Ecological Rights Foundation

June 16, 2026

Via Email:
Humboldt County Planning Commission
c/o Humboldt County Planning & Building Department
3015 H Street
Eureka, CA 95501
planningclerk@co.humboldt.ca.us

I. ORDINANCE 2112 IS A GENERAL PLAN IMPLEMENTING ORDINANCE WHOSE PROTECTIVE PURPOSE MUST GUIDE INTERPRETATION OF THE SPECIAL PERMIT STANDARD

The Lower Redway Qualified Combining ("Q") Zone was adopted specifically "[t]o protect redwood trees greater than twelve inches (12") in diameter at breast height" while still allowing "maintenance and development of permitted uses."

This purpose is not merely aspirational. Ordinance 2112 expressly ties its restrictions to implementation of the County General Plan and further provides that unauthorized cutting or removal of protected redwoods "are inconsistent with the County General Plan" and "therefore prohibited."

Accordingly, Ordinance 2112 must be interpreted as a preservation-oriented implementing ordinance designed to strictly limit removal of protected old-growth redwoods within the Lower Redway Q-Zone. The ordinance is not a routine tree-removal permitting scheme. Rather, it establishes a general prohibition against removal subject only to narrow exceptions.

The structure of the ordinance confirms this intent. Removal of protected redwoods "shall be limited to" only two circumstances:

"1) removal of trees within the physical footprint of a permitted building where there are no other feasible locations on the property which would allow for the trees to remain upon construction of the building, or 2) removal of trees upon demonstration that such a tree, due to damage or disease is in imminent danger of falling, thus creating an immediate hazard."

The ordinance separately excludes driveways, parking areas, and sewage disposal systems from the "physical footprint" exception.

Because the ordinance's stated purpose is preservation of mature redwoods, its removal exceptions must be construed narrowly. Otherwise, the ordinance's protective purpose would be nullified. Nearly every large old-growth redwood adjacent to development presents some level of generalized future risk. The Board of Supervisors nevertheless chose to require a specific showing of "imminent danger of falling" before authorizing removal.

That legislative choice is significant and binding upon the Planning Commission.

II. THE TERMS "IMMINENT DANGER" AND "IMMEDIATE HAZARD" MUST BE INTERPRETED NARROWLY AND CONSISTENTLY WITH THE ORDINANCE'S PRESERVATION PURPOSE

The application materials repeatedly characterize the tree as "high risk," "hazardous," or capable of causing catastrophic consequences if failure were to occur.

However, generalized risk is not the legal standard established by Ordinance 2112.

The ordinance requires a "demonstration" that the tree, due to "damage or disease," is in "imminent danger of falling," thereby creating an "immediate hazard."

Those terms must be interpreted narrowly and consistently with the ordinance's protective purpose.

The ordinance's emergency provisions further reinforce the intended meaning of "imminent." Ordinance 2112 defines an emergency as:

"a sudden, unexpected occurrence demanding immediate action to prevent or mitigate loss or damage to life, health, property or essential public services."

This language demonstrates that the ordinance distinguishes between:

- generalized future risk,
- elevated hazard conditions,
- and actual near-term emergency circumstances requiring immediate action.

Accordingly, evidence that a large redwood could someday fail during a future storm event is insufficient. The ordinance instead requires substantial evidence demonstrating probable near-term catastrophic failure.

The Staff Report repeatedly misstates the standard for issuing a Special Permit to remove the tree, arguing that two RPFs and an arborist find "the tree is a safety hazard in need of removal." Staff recommends that the reports should be interpreted to mean the tree is "in imminent danger of falling, even though none say that." Staff's recommendation is both factually and legally unsupportable.

III. THE RECORD DOES NOT CONTAIN SUBSTANTIAL EVIDENCE OF IMMINENT WHOLE-TREE FAILURE

The reports submitted in support of removal rely heavily upon generalized assertions regarding:

- potential consequences if failure were to occur;
- the size of the tree;
- wind exposure;
- branch shedding;

- cavities;
- root disturbance;
- and speculative future failure scenarios.

However, the record lacks substantial evidence demonstrating imminent whole-tree failure. Notably absent are objective, non-invasive or minimally invasive diagnostic procedures commonly used by qualified arborists to objectively evaluate structural integrity and actual failure probability in historically significant trees. These include:

- sonic tomography;
- resistograph testing;
- root collar excavation;
- pull testing;
- advanced aerial canopy inspection;
- ground penetrating radar;
- trunk shell wall-thickness analysis;
- inclinometer or lean monitoring;
- and quantified risk assessment methodologies.

