

Protecting Your Home ~ What is your flood hazard?

1. Check with your [community officials](#) for flooding information in your area. Some questions you might ask are:

- ✓ Where does the water come from?
- ✓ Are you in the mapped Special Flood Hazard Area or floodway as shown on [your FIRM](#)?
- ✓ Are you in coastal high hazard area or V Zone as shown on [your FIRM](#)?
- ✓ How bad has it been in the past?
- ✓ How bad could it be? (Remember, the next flood can be worse than the last one.)
- ✓ What is an appropriate flood protection level? (How high should you prepare for?)

2. Are you protected by levees?

Areas protected by levees face two types of flood hazard:

- ✓ Deep and sudden flooding due to overtopping or levee failure. This usually occurs as a result of high river or lake levels, or a Tropical Storm or Hurricane. Because there will be some warning of these conditions there should be adequate time to evacuate.
- ✓ Shallow flooding from rainstorms. Areas protected by levees are flat and need pumps to drain stormwater runoff. There may not be much of a warning for this type of flooding.

For additional information on living behind levees, [click here](#).

3. Check out your local drainage situation. Whether or not you are in a mapped flood hazard area or subject to levee failure flooding, you could still be faced with the shallow flooding that comes with a local drainage problem.

- ✓ Does water flow away from your house or does it tend to stand next to your walls?
- ✓ Is the ditch, stream or storm sewer that takes water away clear of debris or obstructions?
- ✓ Do the downspouts from your roof gutters direct water well away from your house?
- ✓ Do you have a sump pump? If so, does it direct water well away from your house?
- ✓ Stormwater mitigation [best practices](#) from the EPA

Once you have the answers to these three questions, the next step is to look at your building's Foundation.

Protecting Your Home ~ Foundations

Flood protection measures are dependent on the depth of flooding and the type of foundation. There are two main types of foundation: elevated and at grade. If you have a basement, bi-level, split level, or other floor below ground level, go to the [basement page](#).

Determine your foundation and then proceed to [Selecting a measure](#).

Elevated foundations include crawlspaces, piers, columns and similar structures where there is open space between the floor and the ground.



House **elevated** on piers

At grade foundations include slabs and other structures where the lowest floor is concrete, resting on the ground.



House on a **slab-on-grade** foundation.



House **elevated** on a crawlspace, i.e., a solid wall with vents that allow air (and water) to flow under the floor.



A New Orleans "raised basement" house. Although originally intended to be an elevated structure, the lowest floor has been improved and converted to a living area. The lowest floor is at grade

Once you have determined your foundation type, review possible mitigation measures for your situation.

Protecting Your Home ~ Mitigation Measures

Flood protection measures are dependent on the depth of flooding (see "What is your flood hazard?") and the type of foundation, either elevated or at grade. This page helps you select which measures may be appropriate for your situation.

Elevated foundations include crawlspaces, piers, columns and similar structures where there is open space between the floor and the ground.

For deep flooding (more than 2 feet over the first floor), including the threat of a levee failure:

- ✓ **Relocation**

Relocation is moving the at risk property from harm's way. This can be done by:

- ✓ Physically moving the structure to a safer location
- ✓ Selling the property to the government

Physically moving the structure:

- ✓ Location for the structure outside of the floodplain must be identified
- ✓ Original location may or may not have to remain cleared (per deed restriction) depending on funding source

Selling the Property:

- ✓ There are several programs to help pay for government acquisition of a flood-prone property.
- ✓ Property is purchased and site is cleared
- ✓ Site may or may not remain cleared (per deed restriction) depending on funding source
- ✓ For more information see Chapter 10 of [Selecting Appropriate Mitigation measures for Floodprone Structures](#)

For more information, see:

- Chapter 7 in [Homeowner's Guide to Retrofitting](#)
- ✓ Chapter 9 in [Selecting Appropriate Mitigation Measures for Floodprone Structures](#)
- ✓ Elevation

For shallow flooding and local drainage problems:

- Elevation
- Barriers: if the water will be less than two feet deep

If the water will stay below the elevated floor, examine wet floodproofing as an option. Or, you can wet floodproof to protect against floods up to the level of your first floor.

At grade foundations include slabs and other structures where the lowest floor is concrete, resting on the ground.

