

Building Codes and Basement Backup: What You Need to Know

What Are Building Codes?

Building codes guide how people design, build, change and maintain buildings. Building and development codes work together to manage a community's land use, growth and construction.

What Are Hazard-Resistant Building Codes?

FEMA defines hazard-resistant building codes as “the current or next most recently published editions of building codes published by nationally recognized authorities, such as the International Code Council, that have not been amended or changed in a way that weakens code provisions related to natural hazards.”

Beyond building safety, codes help people recover faster from disasters. For example, residents can use updated materials and methods to rebuild after a hazard event to avoid similar losses from the next event. Building codes help reduce deaths and injuries during disasters. And when hazard-resistant codes are in place, buildings can better withstand high winds, flooding and earthquakes.

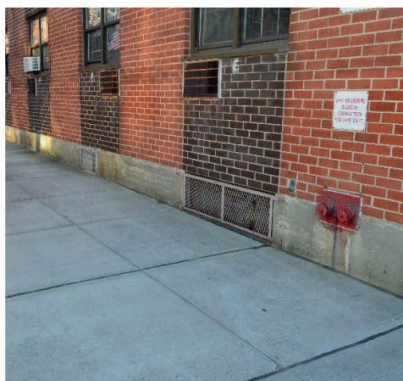
What Causes Basement Backup?

Sewer systems can overflow during heavy rainfall, especially in urban areas. Water enters basements when it reaches a building's lowest point of entry.

In multi-story buildings, water usually enters through loading docks, exterior stairwells and access ramps. It can also enter through vent openings and street-level windows (Figures a and b).

Water can also enter through secondary entry points (e.g., where utility conduits penetrate foundation walls). In some one- and two-family dwellings, water enters through below-grade garages after it reaches the crests of driveways (Figure c).

Water can also flow down exterior basement access stairs as flooding tops the stairway threshold (Figure d).



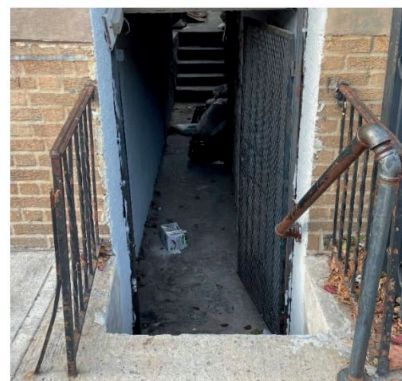
a. Ventilation openings near sidewalk level



b. Basement window sill near sidewalk level



c. Driveway sloping down to converted basement



d. Basement stairway threshold at sidewalk level

Images from *Basement Buildings and Urban Flooding* report on FEMA.gov (2023)



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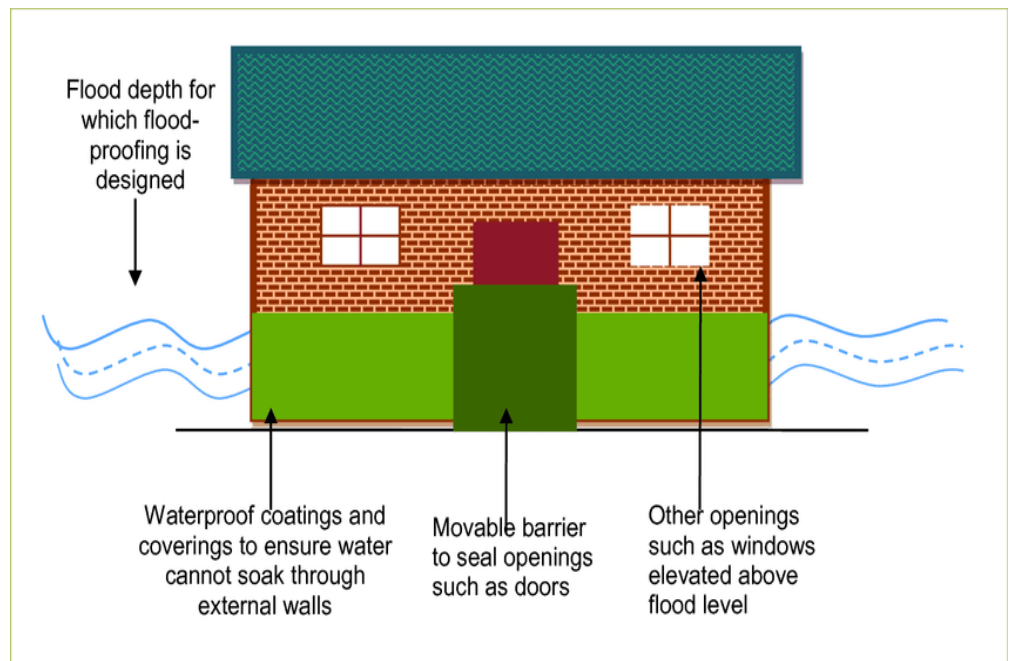
How Can Building Codes Reduce Basement Backup?

There are many options to reduce basement backup. Communities can incorporate the following into their building codes:

- Install gutters and downspouts to direct water away from the home. This is a lower-cost option that can be used on most homes.
- Use water-resistant materials in basements. Using water-resistant materials on new builds, or after a basement flood event, can strengthen resilience against future flood events.
- Elevate or relocate mechanical equipment and appliances (e.g., furnace, hot water heater), or install an overhead sewer system to avoid water damage. These are higher-cost options but provide great protection during flood events.
- Install a secondary sump pump as a backup and check valves or backflow preventers.
- Identify and mitigate points of entry for surface flooding (see examples on Page 1).
- Add water sensors to basements.

Building inspectors should assess basements and below-grade areas exposed to urban flooding to determine how surface water could enter those spaces. They should also assess feasible and effective measures to keep water out and mitigate damage.

Retrofit dry floodproofing measures may be applied to existing buildings in areas where surface flooding has entered basements and below-grade areas. These measures involve making walls, floors, joints, and utility penetrations watertight, and installing temporary watertight panels and barriers at all building openings that are below the anticipated flood level.



Examples of dry floodproofing from FEMA.gov (2023)

Resources

Please visit [FEMA's Building Science website](https://www.fema.gov/building-science) for more information and to access the resource library to view the following recommended resources:

- Building Codes Adoption Playbook: For Authorities Having Jurisdiction (August 2022)
- Building Codes Adoption Portal
- Protecting Communities and Saving Money: The Case for Adopting Building Codes (November 2020)
- Building Codes Toolkit for Homeowners and Occupants (May 2023)



Have questions about building code work in FEMA Region 5? Reach out to Region 5's Building Codes Coordinator at FEMA-R5-BuildingCodes@fema.dhs.gov.