

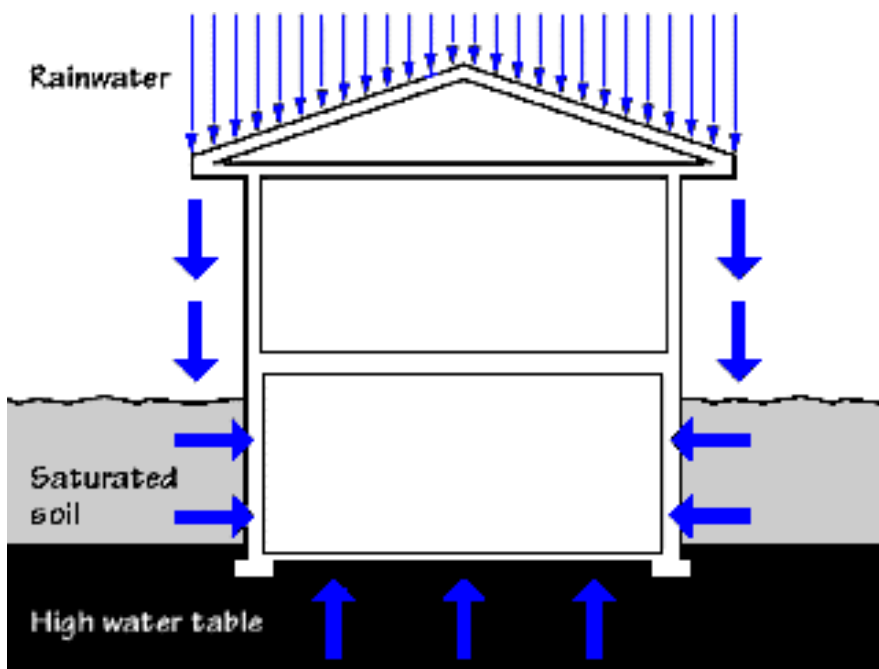
BASEMENT DRAINAGE GUIDANCE

from City Of Madison Engineering

Basement Moisture Sources

Rainwater and Groundwater

In a one-inch rain, 1,250 gallons of water fall on the roof of a 2,000-square-foot house. Without proper grading, gutters, and downspouts, some of this water flows into the basement. The below-grade water table can also rise due to flooding or seasonal site conditions. This is why drain tile systems are recommended around basement walls even in sandy or gravel soils.



Under normal conditions basements are designed to be dry (if somewhat damp/humid) spaces. In large part humidity is unavoidable because the concrete used to construct basements is a porous material and will allow water/ moisture to pass through it at a very slow rate. New construction is designed to avoid serious, free flowing water problems in many ways, including: provision of sump pumps, exterior basement coatings and extensive tile/pipe drainage systems

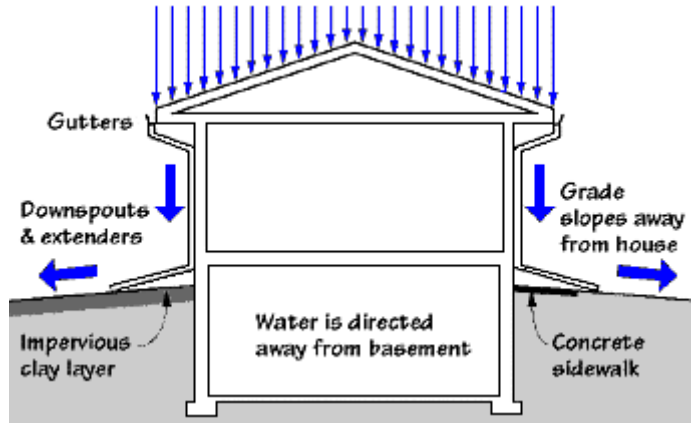
surrounding the foundation. Generally, even these modern homes need to have a dehumidifier operating in these spaces to keep humidity levels within the recommend range. Generally the recommended humidity level for basements is between 40% and 50%. If basement moisture is allowed to reach 60%, the basement will likely have a musty smell.