The absence of these objective diagnostic methods is especially significant where the County is considering irreversible removal of an ancient old-growth coast redwood estimated to be approximately 350–370 years old.

A. Sonic Tomography

No sonic tomography appears to have been conducted.

Sonic tomography is a widely used non-invasive diagnostic technique that evaluates the internal structural condition of a tree trunk by measuring the speed of sound waves transmitted through the wood. Sensors are placed around the trunk circumference and the resulting data produces a tomographic image identifying:

- cavities;
- decay columns;
- internal cracking;
- asymmetrical weakness;
- and the percentage and distribution of remaining sound load-bearing wood.

This type of analysis is particularly important in old-growth coast redwoods because visual cavities and hollows alone do not reliably indicate imminent structural failure. Ancient redwoods commonly survive for centuries with extensive hollowing, fire scars, cavities, and compartmentalized decay while remaining structurally stable.

Without sonic tomography or comparable quantitative structural analysis, the reports provide no objective measurement of:

- remaining sound wood thickness;
- load-bearing shell integrity;

- extent of decay penetration;
- or whether the observed cavity materially compromises trunk stability.

B. Resistograph Testing

No resistograph analysis appears to have been performed.

Resistograph testing involves the use of a very small drill needle that measures resistance through the wood as it penetrates the trunk. The resulting graph can identify:

- density changes;
- voids;
- decay pockets;
- hidden cracks;
- and the thickness of structurally sound wood.

This technique is commonly used to determine whether apparent cavities or decay actually compromise structural integrity or instead represent long-compartmentalized and stable conditions typical of ancient redwoods.

Without resistograph testing, the reports rely largely upon visual assumptions regarding the significance of the observed cavity and trunk injuries.

C. Root Collar Excavation and Root-System Assessment

The arborist expressly acknowledged that:
"A complete evaluation of the tree's potential for failure would require a root collar excavation…"

Yet no such excavation appears to have occurred.

Root collar excavation is a standard arboricultural diagnostic technique used to evaluate:

- root decay;
- girdling roots;
- root severance;
- buttress-root integrity;
- fungal activity;
- and hidden structural defects at the base of the tree.

This analysis is especially important where, as here, the reports speculate that:

- roadway work,
- soil compaction,
- and past root cutting

may have compromised stability.

Without excavation and direct examination, the reports provide no objective evidence demonstrating that the root system is presently incapable of supporting the tree.

D. Advanced Aerial Canopy Inspection

The reports acknowledge that no climbing inspection or advanced aerial structural assessment was performed.

Aerial inspection by qualified arborists is commonly used to evaluate:

- branch unions;
- codominant stem attachments;
- crack propagation;
- canopy loading;
- included bark;
- structural stress indicators;
- and upper-trunk defects not visible from the ground.

Given the reports' repeated reliance upon assertions regarding altered canopy structure and wind loading, the absence of a detailed aerial structural inspection significantly limits the reliability of the conclusions presented.

E. Pull Testing and Structural Load Analysis

No pull testing or quantified structural load analysis appears to have been performed.

Static or dynamic pull testing is used to evaluate how a tree responds to simulated wind loading and can provide objective information regarding:

- stem flexibility;
- root plate movement;
- structural response;
- and actual stability under load conditions.

Similarly, engineering-based load analyses may be used to estimate whether observed defects materially compromise the tree's structural safety margins.

No such quantitative analyses appear in the record.

F. Longitudinal Monitoring and Quantified Failure Probability

The reports also fail to provide:

- longitudinal monitoring data;
- lean progression measurements;
- root plate movement observations;
- crack monitoring;
- or quantified failure probability estimates.

Instead, the reports rely largely upon generalized statements that the tree:

- “poses a high risk”;
- “is more likely” to fail;
- or “could” fail under future wind events.

Speculative future possibilities are not equivalent to substantial evidence demonstrating imminent whole-tree failure under Ordinance 2112’s narrow legal standard.

G. The Lack of Rigorous Diagnostic Testing Is Particularly Significant Given the Extraordinary Resilience of Coast Redwoods

The absence of objective structural testing is especially problematic because coast redwoods possess extraordinary longevity, decay resistance, and compartmentalization ability.

