for every square foot of floor space in the enclosed region. For instance, if the enclosed region is 25 feet by 40 feet (1,000 square feet), the entire area of the openings should be at least 1,000 square inches or about 7 square feet. In this instance, you can meet the size requirement by providing two 3 1/2-square-foot openings or many smaller openings whose total area equals 7 square feet.
- The base of each opening must be no greater than 1 foot above the floor directly under the opening.
- Flood waters need to have the ability to flow in and out of enclosed regions automatically. If you put louvers, screens, or other covers over the openings (which several homeowners do to stop animals from entering the enclosed areas), they must not block water flow. Since the need for human intervention lessens the reliability of wet floodproofing, you may not put in any kinds of electrically, mechanically, or manually controlled cover.

FEMA developed these conditions to provide homeowners with a straightforward way of determining where and how to set up the wall openings without the help of an engineer or design professional. The requirements provide a margin of safety for wet floodproofed houses subject to flooding with rising and falling rates as high as 5 feet per hour. Suppose you wish to install openings that do not meet one or more of the requirements listed above. If that's the case, your design must be certified by a registered engineer or other licensed design professional and accepted by your local officials.

UTILIZING FLOOD-RESISTANT MATERIALS



In the regions below the FPE, any construction and finishing materials that floodwaters could damage should be removed or replaced with flood-resistant materials as detailed in your community's floodplain management ordinance or regulations. Some of these vulnerable materials are drywall, blown-in, and fiberglass batt insulation, carpeting, and non-pressure-treated wood and plywood. Flood-resistant materials are those that floodwaters can inundate with little or no damage. They include concrete, stone, masonry block, ceramic and clay tile, pressure-treated and naturally decay-resistant lumber, epoxy paints, and metal. In addition to resisting damage from floodwaters, these materials are relatively easy to clean after floodwaters have receded.

Protecting Service Equipment

If you wet floodproof a home, you also have to protect the service equipment below the FPE, both on the interior and exterior of the house, as required by your community's floodplain management ordinance or law. Service equipment includes utility lines, heating, ventilation and cooling equipment, ductwork, water heaters, and large appliances.

Information Source:
https://www.fema.gov/pdf/rebuild/mat/sec6.pdf