

# TRU™ (Tree Radar Unit) System

## What it is & How it works

### An Introduction to Ground-Penetrating Radar (GPR)

GPR is an established technique that has been used worldwide for over 30 years to locate objects underground, including pipes, barrels, drums, and other engineering and environmental targets.

Use of GPR instrumentation for internal trunk decay detection and subsurface structural root mapping is a novel and recent application to the arboricultural field that has been developed and patented by TreeRadar™, Inc. under the name TRU™ (Tree Radar Unit).

An air-filled trunk (hollow), or partially air-filled incipient decay zone, are excellent reflectors for detection by GPR systems. In addition, electromagnetic differences between tree roots and the surrounding soil provide the necessary contrast and reflection properties that are detected by GPR.

GPR measurement as a method of mapping tree roots has several advantages over other methods: (1) it is capable of scanning root systems of large trees under field conditions in a short time, (2) it is completely non-invasive, does not disturb the soil or damage the trees examined, and causes no harm to the environment, (3) being non-invasive, it allows repeated measurements that reveal long-term root system development, (4) it allows observation of root distribution beneath hard surfaces (concrete, asphalt, brick), roads and buildings, (5) its accuracy is sufficient to find structural roots with diameters as small as 0.4in (1cm).

# TRU™ (Tree Radar Unit) System

Field Computer



Radar Antenna



Scanning Cart



**Trunk Inspection**

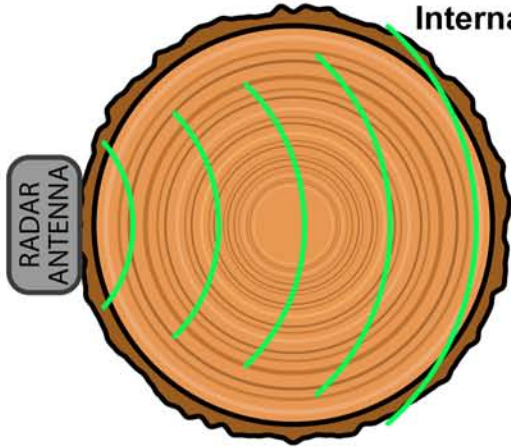


**Root Inspection**

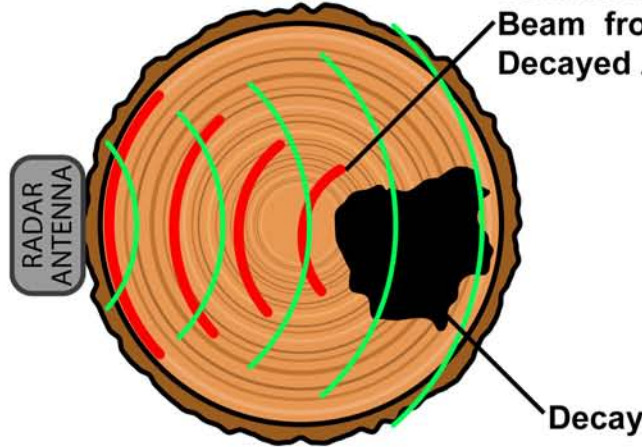


# Trunk Inspection Procedure

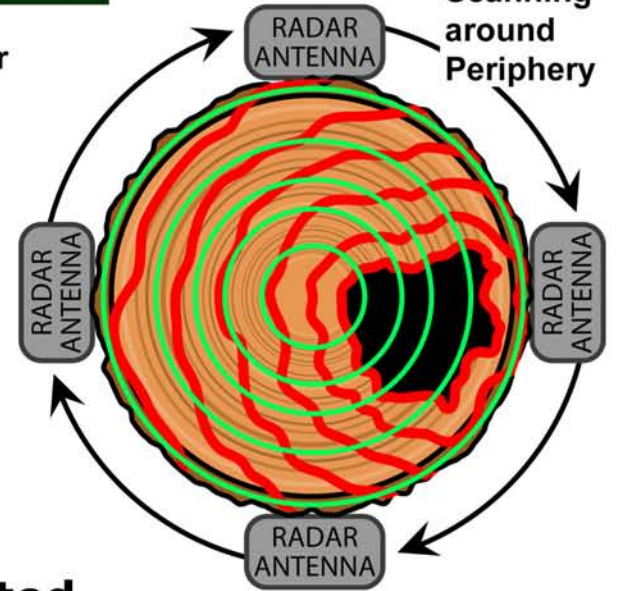
No Reflecting Internal Area



Reflected Radar Beam from Decayed Area



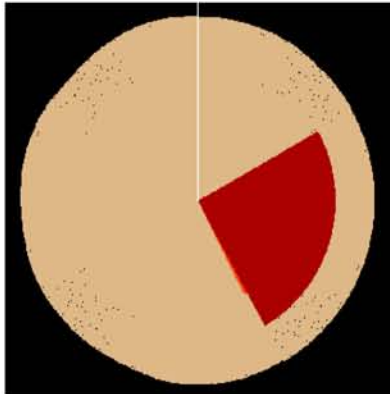
Scanning around Periphery



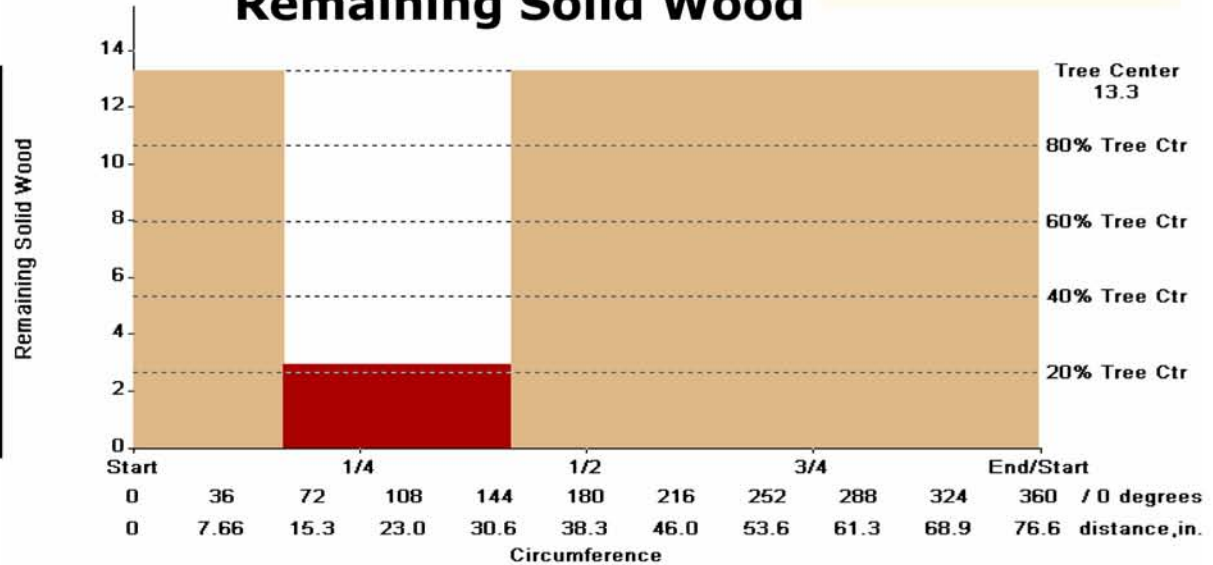
**Actual Cross-Section**



**Predicted Cross-Section**

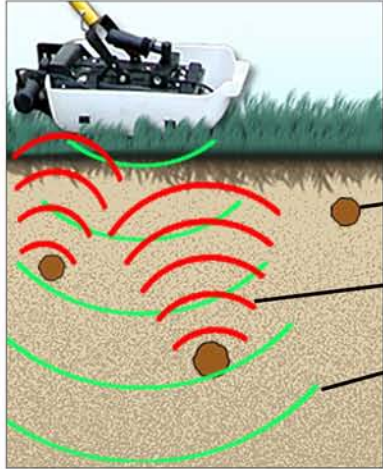


**Predicted Remaining Solid Wood**



# Root Inspection Procedure

Scanning over Bare Surface

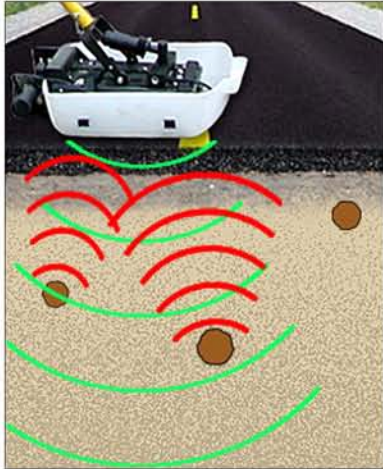


Cross-sectional View of Roots