Many older homes were constructed without benefit of these modern systems. Under the right circumstances (e.g., high groundwater, poor exterior drainage, foundation cracking, etc.) this can result in serious moisture problems in the basement. In general the following step-by-step approach to addressing basement water problems is recommended:

- 1) Control exterior water sources by improving grading and gutter downspout systems
- 2) Provide an interior or exterior drainage (sump pump) system

**APPROACH 1:
Install Proper Gutters and
Downspouts and Correct
Grading**

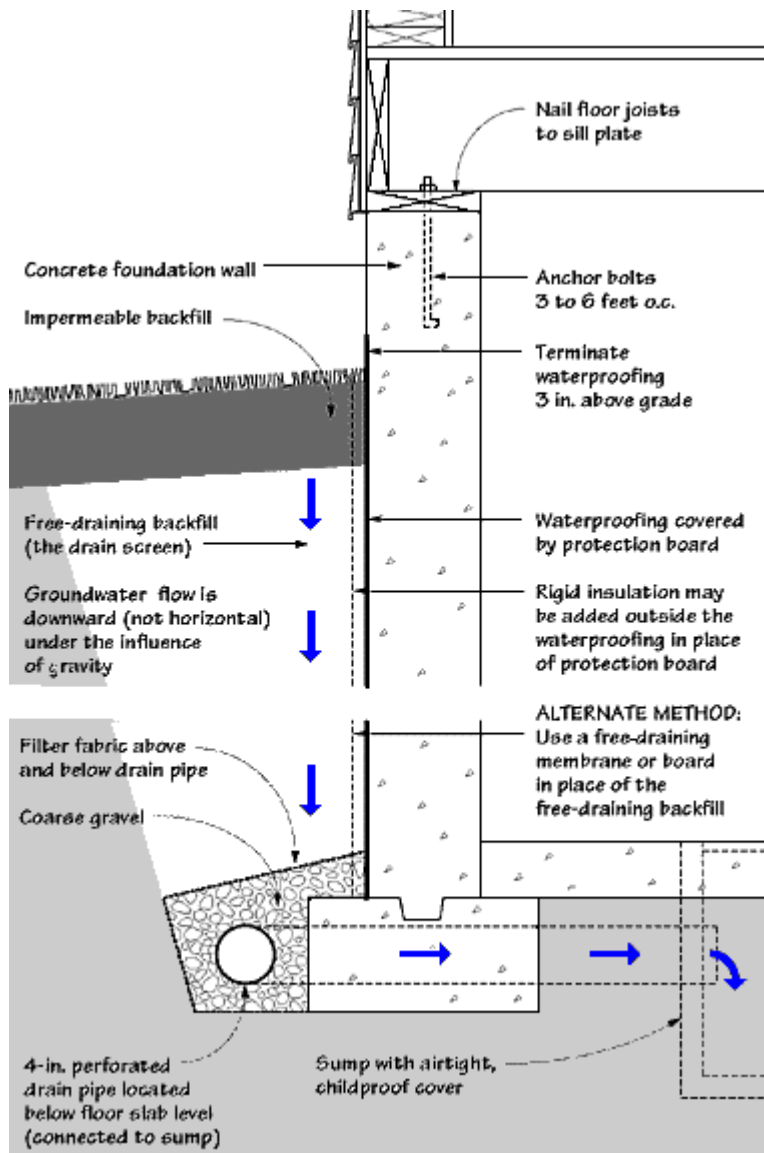
A number of basement water problems can be solved by handling rainwater and surface drainage properly by using gutters and downspouts with extenders or splash blocks to carry the water away from the foundation. Sloping the grade away from the house, which may require hauling fill to the site, is also 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, it is necessary to remove water at the source as much as possible.



**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 drainpipe installations are satisfactory. A minimum of 12 inches of coarse aggregate should be placed around the drain tile.

