Solutions to
Basement Moisture Problems

The best way to approach any building problem is to first do the things that are easy and low cost. Then proceed in a logical order doing the next least costly technique with the most positive likely result. With moisture problems, the best approach is almost always to remove or control the source of the moisture, not to try to stop it at the last line of defense.

First, the simplest and least costly techniques are to remove excessive internal moisture sources in the basement (humidifiers, cooking) and ventilate other sources (clothes dryer, bathroom). Second, if condensation in the summer is the problem, do not ventilate the basement directly with warm, humid air. Ventilation through an air conditioning system or with a dessicant-type heat exchanger is recommended.

Dehumidification can be used as a means of reducing the symptoms of humidity and odor in a basement, but it is not a permanent or complete solution. In fact, if a dehumidifier is used in a basement with moisture problems, it may cause greater damage. By drying out the basement air, moisture is drawn into the basement more rapidly causing efflorescence and spalling of concrete and further damage to interior finishes.

It is appealing to solve a basement moisture problem with a membrane or coating on the inside. It is less expensive than a drainage system and seems to work for a time in some cases. The water is still there, however, and eventually these systems deteriorate or simply move the water to another pathway into the basement.

The recommended approach after removing interior moisture sources is to evaluate the gutters, downspouts, and surface grading around the house. These should be corrected first and may solve the problem. Then, if a moisture problem persists, proceed with an interior or exterior drainage system. All of these techniques are described in the remainder of this publication. If your goal is to finish a basement that has water problems, it is recommended to first deal with the water problem.

An active sub-slab depressurization system including a washed-rock layer below the slab is recommended. This draws moist air from beneath the slab and may help to reduce the amount of moisture vapor that enters the home through openings in the slab. It also assists in controlling radon and other soil gases.

Sumps and other open connections to the soil outside the foundation and below the slab should be blocked and sealed.

Step by Step Process

1. Control interior moisture sources.

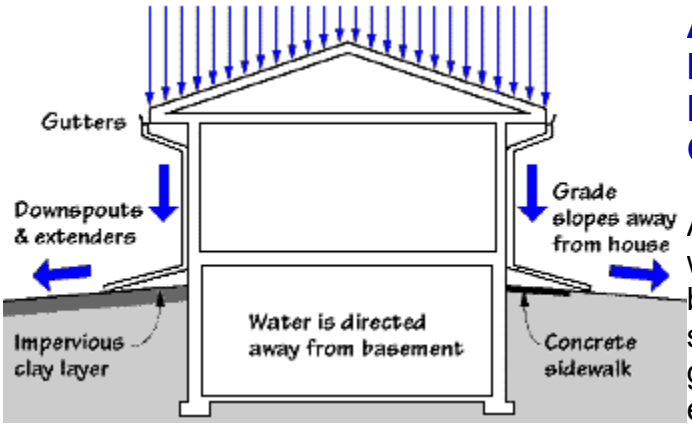
2. If summertime, don't ventilate with outside air.

3. Correct grading, gutter and downspout system.

4. Provide an interior or exterior drainage system.

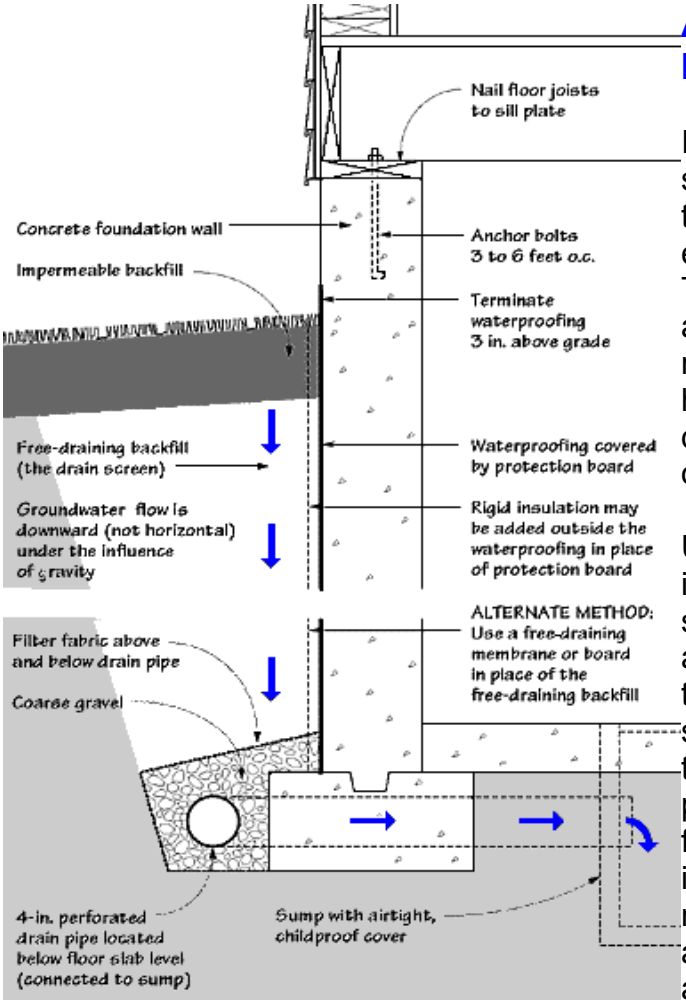
NOTES:

- A dehumidifier can help reduce the symptoms of humidity and odor, but does not solve the problem.
- A membrane or coating on the interior without providing drainage generally will not solve the problem in the long term.
- Walls must be dry before insulating. Slabs must be warm and dry before carpeting.



APPROACH 1: Install Proper Gutters and Downspouts and Correct Grading

A great number of basement water problems can be solved by handling rainwater and surface drainage properly using gutters and downspouts with extenders or splashblocks to carry the water away from the foundation. Sloping the grade away from the house, which may require hauling fill to the site, is very important. This should be done before any below-grade drainage system is installed, since the above-grade corrections may solve the problem. Even if a drainage system is required, removing water at the source as much as possible is necessary.



APPROACH 2: Exterior Drainage System

Installing an exterior drainage system at an existing building is the most costly, but also the most effective water control approach. This requires digging up the area around the foundation and rebuilding it similar to a new house installation. It also requires digging up shrubs and other obstacles around the house.

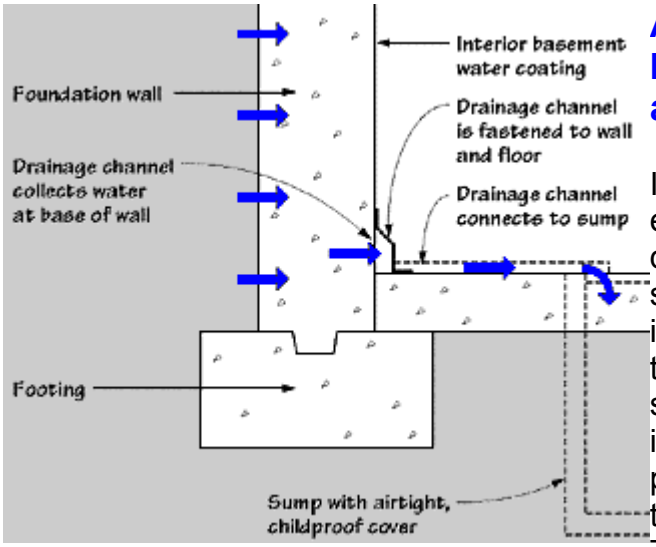
Usually, waterproofing and insulation are installed at the same time, in addition to making any repairs to the structure. The traditional exterior drainage systems use free-draining sand in the backfill. Drain tile can be placed beside or on top of the footing. Level drain pipe installations are satisfactory. A minimum of 12 inches of coarse aggregate should be placed around the drain tile.

Free-draining Membrane or Board

It can be expensive to haul pea rock or sand to a site for backfilling purposes. Instead, a drainage mat can be placed against the foundation wall and then backfilled with any soil on site. The drainage must have a free-flowing path to the perforated drain pipe below.

