Install Flood Openings

Overview

- Flood openings should be installed in foundation and enclosure walls below the Base Flood Elevation line (BFE) in order to allow the automatic entry and exit of floodwaters.
- Flood openings are installed in order to ensure that the water level inside of the structure is rising and falling at the same time as the water level outside of the structure.
- This strategy prevents foundation walls from collapsing from unequal hydrostatic pressures from flood water.
- To obtain equal water levels inside and outside of the structure, the size and number of flood openings must be determined by an engineer or professional.
- The number and size of the flood openings will be determined by the size of the structure as well as the anticipated rate of rise and fall of floodwaters.
- The flood openings must be maintained so that they continue to open automatically during flooding events without human intervention.
- Installing flood openings may reduce NFIP insurance premiums.
- This strategy will be most effective when combined with other wet floodproofing strategies such as:
  - Installing water resistant insulation
  - Purchasing a sump pump
  - Applying waterproof sealants to interior walls
  - Elevating service equipment
  - Installing backflow valves on water and sewer lines

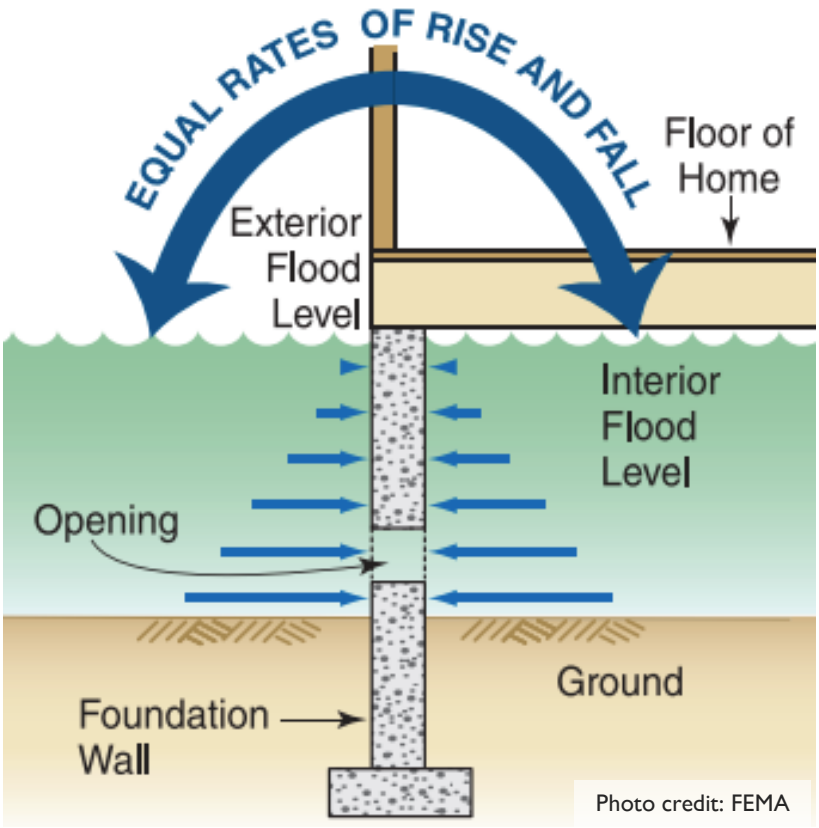

Photo credit: FEMA

Key Takeaways

During flood events, water can cause damage due to hydrostatic forces on the foundation and/or enclosure walls.

If the pressures become too high for the walls to withstand, the foundation walls may collapse, resulting in extensive and expensive damage to the structure as well as its contents.

To help avoid flood damage to the foundation of a structure, flood openings can be installed in the foundation or enclosure walls.


Photo credit: FEMA

I-ADAPT

Exterior Adaptation
Flood Openings

Estimated Costs/Benefits

*U.S. dollars (2022), estimates are subject to change

Potential Costs		Potential Benefits		
Item	*Estimate per flood vent opening*	*Post-Flood Recovery Actions*	*Estimate*	
Individual flood vent	$100-$285	Flood damage recovery (professional clean-up, mold removal, replacement/repair of flood damaged items)	1 inch water ↓ 3 feet water	$10,800-$53,500+ ↓ $39,800-$185,700+
Flood vent sealing kit	$75-$170			
Installation/vent	$90-$150	Foundation repair	$1,000-$6,000	
ESTIMATED COST PER VENT	**$265-$605**	**ESTIMATED TOTAL SAVINGS**	**$11,800-$191,700+**	

Potential Funding Sources

- Building Resilient Infrastructure and Communities (BRIC)

Additional Resources

- FEMA Homeowner's Guide to Retrofitting (Chapter 8)
- FEMA Requirements for Flood Openings in Foundation Walls and Walls of Enclosures
- FEMA Wet Floodproofing

Resources can also be found at https://de.gov/iadapt

Expected Maintenance

- Periodically check the flood openings to make sure they are free of blockages and/or damage.

Additional Actions

- Potentially purchase a sump pump or other drainage system to remove excess water after flooding.
- For maximum effectiveness, employ other wet floodproofing strategies in addition to installing flood openings.
- Move possessions to a higher floor.

Permitting Agencies

Contacts for permitting requirements include but are not limited to the following:

- Your city and/or county government for local flood ordinances or regulations
- Your city and/or county government for building permits

Who to Contact

- Design professional or engineer
- Floodproofing contractor

Technical definitions and more information are located on the I-ADAPT website: https://de.gov/iadapt.

This information is intended to be used for planning purposes. It is not intended to substitute or take precedence over the guidance of design engineers, contractors, utility companies or regulatory agencies.

For more information, contact DNREC's Division of Climate, Coastal and Energy at DNREC_IADAPT@Delaware.gov