Free-draining Membrane or Board

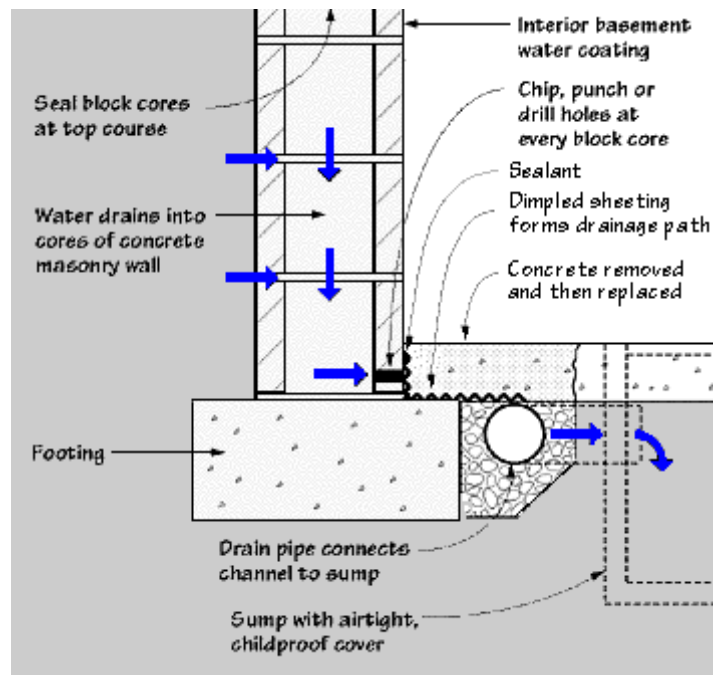
It can be expensive to haul pea rock or sand to a site for backfilling purposes. Instead, a drainage mat can be placed against the foundation wall and then backfilled with any soil on site. The drainage must have a free-flowing path to the perforated drainpipe below.

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, and the discharge from the sump pump **MUST** be discharged to a location on the property that does not slope back to the home from which it is being pumped. Failure to do this will result in recycling of the pumped water back into the sump system.

APPROACH 3: Interior Drainage System Beneath the Slab

The most effective of the interior drainage systems is a perforated drainpipe installed inside the perimeter of the footing. This requires removing and replacing concrete at the slab edge. By placing the drainpipe 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, and the discharge from the sump pump **MUST** be discharged to a location on the property that does not slope back to the home from which it is being pumped. Failure to do this will result in recycling of the pumped water back into the sump system.



In cases where the basement walls are constructed from blocks (not a poured wall), 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 drainpipe. 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.

SUMP PUMPS – if you have decided to have a sump pump installed there are a few basic things you need to keep in mind as you proceed.

- 1) A building permit is needed to complete this work.
- 2) Prior to doing any digging work on your property you should contact Diggers Hotline and have your yard marked for utilities (800) 242-8511 or www.diggershotline.com
- 3) A contractor that you hire should be willing to come out and review the situation and give you a free written estimate. It is generally not good practice to agree to work without a written contract detailing what specific work is included with the price quote and what the warranty on the work is.
- 4) In some cases it may be desirable to discharge the water from the sump pump directly to the street curb or to a nearby storm sewer inlet. If this is the case (discussed below) it is necessary that the work within the Public Right of Way (ROW) be completed by a Contractor qualified to work in the ROW by the City of Madison. This requirement is primarily an insurance requirement and protects you in the event anything should occur while installing this in the ROW.

If you decide to have this work done be aware that a Permit to Work in the ROW is needed. Additional information on this permit can be found at:
<http://www.cityofmadison.com/engineering/documents/RightOfWayFrm.pdf>

If your Contractor discharges to the curb you will need to keep this discharge point free of snow during the winter months.

Examples of when you may want to connect to the curb or storm sewer include:

- a) Sites where there is no location on the property to discharge the pumped water that will not allow the water to drain back toward the home;
 - b) Sites where the sump pump is running on a frequent basis (several times a day and often all year) and discharge to driveway/sidewalk is causing a safety (algae, mold/mildew, or slime to grow on the concrete surfaces) or discharge to the grass is so frequent as to cause the grass to die;
 - c) Sites where the property owner prefers to have a buried discharge from the sump system for aesthetic reasons.
- 5) The sump crock or pit should have an airtight, childproof cover. The discharge from the sump pump **MUST** be discharged to a location on the property that does not slope back to the home from which it is being pumped. Failure to do this will result in recycling of the pumped water back into the sump system.
 - 6) There is a great deal of information available on the Internet regarding sump pump installation. While City Engineering does not formally “recommend” any sites some of those that seem to have good information to share include:
 - a) <http://www.thisoldhouse.com/toh/video/0,,1631605,00.html>
 - b) <http://www.badgerbasementsystems.com/sump-pump.php>
 - c) http://en.wikipedia.org/wiki/Sump_pump
 - 7) If you have further questions please contact Greg Fries, City Engineering, at 608-267-1199; gfries@cityofmadison.com