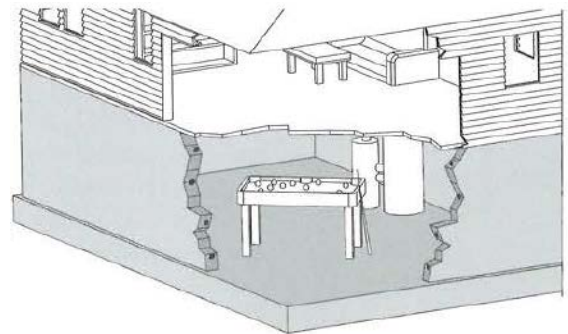


Concrete Homes Technology Brief No. 14: Concrete Basements

Why build a basement?

Basements are a valuable part of any new home, with benefits far outweighing cost. By the early 2000s, about half of all new homes in North America were being built with basements, and the rest could be. Concrete is the material of choice for basement construction, with close to 100% of North American basements built of one of many available concrete wall systems.

Basements provide inexpensive space for many uses. A basement's sturdiness and location make it ideal for housing mechanical equipment like furnaces, water heaters, and other utilities. These same properties make it an excellent choice for recreational space, storage areas, workshops, or hobby rooms. Basements typically house main electrical lines, plumbing, and ductwork, making these easily accessible for changes and repair. The sheltering properties of below-grade space make basements "safe havens" for occupants during hurricanes, tornadoes, and severe thunderstorms. With a few upgrades, basements can be transformed into entertainment centers, offices, or extra bedrooms for a growing family. This provides a homeowner future expansion potential without the cost of constructing more floor space above ground, and can also substantially increase the resale value of a property.



How much does basement space cost?

Building almost any home requires digging, from a few inches to a few feet. By increasing the digging to 6-8 feet, forming walls of the desired height, and pouring a concrete slab at the bottom, a contractor can make a foundation into a full basement. In the early 2000s, the incremental cost was as little as \$10 per square foot over the cost of a shallower, stem wall foundation, or \$20 per square foot over the cost of a simple slab on grade—far below the cost of constructing more space in the above-ground portions of a house.

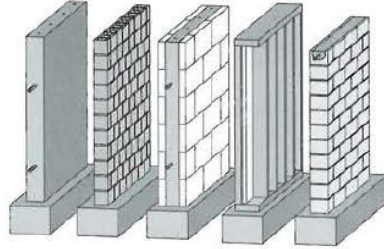
Why is my basement built of concrete?

For basement construction, concrete is by far the product of choice. Concrete provides a permanent, stable base for a house to rest on and creates an enclosed space protected from the ground, rodents, and weather. Sturdy concrete walls are highly resistant to shifting or sagging under ground and water pressure, often for a century or more. When necessary, strength can be enhanced by increasing wall thickness and embedding steel reinforcing bars inside the concrete. Concrete does not rot, warp, rust, deteriorate, or provide a food source for mold in the presence of water or moisture. Concrete doesn't burn and can't be eaten or damaged by termites, insects, or vermin. Properly designed concrete walls keep out water, radon, and outside noise. They can also be constructed with a durable architectural finish and high insulation value.

What are the different ways to build a basement out of concrete?

Cast-in-place concrete using removable forms (sometimes calls "poured concrete") produces an economical wall with a hard, durable surface on both sides. Concrete masonry (block) walls can also provide an architectural surface in many different colors and textures, for a distinctive exterior appearance and an attractive interior

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Walls of cast-in-place concrete with removable forms, concrete masonry, insulating concrete forms, precast panels, and autoclaved aerated concrete.

finished wall. Insulating options are available for both cast-in-place and masonry wall systems, depending on desired results. Insulating concrete forms (ICFs) create a highly energy-efficient wall that is ready to finish with traditional gypsum wallboard on the interior surface. Solid precast panels are also pre-insulated, ready for wallboard, and go up rapidly in almost any weather. Some precast panels have insulation “sandwiched”

into the center of the wall, providing a smooth finish that doesn't require wallboard. Autoclaved aerated concrete (AAC) blocks are made of a lightweight concrete with good insulating properties.

What should I look for to be sure I'm getting a quality basement?

Experience counts—As with any construction, it is important to hire a reputable, experienced contractor. Look for someone with a history of building with the type of system you desire. Check references to verify quality workmanship and professional performance.

Water management—In many areas it is necessary to install components that keep ground water away from the perimeter of a home. Talk with your contractor about a damp-proofing or waterproofing membrane over outside walls, vapor retarder or barrier under the slab, and a drainage system at the base of the foundation. Waterproofing membranes offer superior performance over damp-proofing products and are readily available.

Plan ahead—If you are planning to use the basement for storage, work, or living space, inspect the plans to make sure ceiling heights are adequate and mechanical equipment is located out of the way.

Quality control—When construction is complete, check that all basement dimensions match those on the plans. Walls should be straight and precisely vertical.

What's the bottom line?

A basement provides valuable, versatile space for a new home at a relatively small additional cost. Concrete creates strong, high-quality walls, with different systems offering a variety of properties to meet your needs. For best results, retain a reputable and experienced professional contractor. Plan your space with an eye toward future use. Look for proper water control measures, and verify that the results match your plans.

To learn more about basements and their construction:

Portland Cement Association, www.cement.org
Concrete Foundations Association, www.cfawalls.org
National Concrete Masonry Association, www.ncma.org
Precast/Prestressed Concrete Institute, www.pci.org