



# “Water is our best friend, and our worst enemy”

Excess or too little moisture around your house can cause serious foundation problems. Seasonal fluctuations of soil moisture can cause significant movement of foundations, up or down if the soil is highly expansive clay. At the very least moisture fluctuations can cause soil elevation changes of up to four inches in loamy soil simply due to the loss of volume. This alone can cause significant foundation issues.

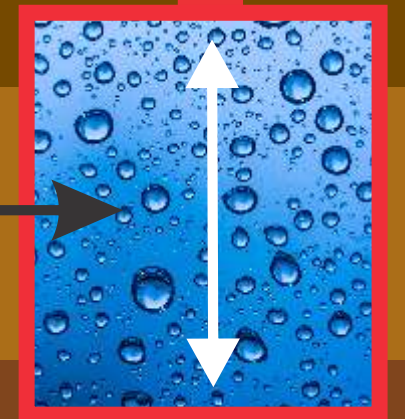
Excess moisture can cause upward heaving of foundations as volume increases, but also cause rapid settlement when the soil becomes unable to support the foundation load.

Fortunately, these problems can be avoided by implementing proper drainage and irrigation plans that minimize the effects of too much water.

**EXTREME WINTERS**  
2017/2019/20-23-24

Maintaining an optimal range of moisture is the key to keeping your foundation in good health.

**OPTIMAL MOISTURE**



**HOT SUMMERS**  
**DROUGHT CONDITIONS**

Downward foundation settlement can occur as the volume of moisture decreases, and soil becomes more compressible. Compressible soils do not readily absorb water, so the cycle can increase rapidly as dry conditions continue, causing substantial damage to your home's foundation. These problems can be avoided by implementing strategic irrigation practices during dry periods.

# It's all in the Soil



There are many reasons for foundation problems in your house but in most cases, the expansion or consolidation of the soil that supports your homes foundation results in foundation movement. This, in turn, can make the entire structure sink gradually. No worries if the movement is minimal or happens only once, but if you spot cracks or gaps in the foundation, that seemingly grow over time, it could be a sign that your house is settling enough that foundation problems will occur. Depending on how much, and where the settling occurs is cause for foundation problems that may need the help of a professional.

### Why does that happen?

In general, differential settlement, (sinking), occurs when soil under a footing, compresses. The cause of soil compression could be either;

- Moistening of the subgrade soil by water infiltration.
- Drying of clay-like soils.
- Crumbling of decomposing organic material in a subterranean layer.
- Inadequate or non-uniform compaction of the soil prior to construction of the foundation.
- Additional loading applied to an existing foundation through structural
- Additions/expansions/modifications.
- Hillside slope creep due to an adjacent slope slowly shifting.

Over 90% of homes we inspect have poor or nonexistent rain gutters. When they do, most dump all the rain run-off directly onto the ground, next to you foundation. Great when it just sprinkles, but that old song rings too true in California.

*“Seems it never rains in Southern California. Seems I've often heard that kind of talk before It never rains in California, but girl, don't they warn ya? It pours, man, it pours”*

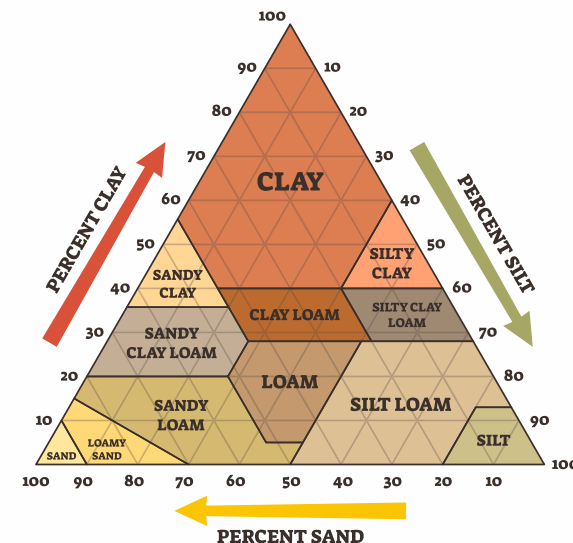
Inadequate drainage of surface water, either from rain or irrigation, away from the home often contributes to sub-grade soil saturation. This is the number one cause for foundation problems in Southern California.

