# About Foundation Repair And Water Drainage

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**DENNIS RIALS** 

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BEDROCK FOUNDATION REPAIR LLC

#### WATER WATER EVERYWHERE

Almost ALL foundation problems are caused by water. One way or another, water is the culprit. This is especially the case with clay soils. Keeping water away from the foundation by correcting drainage can stabilize the foundation. That is why Bedrock Foundation Repair, LLC, started Bedrock French Drains, LLC. We are foundation repair experts, and water drainage specialists. Bedrock has 46 years of experience in foundation repair and drainage correction.

# THE PROBLEM WITH CLAY

Clay soils, such as are often found in Texas, are hard on foundations. When clay soil is saturated with water, it swells, and when the soil dries out in the summer, it shrinks. This back and forth swelling and shrinking damages the foundation and causes uneven settling. As the foundation settles, so does the structure. Cracks develop in the sheetrock and in the brick, doors won't shut, and leaks can develop in the roofing. Control the water, and you can control foundation movement.

# **POSITIVE SLOPE**

The first step to achieve this is to develop a positive slope away from the foundation. This single step can correct 90 percent of drainage problems.

• Putting soil against the foundation is a simple solution, but soil placed against porous masonry (brick or stone) can allow water into the home and rot the underlying wood. Also, soil should not touch any wood on the structure, or rot could result.

• Allowing water to pool against a foundation will also cause trouble. Many homeowners place rocks or wood chips around their foundation for aesthetic purposes, but these can also allow water to pool against a foundation. Water must drain away from the foundation. By whatever means necessary, that is the goal.

• One solution is to install waterproofing or metal flashing as a skirt around the structure, topped by soil with a positive slope. This will drain the water away from the foundation. Bedrock technicians are trained to assist homeowners in installing proper ground cover for good drainage.



### HUMIDITY AND YOUR FOUNDATION

Humid and moist conditions under a house can cause wood damage and mold. To prevent this, for a pier and beam home, or a frame house, one square foot of cross vent is needed for every 150 square feet of the structure on the bottom floor. International Residential Code Guidelines and most city code regulations also require a crossvent within three feet of any corner.

Crossvents allow outside air to blow under the structure, keeping wood and soil dry. Changes in atmospheric pressure will naturally move air back and forth, keeping moisture from collecting on the wood and the underlying soil. When plastic liners are placed on top of the soil, in the crawlspace, the wind being sucked back and forth cannot dry the soil. Wet areas can develop mold, bacteria and insects, and a resultant musty smell in the home. These smells will enter the home through cracks and the walls, just as when an animal dies under the home. You can smell it in minutes. This will affect resale value.

For homes with additions or porches that prevent installation of the proper amount of vents, a forced air system may be required. (See below.)

Note: Bedrock manufactures its own crossvents, made to fit any brick or siding. It also has antique decorative crossvents made to order from our suppliers.

# WHERE SOME HUMIDITY COMES FROM

- A wet crawlspace adds about 100 pints of moisture to the air each day.
- A shower adds about a cup of moisture inside the house every 5 minutes.
- The respiration of four people also adds about a cup of water to the air every 5 minutes.
- A dryer vent emits about 5 pints of moisture per load.

Accordingly, dryer vents should always discharge to the outside, never under or into a structure.

# **MOLD DANGERS**

Where there is water, mold and bacteria will grow. There are about 300 different kinds of mold, but the most unhealthy mold is called *Cladosporium*, or black mold, which grows on the moist dirt and decaying matter. Other common types of mold are *Serpula lcrymans, Coniophora puteana, Fibroporia vaillantii*, and *Phellinus contiguus*.

Most can be hazardous to your health. Some people are more susceptible to mold than others. Breathing issues or lung congestion may be caused by moisture in the crawlspace. A Bedrock technician can advise you on removing water under and around the home, keeping families healthy and foundations strong.

### **IMPROVING VENTILATION**

If it is impossible to install one vent for every 150 square feet of a home, then a forced air system should be installed. A simple fan is not effective. A true forced air system establishes a NEGATIVE pressure under the structure with ductwork, so that mold and bacteria cannot easily penetrate into the home.

