



Nonstructural Flood Proofing

What can you do to reduce the risk of a flood impacting your home or business?

A quick reference guide

Why consider Nonstructural Flood Proofing?

Advantages

- Less costly than structural flood proofing.
- Reduces flood damages.
- Uniqueness of structures can be considered so structures can be protected individually.
- Typically there are several solutions that can be customized to the unique features of a building.

Physical approaches include:

- Elevating structures and systems, Buyout/Acquisition, Dry Flood Proofing, and Wet Flood Proofing.

Nonphysical approaches include:

- Flood warning systems, Flood insurance Floodplain Mapping, Flood Emergency Preparedness Plans, Land Use Regulations, Zoning, Evacuation Plans, and Risk Communication.



Door panels



Window panels

General nonstructural flood proofing recommendations for all homeowners:

- Examine doors, windows, siding, masonry etc. Any spaces or gaps in the structures increase the potential for water to enter.
- Raise HVAC units and any electrical panels 3-4 feet off the ground. Consider relocating to porches or roofs.
- Raise electrical outlets 3-4 feet off the ground.
- Repair unstable decks, footers, and single pane glass basement windows.
- Seal foundations to prevent water entry.
- Regrade backyards to hold water and/or direct water instead of flooding buildings.
- Use waterproof paint throughout the building.
- Always have a sump pump with a battery backup or portable generator.
- Use alternatives to sheet rock in areas of the structure with high risk for water entering.
- In historic buildings, it is best to leave the materials used in the original framework of the building, such as joists, stone, concrete, or brick exposed instead of covering them with sheet rock or other materials.
- Weigh the pros and cons to implementing dry flood proofing and wet flood proofing.

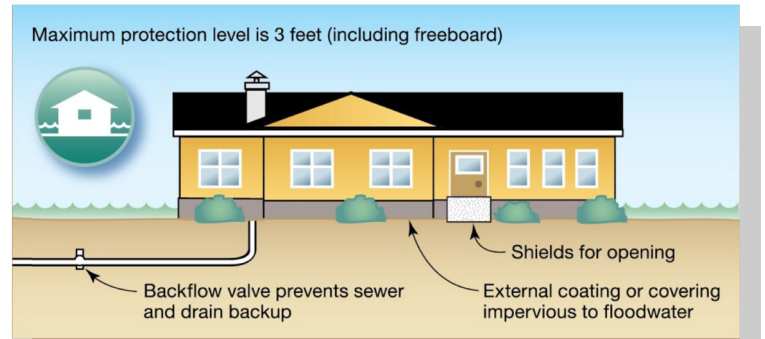


Re-grading yard away from building to landscaped area.



For Basements:

- Seal foundations to prevent water entry.
- Fill in basement windows with appropriate flood proof materials to prohibit water entry.
- Remove valuable items from the basement.
- Add a sump pump with battery back-up.
- Raise electric box to top of 1st or 2nd floor.
- Add flood vents to intentionally allow water to enter or exit a building and reduce the hydrostatic pressure against the wall.
- Install one-way check valves into drainage pipes to prevent sewage backing up.
- Move service meters, boilers and electrical points above the likely flood level.
- Replace bottom stairs with concrete steps instead of wood.
- Install tile floors. Treat floors and walls with non-molding and waterproof materials.
- Replace basement doors with flood resistant doors.
- Fill basement to prohibit flooding or collapse.
- Structurally reinforce basement walls.



Flood vents



Polished concrete floor

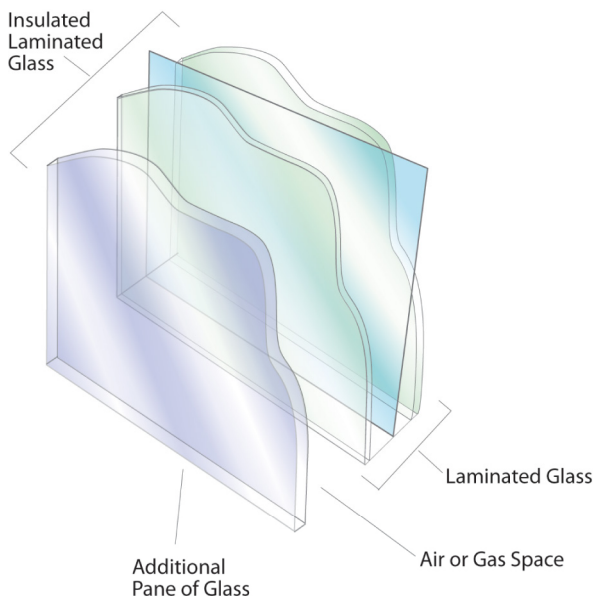


For First Floors:

- Install flood resistant doors.
- Raise the door threshold when possible.
- Install structural glass for windows: could be aquarium or hurricane glass.
- Reduce the size of the storefront windows when appropriate to the scale and architecture of the building.
- Install hurricane shutters that can be closed to prohibit objects coming through window.
- Raise electric outlets to the top of the walls.