The No. 2 problem; Our record drought conditions. Moisture content in soil is volume. When reduced due to the dry conditions, soil settles, along with your foundation.

Is this your house?  
if it is, its wrong,  
and it may  
be the cause  
of your  
foundation woes.



### SOIL TYPES



Clay soil has a very high elasticity index, meaning that it can greatly shrink or swell with the amount of water present. The higher content of clay in the soil below your foundation, will determine the potential for settlement and future foundation problems.

# Inadequate drainage occurs when the topography is flat,

slopes toward the house, or puddles near inside closed planters.

When irrigation volume is unnecessarily high, or torrential rains occur, this creates 'ponding' conditions, where water has no escape route (bathtub scenario), or the yard drains are blocked due to debris or lack of maintenance.

For many houses, water may have saturated the soil adjacent to this foundation due to inadequate surface drainage during irrigation, past torrential rains, or an excessive use of the hose along the backyard wall.

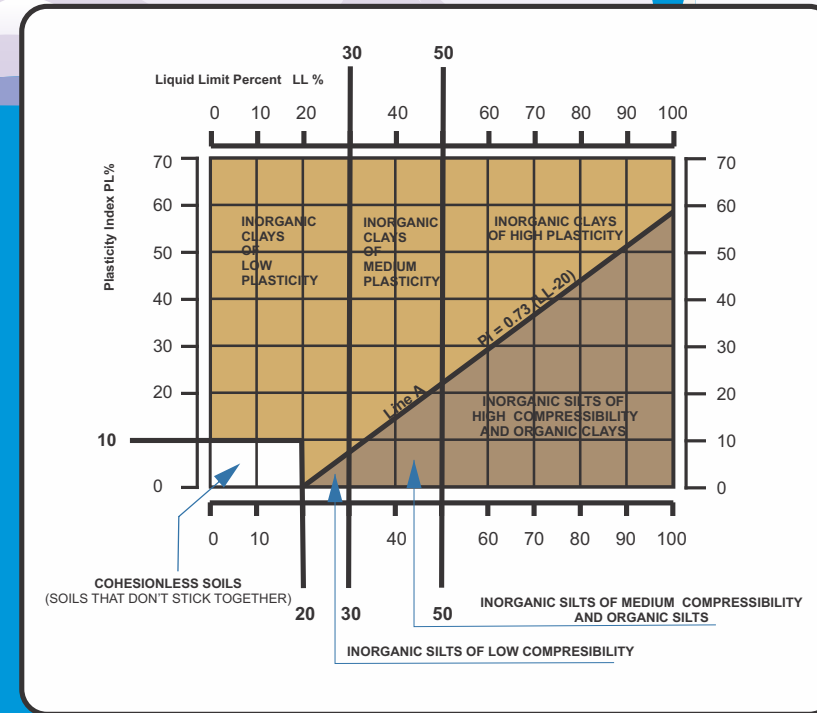
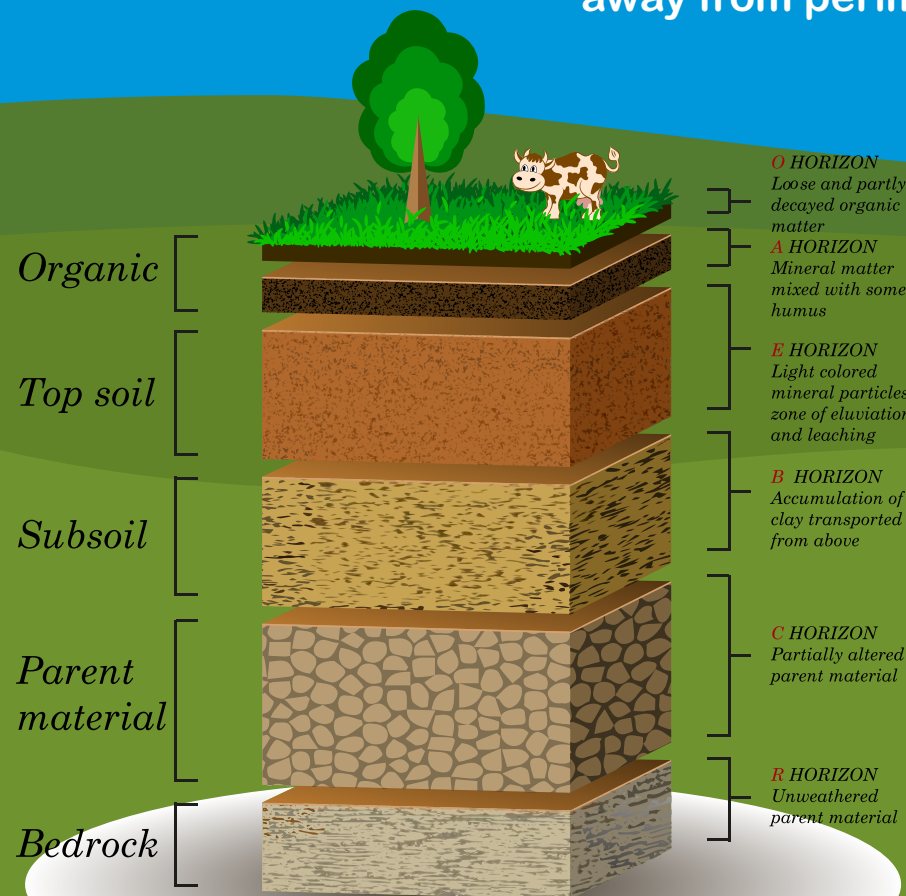
One of the most prevalent scenarios we see, is rain gutters draining directly adjacent to the foundation, and often into a planter that creates pooling.