A true forced air system keeps fresh air in the crawlspace. When combined with a moisture detector, the fan will only cut on when the moisture level reaches a designated point. Mold and bacteria need water to grow. Ventilation can dry out the water, removing musty smells, mold and bacteria.

# **GROUND COVER**

Good ground cover prevents water from seeping through the soil to the foundation and under the foundation. It also prevents the



ABOVE: Periwinkle is a popular ground cover.

soil from drying out too much in the dry months. Good ground cover prevents erosion and saturation of the soil. The best ground cover is concrete.

### ROTATION

When a floor settles, the wall settles also, causing it to 'rotate' away from the structure. Signs of rotation include cracks in the sheetrock or in the brick, and misaligned door frames.

The foundation is settling at that point. The higher up you go, the larger the crack or gap. That means the damage done to the roof is also greater. As mentioned, foundation settlement can lead to roof leaks.

#### **SOIL MIGRATION**

Many older homes have very small crawlspaces, making work difficult. However, the crawlspaces were not built that way. Rotting leaves and debris can build up around a house over the years. Water draining under a structure, can bring this silt or debris with it. Bedrock calls this soil migration: When water penetrates under a foundation, it is not crystal clear water; it carries with it silt and mud. As it evaporates, it leaves the soil. In this way, a crawlspace can 'fill up' with soil, leaving less room. Severe negative water drainage can even fill up the entire crawlspace in a few years.

#### **CRAWLSPACE ACCESS**

Most pier and beam homes have a closet trap door for access to the crawlspace, but some have access on the perimeter of the structure. The problem with a closet trap door, is that when it is opened, mold spores, insects and germs can enter the house.





The crawlspace is an unsterile environment, and the bugs and bacteria need to stay there. Bedrock recommends sealing the closet trap door, and replacing it with an exterior scuttlehole box. Then contractors, inspectors, plumbers, and foundation repairmen may avoid entering the home.

A simple opening in the skirting, however, is not effective, because water can flow through that. You usually cannot create a positive slope away from the foundation without covering up the perimeter opening, but with a scuttlehole box, it can be done. Scuttlehole boxes cost about \$1200 for a frame house, or about \$2200 for brick or stone facades.

### **PIER SUPPORTS**

There are many different pier supports to place under the foundation. Most slab foundations have no piers, but almost all brick or stone structures have piers under the perimeter concrete beam, usually one about every 8 feet. Older frame structures in Texas also have pier supports. In the past these were usually wooden bois d'arc posts, which work very well as they do not rot. Termites will also not eat them. Newer frame homes will have stones, blocks or mortared bricks for piers. The most substandard supports for frame structures are wood to ground contact supports, sometimes called 'stiff legs', and trailer house blocks. Small lightweight structures, such as trailers, sheds, or doghouses can use such blocks, but these can fail on heavier structures. Also dangerous are cinder blocks, which are hollow and can break easily. The best support for frame structures, for the money, is a poured-in-place concrete footing, if it is installed at least 8 inches into the ground. At 18" square (or 24" square for two stories), it distributes the weight well, and is steel reinforced.

These kinds of piers also make it difficult for water to penetrate enough to get under the footing. Most piers should be installed at least six feet apart, to distribute the weight adequately. Poured-inplace footings cost about \$400 each.

#### **CRAWLSPACE HEIGHT**

Another issue for the homeowner is the height of the crawlspace. The minimum height for a crawlspace is generally 18" under the floor joists. This allows for cross ventilation, and also for workman to get under the girders. Girders usually extend six inches down from the floor joists, leaving only 12 inches clearance for workers to squeeze through.

As mentioned above, with settlement and soil migration under the structure, the crawlspace can soon be so small as to be



inaccessible. The solution is removal of the excess soil, which can be done by a Bedrock crew.

