Get To Know Your Inner Tree

INSIGHT TREE IMAGING LLC

Level 3 Risk Assessment & Root Mapping

Ground Penetrating Radar (GPR)

How does it work?

The use of radar imaging on trees creates the same type of high- resolution, non-invasive image that a medical professional would utilize with MRI imagery. This is the latest method to safely evaluate a tree's internal structure without invasion of the tree itself. Having the ability to create and see an internal image of a tree and then to identify any hidden internal problems fills a critical gap in tree preservation. GPR has been used worldwide for many decades. Radar is an object-detection system that uses electromagnetic waves – specifically radio waves – to identify the range, altitude, direction, or speed of both moving and fixed objects. When an electromagnetic wave emitted from a small surface transmit antenna / receiver encounters a boundary between objects with different electromagnetic properties, it will reflect, refract, and or diffract from the boundary in a predictable manner. Radar waves or signals are reflected especially well by materials of considerable electrical conductivity. The radar signals that are reflected towards the antenna are the desirable ones that create the image and make radar work. The radar signal detects water in the root system of the tree and can distinguish this water from

water in the surrounding soil matrix. An air-filled tree trunk (with a decayed hollow) or a partially airfilled incipient (early stage) decay zone inside a cell wall within a tree are excellent reflectors for detection by GPR systems. Use of GPR instrumentation for internal tree trunk decay detection and below ground root locating is one of its latest uses in tree risk assessment.

How does radar distinguish between decayed and healthy wood in a tree trunk or limb?

Wood decay fungi decompose lignified cell walls in living wood tissue by using enzymatic and non-enzymatic systems. In time this creates a microscopically detectable hollow or void within the cell walls of the wood, thereby reducing normal wood strength. Radar imaging can identify these small, microscopic changes (voids) in the wood composition. It's the loss of the wood's mechanical strength by these wood digesting organisms that is inherently linked to hazardous situations, often resulting to injuries or property damage. Ground penetrating radar is one of the latest non-invasive forensic technologies used for wood decay analyses; its sensitivity to hollows, internal cracks or voids enables it to detect and, through specialized computer software, create an image of these small internal molecular changes in wood density and composition.