Hurricane shutters



Impact resistant glass

- Raise electrical panels to the 2nd floor.
- Waterproof interiors like removing sheetrock to allow exposed stone or brick. Use materials that don't rot or hold mold spores.
- Refit kitchen appliances with stainless units.
- Replace timber floors with concrete and tile on the ground floor, replace chipboard or mdf kitchen cabinets with plastic equivalents.
- Replace gypsum plaster with more water-resistant material, such as a lime plaster or cement render.
- Add a floodgate for all 1st floor doors.
- Raise first floor where possible.



Dry Flood Proofing vs. Wet Flood

Dry Flood Proofing: *designed to prevent water from entering structure up to 3-4 feet on exterior walls.*

Examples of dry flood proofing include interventions that are water tight and able to resist hydrostatic force:

- Flood doors
- Window panels
- Door panels
- Interior Flood Gates

Outer Barrier (3-4 ft max)



Flood doors

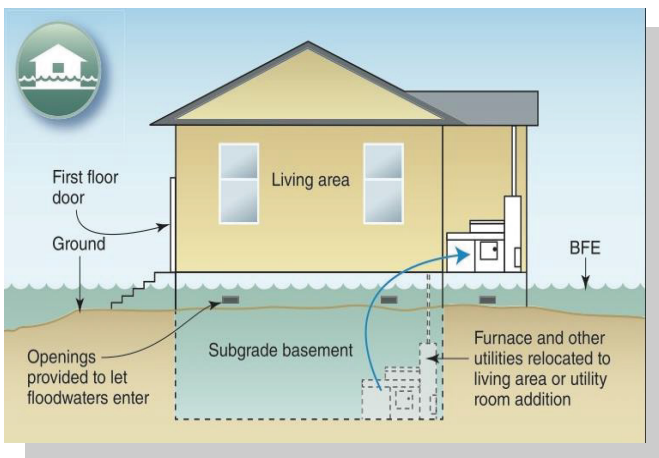


Advantages:

- Can be effective at keeping interior of building and its contents dry, especially in masonry structures.
- Relatively low cost.

Challenges:

- The building must be in good condition.
- The interventions may be quite expensive.
- Limited warning time to install temporary closure barriers manually.
- Not often easy to integrate into historic structures.



Wet flood proofing schematic

Wet Flood Proofing: *designed to allow flood waters to enter structure and pass through the building to reduce the risk of structural damage.*

Examples:

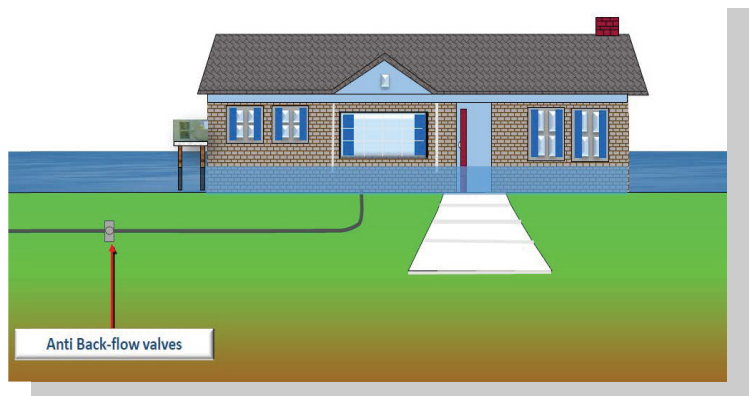
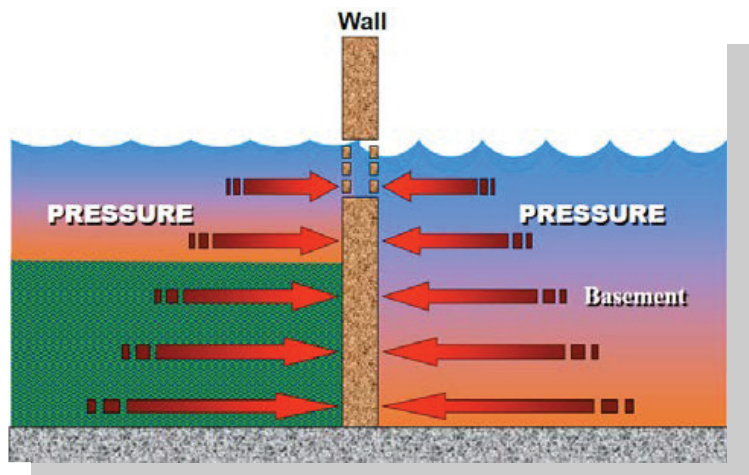
- Flood vents/louvers.
- Elevating critical systems (HVA, electrical etc)