Ancient coast redwoods commonly survive for centuries despite:

- hollow trunks;
- extensive basal cavities;
- fire scars;
- exposed cambium;
- broken tops;
- and substantial internal decay columns.

Many old-growth redwoods containing large “goose pens” or hollow chambers remain structurally stable and biologically vigorous for generations.

Accordingly, visual evidence of cavities, hollowing, or scarring cannot reasonably be equated with imminent catastrophic failure absent rigorous structural testing demonstrating that the remaining sound wood is insufficient to maintain stability.

Here, no such rigorous testing appears to have been conducted.

To the contrary, the arborist expressly acknowledged that:
“A complete evaluation of the tree’s potential for failure would require a root collar excavation and an aerial assessment…”

That acknowledgment substantially undermines any claim that the present record constitutes substantial evidence demonstrating imminent whole-tree failure sufficient to justify irreversible removal of an ancient old-growth redwood under Ordinance 2112.

To the contrary, the arborist expressly acknowledged that:

“A complete evaluation of the tree’s potential for failure would require a root collar excavation and an aerial assessment to inspect branch attachment and angles, and to look for defects that are not readily observable from the ground.”

The report further states that the inspection was limited to visual examination and excluded climbing, excavation, probing, or coring. Id.

These disclaimers are highly significant because Ordinance 2112 requires a "demonstration" of imminent danger, not merely preliminary visual concern or generalized hazard characterization.

Moreover, the reports repeatedly rely upon speculative and conditional language, including assertions that:

- altered canopy structure "will now act as a large sail";
- changing wind exposure makes failure "more likely";
- and failure "could" cause catastrophic consequences.

Speculation regarding possible future outcomes does not constitute substantial evidence of imminent catastrophic failure under the ordinance's narrow legal standard.

IV. THE RECORD PRIMARILY IDENTIFIES LIMB-FAILURE CONCERNS RATHER THAN IMMINENT WHOLE-TREE FAILURE

A substantial portion of the application materials focus on branch-drop hazards and historical limb shedding. The application states that the tree "has a documented history of dropping large limbs onto the residence." Likewise, the arborist report emphasizes that:

- even healthy redwoods may shed limbs;
- remaining branches are large and heavy;
- and falling branches could cause injury or property damage.

However, Ordinance 2112 expressly distinguishes branch-removal activities from complete tree removal. The ordinance specifically authorizes "Cutting and removal of dead branches of redwoods for non-commercial purposes to protect public health, safety and welfare" without the need for a Special Permit.

This provision is critically important because it demonstrates that the Board of Supervisors anticipated branch-related hazards and expressly authorized limbing and pruning as mitigation measures short of complete removal.

Under ordinary principles of statutory interpretation, provisions should be interpreted harmoniously so that each retains independent meaning. If generalized branch-failure concerns alone justified complete removal of ancient redwoods, the ordinance's separate authorization for branch-removal activities would be rendered largely meaningless.

The ordinance instead establishes a clear hierarchy:

1. preserve the tree where feasible;
2. mitigate branch hazards through pruning or limbing where feasible;
3. authorize removal only upon substantial evidence demonstrating imminent whole-tree failure.

V. THE APPLICATION FAILS TO ADEQUATELY ADDRESS LESS DESTRUCTIVE MITIGATION MEASURES

The preservation-oriented structure of Ordinance 2112 necessarily requires meaningful evaluation of alternatives and mitigation measures before irreversible removal of an approximately 350–370-year-old old-growth redwood. Yet the application materials contain little meaningful analysis regarding selective crown reduction; additional limbing; cabling or structural support systems; or other arboricultural risk-reduction measures.

Instead, the reports largely assume that removal is appropriate because consequences could be severe if failure ever occurred. That reasoning improperly conflates consequence severity with imminent probability of failure. A large old-growth redwood will always present potentially serious consequences if it fails. Ordinance 2112 nevertheless adopted preservation—not convenience or generalized risk reduction—as the governing legislative policy.

VI. OLD-GROWTH COAST REDWOODS POSSESS EXTRAORDINARY LONGEVITY, DECAY RESISTANCE, AND STRUCTURAL RESILIENCE

The reports improperly imply that cavities, trunk scarring, exposed cambium, or internal decay necessarily indicate imminent structural failure in old-growth coast redwoods.

Coast redwoods (Sequoia sempervirens) are globally recognized for extraordinary longevity, resilience, and resistance to decay. Ancient redwoods routinely survive for centuries despite:

- extensive fire scars;
- hollow trunks;
- large basal cavities;
- broken tops;
- lightning damage;
- exposed cambium;
- repeated burn injuries;
- and substantial internal decay columns.