### **SLAB FOUNDATIONS**

Slab foundations are easiest to repair and easiest to stabilize, if the perimeter has a positive slope. Some contractors drive pilings into the ground, others pour concrete in a tubed pier, and some use other methods. The best bet for the money are concrete pilings. Steel pilings will eventually rust. Concrete pilings are driven into the soil, using the weight of the structure to push against. When they reach a 'point of refusal,' meaning they refuse to go into the ground any further, that means the strength of the soil at that depth is stronger than the weight of the structure against it. That is the guarantee that it is sufficient to support the structure.

Most concrete pilings cost about \$550 each. On a typical slab foundation, they are placed eight feet apart. Interior placement of pilings are more complex, and can cost roughly \$1200 each.

The Mercedes Benz of all foundation supports is one that goes to hard rock. Bedrock patented the TORPEDO PIER that can go up to 90 feet deep into hard rock. Many homeowners prefer torpedo piers as they place the house on rock, ending seasonal movement and constant cracking. Costs vary depending on the distance to rock, but most areas around Dallas can be reached within 40 feet. Torpedo Piers cost roughly \$2,000 each.

#### FOUNDATION MAINTENANCE

Foundation maintenance consists of one major concept: Keeping the soil moisture under and around the house as uniform as possible. Some measures to help accomplish this are:

• Install good ground cover. This will prevent excessive moisture from seeping deep into the soil, causing problems to the foundation. The ground cover also prevents erosion of the soil, and excessive "drying out" of the soil through evaporation.

• Water the soil around the house during dry periods just enough to keep the grass green. More watering is needed in areas with abundant shrubbery, plants and trees. The south and west sides

of the house are more exposed to the sun, and may need more watering to offset rapid evaporation. In the dry season, soak the soil about 3 feet away from the foundation.

• Never place sand, sandy loam, rocks or crushed granite around the foundation. They are very porous, and allow water to pass through to the clay below, where it will not dry out. Rocks can be used as ground cover if there is a positive slope away from the foundation underneath the rocks.

• Never pour water into the cracks of the ground. These cracks sometimes go a few feet deep, and the water can reach soil that is normally undisturbed by large amounts of moisture. Depending upon the shrink/swell potential of the soil, it may upheave, or it may consolidate and lose volume, either way moving the foundation and causing problems.

• Never allow water to pool close to the foundation. If water stands for very long, it will seep under the foundation, causing problems. It will cause the clay soil to swell, sometimes lifting the foundation in the air. When it dries it will shrink, and the foundation will settle. It can also cause loose soil to consolidate, and the structure will settle.

### **EXPANSIVE CLAY SOILS**

Foundation problems caused by expansive clay soils usually develop when the amount of water in the soil changes nonuniformly under the foundation structure. As already mentioned, clay soils shrink when dry and swell when wet, resulting in up and down movement of the house. Sandy soils have about 50 particles per cubic inch, and silts have about 150 particles. Clay soils, however, can have up to a million particles per cubic inch! These swell greatly when water is applied. Clay soils swell away from foundation supports when wet, but when they dry out, they do not compact to the original location, leaving voids and weak spots under the foundation support.

### WHO WE ARE

Bedrock Foundation Repair has been serving the needs of residential and commercial clients in the Dallas – Fort Worth Metroplex since 1979. We specialize in foundations, french drains and engineering services. Founder Dennis Rials (on right) began his foundation and drainage training in the 1970s, after purchasing historic homes in Old East Dallas, all of which had foundation problems. He soon started repairing foundations and leveling houses for others. This intensive work on old



pier and beam houses prepared Bedrock for the many different foundation problems it has encountered since in Texas, Louisiana and Arkansas. Bedrock Foundation Repair, LLC 214-824-1211 Family Owned Since 1979 Bedrock Engineering, LLC: 214-824-2029 Bedrock French Drains, LLC: 214-824-1233 Work Day: 214-824-1211 After Hours: 214-934-8422 office@bedrockfoundation.com www.bedrockfoundationrepair.com Located near the State Fair Grounds: 1018 Fletcher Street, Dallas TX 75223



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