Advantages:

- Relatively low cost.
- Quite effective.
- Minimizes loads on walls and floors by equalizing hydrostatic pressures.
- Often compatible with historic preservation guidelines.
- Requires minimal pre-flood actions.

Challenges:

- Allows water to enter structure.
- Requires significant alterations to interior building layout and functionality.
- Clean-up following a flood can be costly.
- Pumping water out too soon after a flood may lead to structural damage.
- Damage may still occur from high velocity flood flow and wave action.



Flood Proofing Resources:

Historic Conservation and Preservation:

Guidelines, applications, tax credit information as well as meetings, agendas and schedules for the Historic Commission:
<https://www.howardcountymd.gov/Departments/Planning-and-Zoning/Conservation-and-Preservation/Historic>

Current Historic Guidelines:

<https://www.howardcountymd.gov/LinkClick.aspx?fileticket=0PNgiauENPk%3d&portalid=0>

Note: Any exterior alteration to a structure within the Historic District boundaries requires Historic Preservation Commission approval. It is the hope of the Commission that residents consider preserving historic features and not cover or destroy architecturally significant features of a building, especially if those features have been retained following previous flood events.

Information on potential sources of funding for flood proofing (funding may continue in the future)

<https://www.howardcountymd.gov/News/ArticleID/1443/News031919b>

Elevation Certificates

Elevation Certificates are Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) documents that formally document a building's elevation relative to the Special Flood Hazard Area (SFHA), also known as the high-risk Flood Zones A and AE in Howard County, or more commonly referred to as the 100-year floodplain. Elevation Certificates are used by flood insurance agents to properly rate a flood insurance policy and by local jurisdictions where building owners propose building or modification to structures located in the SFHA. They also provide building owners with information as to how close a building is to the 100-year floodplain and its associated flood risk. The County will provide property owners with elevation certificates free of charge (as of now, while the program is still funded).

Our resource for elevation certificates is our Howard County Digital Flood Insurance Rate Map (DFIRM) website:
https://data.howardcountymd.gov/gdfirm/main_Web.aspx

(This tool shows FEMA's data on the County's high-resolution orthophotography. Under "Effective Floodplain Data", clicking on "Digital Flood Insurance Rate Map" will draw the effective FEMA mapping for the County. One can view the elevation certificates, which appear as red dots. Clicking on a red dot will allow you to view the PDF document.)



Flood Proofing Resources(cont.):

Sources of flood proofing materials:

<http://www.StormMeister.com>

<http://www.floodsafeusa.com/>

<http://www.flooddivert.co.uk>

<https://www.flashflooddoors.co.uk/>

<http://www.hammerheadintl.com/>

<https://smartvent.com>

<http://www.floodshield.com/>

<http://gcsbsi.com/destin-hurricane-shutters/colonial-shutters/>

<http://www.building.co.uk/batten-down-the-hatches/3092556.article>

<http://wwtonline.co.uk/features/digging-deeper-watertight-strategies#.WA9lQy0rJeM>

<https://www.psfloodbarriers.com>

Online videos demonstrating flood proofing materials in action:

Impact Resistant Glass (intended for hurricanes):

<https://www.youtube.com/watch?v=QcCVe5e0IU8>

<https://www.youtube.com/watch?v=vWyT-sTcuPQ>

Self rising (FloodBreak Automatic Floodgates):

<https://www.youtube.com/watch?v=NuDshmb4fmA>

Flood water wall - Install by hand:

<https://www.youtube.com/watch?v=g7DAXqDgv6Y>

NOAQ Boxwall (Ireland) - for very small events. These are anchored by the weight of the water.

<https://www.youtube.com/watch?v=fQ4QVaJu79w>

<https://www.youtube.com/watch?v=nEAlUpCrXjg>