Many iconic old-growth redwoods contain large hollow cavities or “goose pens” capable of sheltering people or livestock while remaining structurally stable and biologically vigorous for centuries.

Unlike many tree species, coast redwoods possess exceptionally decay-resistant heartwood rich in tannins and other compounds that inhibit fungal decomposition. Old-growth redwoods also exhibit extraordinary compartmentalization ability, allowing ancient trees to isolate injuries and continue surviving despite major structural wounds that would be fatal in many other species.

Accordingly, the mere presence of cavities, scarring, exposed wood, or internal rot cannot reasonably be equated with imminent catastrophic failure absent rigorous structural analysis demonstrating actual near-term instability.

The reports submitted here contain no quantified analysis establishing that the observed conditions exceed the broad range of injuries and cavities commonly tolerated by ancient coast redwoods over centuries of survival.

VII. THE POST-PERMIT DEMOLITION OF THE ADU MATERIALLY UNDERMINES THE ASSERTED BASIS FOR REMOVAL

EcoRights understands that one of the structures relied upon in support of the hazard analysis was an accessory dwelling unit ("ADU") located within the purported strike zone. However, after obtaining CAL FIRE's exemption approval, the landowner reportedly demolished and burned the ADU before proceeding with tree removal. If accurate, this fact raises questions about the veracity and motivation of the applicant, and it materially alters the asserted factual basis for removal.

The elimination of one of the claimed target structures necessarily changes:

- the hazard profile;
- the number and type of occupied structures within the strike zone;
- the feasibility of mitigation measures;
- and the balancing of preservation alternatives under Ordinance 2112.

At minimum, the Planning Commission should determine:

- whether the ADU was relied upon as part of the permit justification;
- whether removal of the ADU materially reduced the asserted hazard;
- whether less destructive mitigation became feasible once the structure no longer existed;
- and whether the permit findings remained supported by substantial evidence after demolition of the structure.

VIII. GIVEN THE GENERAL PLAN'S PRESERVATION POLICIES AND THE ORDINANCE'S NARROW EXCEPTIONS, AMBIGUITIES MUST BE RESOLVED IN FAVOR OF PRESERVATION

Because Ordinance 2112 implements General Plan policies protecting mature redwoods within the Lower Redway Q-Zone, the Planning Commission's discretion is constrained by the ordinance's preservation purpose and narrow removal criteria.

The Commission is not tasked with deciding whether removal might marginally reduce future risk. Rather, the Commission must determine whether substantial evidence demonstrates that this ancient redwood is presently in imminent danger of falling such that removal is justified under the ordinance's narrow exception.

The current record does not satisfy that demanding standard.

Given:

- the ordinance's explicit preservation purpose;
- the extraordinary ecological and historical value of old-growth redwoods;

- the species' well-documented resilience and decay resistance;
- the absence of rigorous structural testing;
- the availability of less destructive mitigation measures;
- and the ordinance's express authorization for branch-removal activities without tree removal,

the Commission should deny the requested Special Permit absent substantially more rigorous and objective evidence demonstrating actual imminent whole-tree failure.

IX. THE REMAINING SURROUNDING REDWOODS AND STUMPS SHOULD BE PRESERVED TO MAINTAIN ROOT SUPPORT, WIND BUFFERING, AND STRUCTURAL STABILITY OF THE REMAINING OLD-GROWTH TREES

The Planning Commission should also recognize that old-growth coast redwoods do not function as isolated individual trees. Rather, coast redwoods evolved as interconnected forest systems characterized by overlapping root structures; mutual wind buffering; interdependent stand dynamics; and extensive stump-sprouting regeneration.

Coast redwoods possess relatively shallow root systems compared to other tree species. Rather than relying primarily upon deep taproots, redwoods commonly depend upon broad lateral root systems; root grafting; intertwined root networks; and mutual support among neighboring trees.

The applicant's arborist report repeatedly attributes increased hazard potential to changing wind exposure resulting from prior surrounding tree removals. The report states that historical tree removal has altered wind dynamics and that the remaining canopy "will now act as a large sail." Rather than supporting the removal of the remaining old growth tree, that acknowledgment directly supports preservation of remaining adjacent redwoods and stump sprout systems. Coast redwoods possess extraordinary vegetative regeneration capacity. Redwood stump sprouts commonly remain physiologically connected to parent root systems and may continue contributing to:

- soil stabilization;
- slope integrity;
- hydrologic regulation;
- root reinforcement;
- and mutual stand support.

