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Foundations and Trees

The last two summers in Ottawa have produced drought conditions. This puts trees under stress and forces them to look far and wide for moisture. This can affect a house foundation. Read on:

Is it true that trees can have an effect on the foundation of my home?

It is true that a tree may cause differential settlement of a house or building foundation, but it doesn't happen in all cases and at any time. There are three things that must be occurring simultaneously to produce settlement in a foundation. These are generally agreed to be: large and mature deciduous tree close to the house, wet clay soil conditions under the home and an abnormal drought condition caused by man or nature. We will talk about each briefly below.

Certain broad-leaved deciduous trees which can cause house settlement, in order of risk, include weeping willows, maples (especially Silver and Manitoba), poplars (Lombardy), ash, alders, aspens, elms and lindens and to a lesser degree birch, oak, beech and any conifer. The basis of the risk is simply the faster growing trees require more water during peak summer times when the weather is the hottest and driest. Remember that we are talking about mature trees. Up until they reach twenty or so feet high or are twenty years of age they are rarely a problem. Sometimes a group of smaller trees can be an issue but this is rare.

The soil conditions under a house have a direct effect on the settlement process caused by trees. Consider that soil under the ground is always wet at some depth. As you go deeper, you may even come across a ground water table that is almost like a lake or pond under ground. As you remove the moisture from the soil, the soil can compact or shrink. Considering some clay soils are up to 40% water, this volume change can have a drastic effect. Many of us notice this on the ground surface as the land seems to lower around large trees. Imagine this may happen well below ground and you have the reason for house settlement.

In terms of an abnormal drought condition, consider that a large tree, on a hot day, may need 30-50 gallons of water or more just to survive. This water is drawn into the roots and up the tree, some to the full height of the tree. A long period without rain or minimum rain would mean that the tree has to find this water below ground in the soil. It will go where it needs to find water and this includes the soil under your house. What may have been damp or wet soil for thirty years suddenly is dried out by the suction action of the tree roots toward the tree.

What will I see as clues that I have a problem?

During the summer drought period, cracks would suddenly appear in your foundation exterior parging, brick finish and interior drywall. If you don't have brick you would likely see separation of the caulking around windows and doors. If you have an unfinished basement you would see the cracks in the foundation walls and across the basement floor. You may even notice a slope to the floor downward toward the tree.

You said that the drought could be man made, is that true?

Sure, if you pave around a tree, install a deep sewer or fill in a pond you may change the conditions that allowed the tree to obtain water easily. This is especially hard for City trees that have to compete with roads, sidewalks, sewers and patios for water.

Are the roots going to eventually push through the walls and collapse my house?

No. The issue with trees is the high demand for water and the soil conditions. The roots are not strong enough to push through a foundation. Amazingly enough though, small roots can sometimes extend over 100 feet from a tree to find water. We have found extensive root systems under basement floors throughout Ottawa.

Okay, so there is a big tree on my property, should I cut it down?

Remember that you require all three elements to have a risk of settlement. If you resolve one, you probably won't have any problems. For example, if you had a very deep foundation or are located on bedrock or good sand, you almost certainly will not have a problem. If you are able to water your tree, you can reduce your risk. And finally, you can cut the tree down.

What does the tree use all the water for?

Surprisingly enough, most of the water is used for transpiration. This is the natural rising up of the water from the roots to the uppermost branches and leaves and the subsequent evaporation into the air. This process is driven by the radiation and heat from the sun. A tree uses 1,000 times more water to complete this process than for actual growth.

What are my options if I want to keep the tree?

A local foundation contractor, soils engineering company, and engineer have come up with the concept of placing a trench in the ground to help improve the situation.

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We would be willing to discuss this with any person wishing to consider an alternative to tree removal.