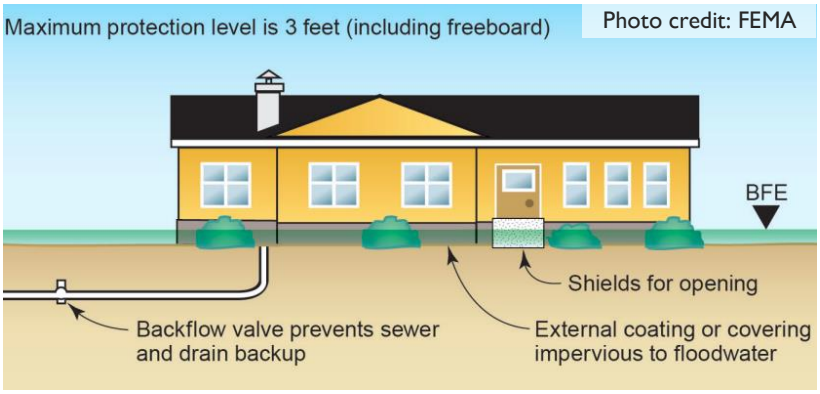
Dry Floodproofing (Passive)

Overview

- A passive dry floodproofing system lowers the flood damage potential by blocking floodwater from entering the structure. It is installed by a waterproofing contractor. Once installed, the system requires no active deployment before flood events.
- This measure should not be used if there may be more than 3 feet of floodwaters, if flood velocities may be high, or if flooding may last for more than 12-24 hours.
- Dry floodproofing is only appropriate for structures with concrete or masonry walls and a slab-on-grade foundation.
- Dry floodproofing is generally accomplished through a combination of several strategies:
  - Waterproof veneer on the exterior
  - Sealing off doors and windows
  - Installing waterproof doors and windows
  - Modifying interior walls to resist water damage (e.g. waterproof insulation, any wood is replaced with exterior grade lumber, etc.)
  - Reinforce walls to withstand floodwater pressures and impact forces
  - Waterproof sealants on exterior walls
  - Waterproof sealants on basement walls
  - Interior drainage system with sump pump
  - Check valves in sewer and water pipes
  - Elevate utilities
  - Backup generator
- As the system will not block all seepage, a drainage system including a sump pump and sewer/water backflow valves is required.
- A design professional or engineer must determine whether the building's walls and floor slab can withstand the loads generated by anticipated flood waters.
- The design professional/engineer must take the underlying soil into account as soil type will determine how quickly water percolates through the perimeter of the structure.



Key Takeaways

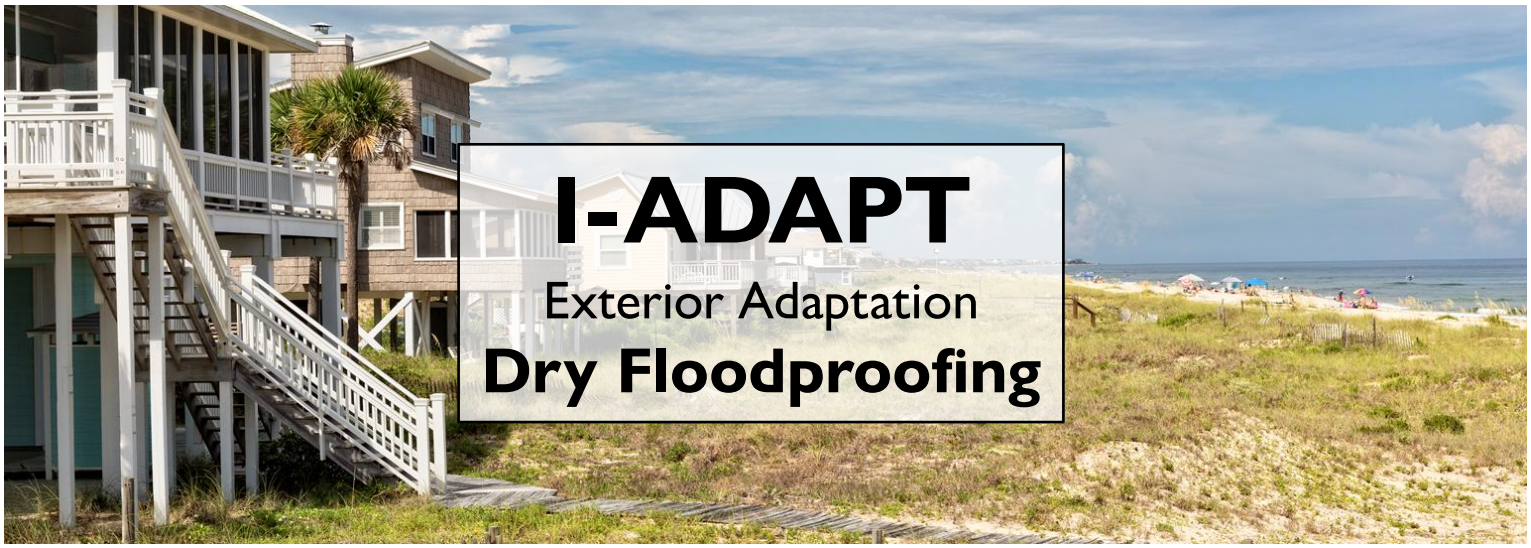
During flood events, water that enters a structure can damage the foundation and personal property.

To avoid flood damage inside of a structure, some structures can be dry floodproofed.

Dry floodproofing strategies help to prevent floodwaters from seeping into the building. However, this collection of measures can only be used in certain circumstances and locations.

Estimated Costs and Benefits

Example Potential Costs		Potential Benefits		
Example Strategies	*Estimate*	*Post-Flood Recovery Actions*	*Estimate*	
Waterproof veneer	$4,500-$10,300	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+
Waterproof sealants on exterior walls	$600-$4,000			
Floodproof door	$2,350-$51,600			
Floodproof window	$6,500-$51,600			
Backflow valves (2 – sewer and water lines)	$100-$1,700 per line			
Interior drainage system with sump pump	$2,000-$10,000			
ESTIMATED TOTAL COST 1,000 sq ft structure	**Highly variable**	**ESTIMATED TOTAL SAVINGS**	**$10,800-$185,700+**	



I-ADAPT

Exterior Adaptation

Dry Floodproofing

Estimated Costs/Benefits

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

- Building Resilient Infrastructure and Communities (BRIC)
- FEMA Flood Mitigation Assistance Grant (FMA)

Expected Maintenance

- The system will need annual maintenance and inspections to ensure that all components will operate properly under flood conditions. This can be costly.
- The dry floodproofing system will need to be evaluated for continued suitability as a floodproofing measure.
- Some of the strategies (e.g. sealants) may need to be replaced regularly.

Additional Resources

- FEMA Engineer Principles and Practices for Retro-fitting Flood-Prone Residential Structures (FEMA P-259)
- FEMA Reducing Flood Risk to Residential Buildings That Cannot Be Elevated
- FEMA Requirements for the Design and Certification of Dry Floodproofed Non-Residential/Mixed-Use Buildings
- FEMA Homeowner's Guide to Retrofitting

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

Additional Actions

- An interior drainage system with a sump pump is required in order to remove seeping floodwater.
- Dry floodproofing measures are often more successful when used together. Therefore, several of these strategies may need to be installed together.

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
- DNREC Coastal Construction Permit
- DNREC Wetlands and Subaqueous Lands Permit

Who to Contact

- Design professional and engineer
- Waterproofing contractor

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

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