Proper drainage is important to keep water away from perimeter foundations to prevent foundation movement.

Water percolates through the topsoil to saturate the subgrade soil under the foundation.

In such conditions, the soil under the foundation becomes more compressible. This is known as 'soil consolidation'.

Soil consolidation can occur in most soil types, but are far more prevalent in clay type soil conditions.



The plasticity index (PI) is a measure of the plasticity of a soil. The plasticity index is the size of the range of water contents where the soil exhibits plastic properties. The PI is the difference between the liquid limit and the plastic limit, ( $PI = LL - PL$ ). The higher the plasticity index, the greater the potential for foundation problems, and the greater need to manage your soil conditions around your home.

Soil is classified into four types:

**SANDY SOIL   SILT SOIL   LOAMY SOIL   CLAY SOIL**

### Sandy Soil

The first type of soil is sand. It consists of small particles of weathered rock. Sandy soils are one of the poorest types of soil for growing plants because it has very low nutrients and poor water holding capacity, which makes it hard for the plants root system to absorb water. This type of soil is very good for the drainage system. Sandy soil is usually formed by the breakdown or fragmentation of rocks like granite, limestone and quartz. Most desert communities are built on sandy soil and experience little settlement.

### Silty Soil

Silt, which is known to have much smaller particles compared to sandy soil and is made up of rock and other mineral particles, which are smaller than sand and larger than clay. It is the smooth and fine quality of the soil that holds water better than sand. Silt is easily transported by moving currents and it is mainly found near the river, lake and other water bodies. Many homes constructed in lowland valley near natural water flows or lakes, are built upon this type of soil.

### Loamy Soil

Loam is the third type of soil. It is a combination of sand, silt and clay such that the beneficial properties from each is included. For instance, it can retain moisture and nutrients; hence, it is more suitable for farming. This soil is also referred to as agricultural soil as it includes an equilibrium of all three types of soil materials being sandy, clay, and silt and it also happens to have humus. The percentage of clay content will dictate the potential foundation problems. Loamy soil also has a high probability of soil consolidation.

### Clay, (clay soil)

Clay is the smallest particle amongst the other types of soil. The particles in this soil are tightly packed together with each other with very little or no airspace. This soil has very good water storage qualities and makes it hard for moisture and air to penetrate it. It is very sticky to the touch when wet, but smooth when dried. Clay is the densest and heaviest type of soil which does not drain well or provide space for plant roots to flourish. Clayey soils have a high expansion and contraction rate. (plasticity index). Upon moistening, these soils expand. Upon drying, these soils shrink more than they previously expanded, which leads to differential settlement. Clay soil causes more damage to residential structures across the U.S. yearly, than Hurricane Katrina and Sandy combined. (USGS report).