Even after overstory removal, redwood stump sprouting often represents the natural mechanism by which grove structure and wind buffering recover over time.

Removal, grinding, poisoning, or destruction of surrounding stumps could therefore further destabilize the remaining old-growth trees on the applicant's and neighboring properties by:

- accelerating root decay;
- disrupting interconnected root systems;
- reducing soil cohesion;
- increasing erosion;
- and preventing regeneration of protective surrounding canopy structure.

This issue is especially important because the applicant's own hazard analysis relies heavily upon assertions regarding altered wind exposure caused by prior tree removals. The logical implication of that analysis is that preserving remaining adjacent redwoods and stump-sprout regeneration is necessary to avoid further destabilization of the retained old-growth tree.

Accordingly, in light of the above and the recent prior removal of four old-growth redwoods from the applicant's property without a Special Permit, the Planning Commission should not only deny a Special Permit for removing the tree at issue, it should impose conditions requiring:

- preservation of all remaining adjacent redwoods to the maximum extent feasible;
- prohibition on unnecessary removal of surrounding redwoods;
- retention of existing stumps and stump-sprout systems;
- prohibition on stump grinding or herbicide treatment;
- protection of interconnected root zones from compaction and excavation;
- and long-term monitoring of the retained old-growth tree for changes in wind exposure and structural response following any nearby tree removal.

Failure to preserve the surrounding grove structure and regenerative capacity of the site may itself create or exacerbate the very instability concerns asserted by the applicant.

X. STAFF'S "IMMINENT HAZARD" INTERPRETATION IS CONTRARY TO ORDINANCE 2112 AND UNSUPPORTED BY THE RECORD

Staff's interpretation of Ordinance 2112 improperly rewrites the ordinance's stringent protection standard for old-growth redwoods. The ordinance does not authorize removal merely because a tree presents some level of "risk," "hazard," or because an arborist recommends "immediate removal." Rather, the ordinance allows removal only upon a demonstration that the tree, due to damage or disease, is in imminent danger of falling, thus creating an immediate hazard. Staff attempts to dilute this mandatory standard by asserting that "taken literally" imminent danger "would be an event that can be predicted," and by equating any recommendation for immediate removal with proof that the tree is in imminent danger of falling. That interpretation improperly reads the critical phrase "imminent danger of falling" out of the ordinance altogether. If the Board of Supervisors had intended to allow removal whenever a tree poses elevated risk or contains defects commonly found in mature redwoods, it could have adopted a much broader "hazard tree" standard. It did not. Instead, Ordinance 2112 imposed an intentionally narrow exception designed to preserve Lower Redway's remaining old-growth redwoods unless failure is genuinely impending.

Notably, neither the RPF report nor the arborist report concludes that this tree is presently likely to fail in the immediate future. The reports identify generalized conditions such as cavities, exposed wood, root disturbance, and elevated wind exposure, but do not provide decay testing, structural load analysis, root pull testing, tomography, quantified likelihood-of-failure analysis, or any time-based assessment demonstrating imminent collapse. Indeed, the County's own cited evidence repeatedly characterizes the tree merely as a "hazard" or "safety hazard," not as a tree in imminent danger of falling. The distinction is critical because many mature old-growth redwoods possess cavities, fire scars, basal wounds, and partial rot yet remain standing for centuries. The ordinance requires evidence of imminent failure, not simply evidence that failure is theoretically possible at some undefined point in the future.

XI. ECORIGHTS AND ITS MEMBERS WERE PREJUDICED BY THE COUNTY'S FAILURE TO PROVIDE LEGALLY ADEQUATE NOTICE AND OPPORTUNITY TO COMMENT ON THE SPECIAL PERMIT APPLICATION

EcoRights has members and supporters residing within the Lower Redway Qualified Combining ("Q") Zone who did not receive legally adequate notice of the hearing despite the ordinance's express purpose of ensuring meaningful public participation regarding removal of protected redwoods.

Humboldt County Code section 8.3 provides:

"Notice of a public hearing for a development permit or variance shall be given as required by Section 65091 of the California Government Code, and as follows…"

Section 8.3.1 further requires:

"Notice shall be mailed, posted, published or otherwise provided at least ten (10) working days prior to the public hearing on the development."