For deep flooding (more than 2 feet over the first floor), including the threat of a levee failure:

- **Relocation:** the most secure way to protect a building at grade.
- **Elevation:** more expensive for a building on a slab foundation. However, there are sources of financial assistance (see Funding).

For shallow flooding and local drainage problems:

- **Barriers** are the most secure approach for a building at grade.
- **Dry floodproofing** can also be pursued.

If you have a raised basement home, it may be most cost effective to clear out the lowest floor, "basement", and let it flood. This is called wet floodproofing and it can work for both deep and shallow flooding.

Protecting Your Home ~ Elevation

Elevation means raising the structure above the flood level.

- This method is generally viewed as the best way to mitigate, short of removing the structure.
- Elevation is easiest and less costly for houses on posts/piles or crawlspaces. It is possible to elevate a slab house, but it is more difficult and costs more.
- Elevated buildings get lower flood insurance rates.

Posts/Piles:

- Most of the cost is in the setup and foundation construction, rather than in materials
- Funding options are available through FEMA programs and the U. S. Army Corps of Engineers
- Less disruptive because lifting equipment can be placed under the house

Crawlspace:

- Most of the cost is in the setup and foundation construction, rather than in materials
- Appropriately sized vents are necessary - one square inch for each square foot of the building's footprint
- Less disruptive because lifting equipment can be placed under the house

Slab:

- Most costly and disruptive
- Can cost up to \$100,000

For more information, see:

- Chapter 5 in [*The Homeowner's Guide to Retrofitting*](#)
- Chapter 8 in [*Selecting Appropriate Mitigation Measures for Floodprone Structures*](#)

Barriers include small floodwalls, levees, or berms that are constructed around one or more properties.

- appropriate for shallow, relatively short duration flooding
- not recommended for flood depths greater than three feet
- If a barrier is built around a house, it is necessary to have a sump pump with a back up generator for pumping rain water out of the protected space.
- Account for sewer backup and other sources of water entering the building. For shallow flooding, this can be done with a **floor drain plug**; although a **valve system** is more secure.

- Higher barriers usually have openings to allow access. These require a method to close them, requiring human intervention. Someone needs to be available to have enough time to take action.
- **Soil type** is important. If soil is permeable, seepage under the barrier can occur. This is especially true if floodwalls stay up for a long time.
- **Cost** depends on depth of flooding and the amount of engineering put into the design. There are no Federal funding sources for this form of mitigation for residential properties.
- **NFIP will not offer lower insurance rates for house protected with a barrier.**

Floodwalls

- more appropriate for denser suburban neighborhoods
- Floodwalls require a method to close openings, such as a garage door, requiring human intervention. Someone needs to be available and have enough time to take action.

Small Levees/Berms

- more appropriate for more rural areas
- require six feet of ground space for each foot in height

For more information, see:

- Chapter 7 in [The Homeowner's Guide to Retrofitting](#)
- Chapter 5 in [Selecting Appropriate Mitigation Measures for Floodprone Structures](#)

Dry floodproofing is appropriate for shallow, short duration flooding. Longer term flooding is likely to leak through the structure.

This method has three components:

1. Make the walls of the structure watertight. This is easiest for masonry or brick faced walls which can be covered with a sealant. Wood, vinyl, or metal siding needs plastic sheeting to make them water tight. The most effective approach is to apply a sealant, apply plastic sheeting and then cover the job with brick facing to protect the water proofing from punctures.
2. Provide closures for openings, including doors, windows, dryer vents, and weep holes.
3. Account for sewer backup and other sources of water entering the building. For shallow flooding, this can be done with a floor drain plug; although a valve system is more secure.

Shortcomings:

- Requires human intervention, someone must be available to close doors and other openings.
- Success depends on the structure's condition. Will not work effectively if the slab is cracked.
- Periodic maintenance is required to check for material decomposition.
- NFIP will not offer a lower insurance rate for dry floodproofed residences.

Cost can vary according to the house's size, construction, and condition; and can range from \$5,000 to \$20,000 depending on how secure the owner wants the structure to be. An experienced contractor provides greatest security.

For more information, see:

- Chapter 7 in [*The Homeowner's Guide for Retrofitting*](#)
- Chapter 7 in [*Selecting Appropriate Mitigation Measures for Floodprone Structures*](#)

Wet Floodproofing allows water to enter the house, however everything that could be damaged by a flood is elevated above the flood level.

This approach is appropriate for garages and raised basement homes.