Reflected Radar Beam from Roots

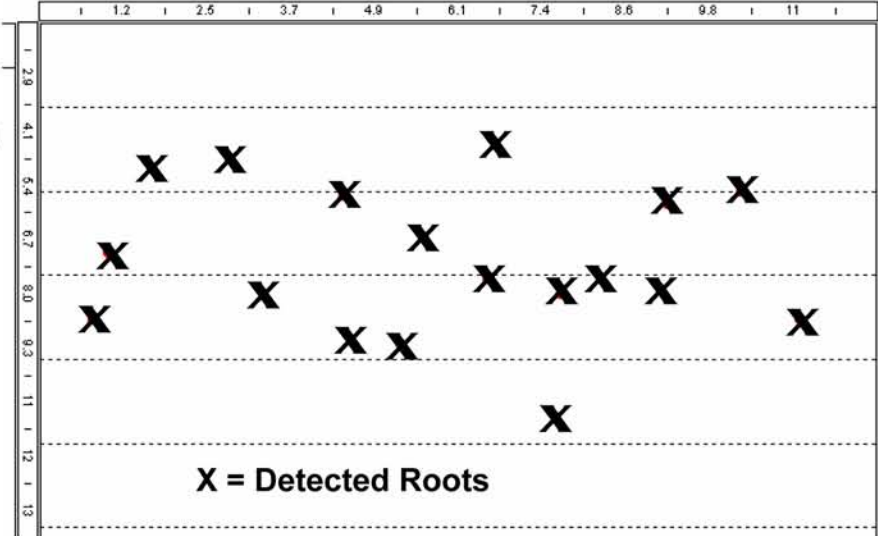
Radar Beam

Scanning over Covered Surface



Scan Direction →

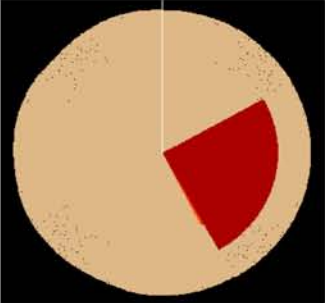
Depth ↓



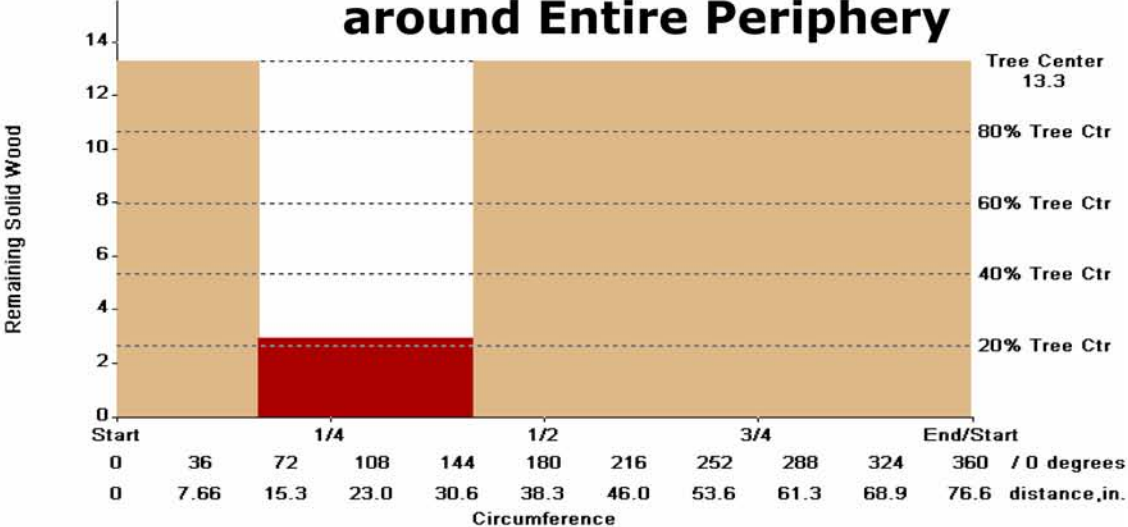
# Inspection Results

## Trunk Inspection

Trunk Cross-Section  
"Virtual Saw Cut"

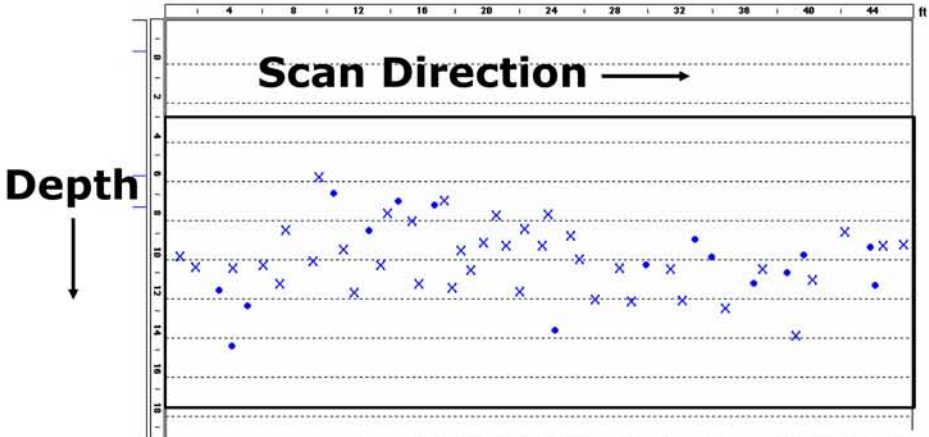


Remaining Solid Wood  
around Entire Periphery

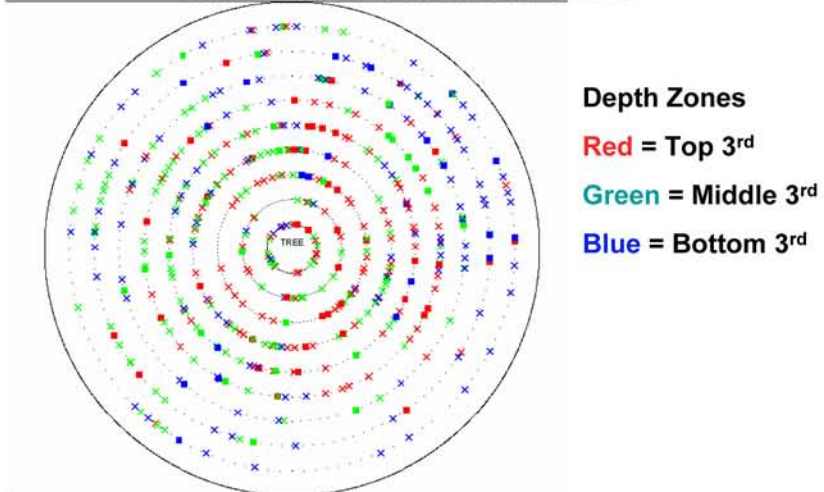


## Roots Inspection

Side-View Root Distribution Map  
"Virtual Trench"



Top-Down Root Layout & Density Map  
"Virtual Excavation"



# Most Trees Fall Because of Compromised Roots – mainly due to Construction or Fungal Attack



# “How Could It Fall Down...It Looked So Healthy?”