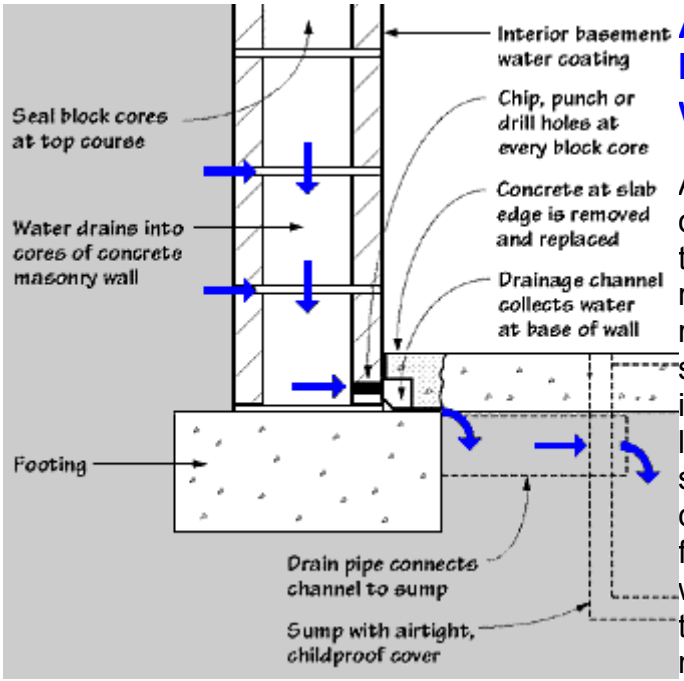
Draining to a Sump

All exterior drainage systems must drain to a sump that can be pumped out. The sump must have an airtight, childproof cover.



APPROACH 3: Interior Drainage Channel above the Concrete Slab

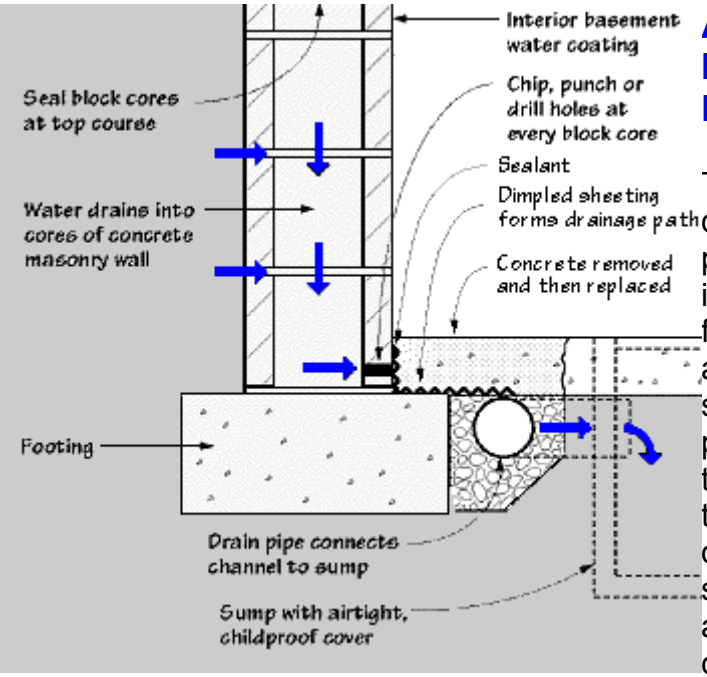
In most cases when water is entering the basement, an interior drainage system is installed. The simplest and least costly approach is a drainage channel adhered at the base of the wall and the floor slab. Water is collected and drained into a sump using another channel placed on top of the slab, then through a trap to the sump basin. The sump should have an airtight, childproof cover. This system is best suited to a concrete wall with cracks. It does not solve the problem in masonry walls because water remains in the block cores at floor level and the water level is only lowered to the top of the slab. With this approach, the water is not completely removed from the space. The result is that humidity, mold, and mildew can still be a problem. This system cannot drain groundwater from under the floor slab.



APPROACH 4: Interior Drainage Channel within the Slab Edge

Another technique is to place a drainage channel at the base of the wall on top of the footing. This requires removing and then replacing the concrete along the slab edge. The drainage channel is connected to a drain pipe leading to the sump. The sump should have an airtight, childproof cover. This approach is effective for concrete masonry walls with water problems because it drains the block cores completely. Holes must be drilled at the base of every block core to permit drainage. This may require removing more than the minimum amount of concrete, as shown, to fit the drill in. These systems have different shapes and prices depending on the product installed. Because moisture is allowed to penetrate the block cores, it is essential to cap the tops

and place a vapor-retarder coating on the interior basement walls.



APPROACH 5: Interior Drainage System Beneath the Slab

The most effective of the interior drainage systems is a perforated drain pipe installed inside the perimeter of the footing. This requires removing and replacing concrete at the slab edge. By placing the drain pipe beneath the slab, it drains the area to a lower level. Similar to an exterior system, the drainage pipe connects to a sump. The sump should have an airtight, childproof cover. A critical component of this approach is the dimpled plastic sheeting placed at the base of the wall and beneath the slab edge. Dimpled sheeting is similar to a small egg crate and permits free drainage of the wall into the drain pipe. It is less expensive than many specialized drainage channel systems. In low permeability soils, this system cannot accept rising groundwater unless there is an aggregate layer under the slab.

It is recommended that this approach be combined with an active soil gas management system that connects with the sump and perimeter drain pipe.