Structural components below the flood level are replaced with materials that are **not subject to water damage**.

- Concrete block walls are used instead of wooden studs and gypsum wallboard.
- The furnace and water heater are permanently relocated to a higher floor.
- Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Wet floodproofing has one **advantage** over the other approaches: no matter how little is done, flood damage is reduced. Thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances to a higher level.

The major **disadvantage** of wet floodproofing is that there are restrictions on the use of the space below the flood protection level.

- The area can still be used; there should be no carpeting, furniture, insulation, and other materials subject to water damage that cannot be removed in time.
- This may not be a problem where the basement homes have flooded before and the owners have opted to not refinish them.
- Can be combined with dry floodproofing - dry floodproof the house and the walls separating the garage from the house and then wet floodproof the garage.

For more information, see:

- Chapter 6 in [The Homeowner's Guide to Retrofitting](#)
- Chapter 6 in [Selecting Appropriate Mitigation Measures for Floodprone Structures](#)

If you have time before a flood:

- Turn off all utilities at the main power switch and close the main gas valve if evacuation appears necessary.
- Move valuables, such as papers, furs, jewelry, and clothing to upper floors or higher elevations.
- House deeds, renter's lease, social security cards, prescriptions, birth certificates, and other identification documents should be kept together for evacuation in an accessible place.
- Bring outdoor possessions, such as lawn furniture, grills and trash cans inside, or tie them down securely.
- Throughout the year trim and cut back any tree limbs that could cause damage during a storm.

Preparing your Home for Disaster:

- Installing permanent storm shutters or barriers over doors and windows on a home ensures the best storm protection.
- Winds during strong storms and hurricanes can cause debris and materials to pummel a home, breaking through windows and doors, causing both structural damage and water damage by exposing a home to the outside elements.
- The best time to prepare a home is well before a storm threat, during the actual design process of the home so shutters and barriers can be retrofitted into the actual design of the home, but mitigating a home for hurricanes can also be done long after a home has been built.
- Windows and doors can be boarded up using plywood, preferably a marine grade or exterior grade wood with 5/8 inch thickness or greater. Taping windows does little to nothing during a major storm.
- For a guide on how to create window covers:
http://flash.org/peril_inside.php?id=104
- If nothing else, remove valuables away from windows and doors and try to keep items in a room without outdoor access or an upper story if possible.
- If there is enough time, remove any perishables from the fridge or freezer to keep foods from spoiling during a power outage.
- Click [here](#) for more information about storm shutters and preparing your home.
- Click [here](#) for more information about retrofitting your home.
- Click [here](#) for more information about preparing for hurricanes.

Permits

Development in floodprone areas is development in harm's way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties.

Before you build on, fill, alter, or regrade your property always check with your local [Permit Department](#). A permit may be needed to ensure that such projects do not cause problems on other properties.

The standards for new buildings and substantial improvements to existing buildings are explained in the section on [floodplain management](#). These regulations are designed to protect your neighbors. By keeping the drainage system clear and getting the proper permits before you build, you can prevent flooding and other drainage problems. When in doubt, call the [local permit office](#)

Floodplain Rules

There are special rules regarding building in the [Special Flood Hazard Area](#). If you can stay out of the SFHA, all the better.

If you have to erect a building in the regulated floodplain, it must have its lowest floor, including a basement, and all utilities elevated to the regulatory elevation set by your community. Check with your [floodplain manager](#) to determine that elevation.

Documentation of meeting this requirement is done with a [FEMA Elevation Certificate](#). There are additional restrictions on filling, grading, or building in a mapped floodway.

If you have an existing building and want to improve, expand, or repair it, you also need to check with your [local permit office](#). Certain codes require that all substantial improvements to a building be treated as a new building. A substantial improvement is when the value of an addition, alteration, repair, or reconstruction project equals or exceeds 50% of the value of the existing building. In the case of an addition, only the addition must be protected. In the case of an improvement to the original building, the entire building must be protected.

When selecting a contractor:

- Ask for proof of insurance
- Ask for references
- Ask for written estimates
- Ask for a written contract
- Ask for any guarantees in writing
- Obtain a copy of the final signed contract
- Avoid cash payments
- Don't sign off before the job is finished
- Check several firms and their reputations
- Look out for "special deals" or contractors who want to use your home as a "model home."
- Get your permits: and inspections