This local requirement is more protective than the minimum statewide notice provisions contained in California Government Code section 65091, which generally requires notice at least ten calendar days prior to hearing. The County Code expressly states that notice must comply with Government Code section 65091 "and as follows," thereby demonstrating that the County intended the local "10 working day" requirement to supplement—not merely restate—the minimum state standard.

On June 10, the Planning Manager was notified of the noticing failure. The County admitted to its noticing mistake and attempted to cure the mistake by mailing out additional notices on that date. However, because the hearing is scheduled for June 18, 2026, the County could not cure the defective notice in time for that hearing date. On June 12, EcoRights also notified the County that it its notice efforts were legally insufficient and requested a postponement of the hearing until proper notice is given. That request has apparently been denied.

Because Ordinance 2112 implements important General Plan preservation policies and regulates irreversible removal of ancient redwoods, strict compliance with procedural safeguards and public notice requirements is essential. Meaningful public participation is especially important because old-growth trees are proposed for removal, substantial wildlife and habitat issues may be implicated, and the requested action could permanently alter the character and ecological integrity of the Lower Redway Q-Zone. The County's failure to provide legally adequate notice has prejudiced EcoRights members, nearby residents, and other interested stakeholders who were deprived of a meaningful opportunity to review the application materials, hire expert consultants, and prepare comments.

Thank you for your consideration.

Sincerely,

Fredric Evenson

Fredric Evenson
Ecological Rights Foundation

Attachments

Subject: RE: Discrepancy with County's records for Ordinance 2112
Date: Wednesday, June 10, 2026 at 3:04:12 PM Eastern Daylight Time
From: Johnson, Cliff
To: Sue M, Ford, John
CC: Adona White, Bushnell, Michelle, evenson@ecologylaw.com

Hi Susan,

Thank you for looking into this and reaching out about this. It does look like the Q zone ordinance on the County's GIS is missing a couple pages and we will correct that asap. Also, you are correct about the noticing. It looks like there is only a difference of 10 owners between the 1,000 feet and everything north, and we are sending them all a hearing notice today.

Cliff

Cliff Johnson, Planning Manager
County of Humboldt Planning and Building Department
3015 H Street
Eureka, CA 95501
(707) 268-3721

Effective July 1, 2024, the Humboldt County Planning and Building Department will reduce the in-person counter service hours. The new hours of operation will be from 8:30 a.m. to 2:00 p.m., Monday through Thursday, with the counter closed on Fridays.

From: Sue M <suesorganics17@gmail.com>
Sent: Wednesday, June 10, 2026 10:40 AM
To: Ford, John <JFord@co.humboldt.ca.us>; Johnson, Cliff <CJohnson@co.humboldt.ca.us>
Cc: Adona White <adonacwhite@gmail.com>; Bushnell, Michelle <mbushnell@co.humboldt.ca.us>; evenson@ecologylaw.com
Subject: Discrepancy with County's records for Ordinance 2112

Dear Mr Ford and Mr Johnson:

I stopped in at the Planning Department on Monday (6/8/26) and spoke with Leah. I asked about any prior versions of Ordinance 2112. She printed out 6 (3 double-sided) pages. Attached below (Fronts and Backs.) Here, Ordinance 2112 is only 2 pages. (The other 4 pages are about the zoning changes, Ordinance 1803).

However, if you go to humboldtgov.org and search on "Ordinance 2112", you will find a document with 4 unique pages (it appears to be 8 pages, but it's really only 4, they're duplicated). (Attached as Ord2112-Complete) The version Leah gave me is missing 2 pages.

Of particular interest, the "complete" version (Item 5 on the second page) includes information that states that all property owners north of Briceland Road must be notified if an applicant is on the north side of Briceland Road, not within 1000', as were recently notified by the county.

I'm not sure if we want to stop the process to get this corrected, or proceed.

Thank you for timely attention to this matter,
Susan Moloney

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ANSI A300 (Part 9)-2011 Tree Risk Assessment
a. Tree Structure Assessment

American National Standard

for Tree Care Operations –

Tree, Shrub, and Other Woody Plant Management –Standard Practices (Tree Risk Assessment a. Tree Structure Assessment)

ANSI A300 (Part 9)-2011 Tree Risk Assessment
a. Tree Structure Assessment

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ANSI A300 (Part 9)-2011
Tree Risk Assessment a. Tree Structure Assessment

American National Standard
for Tree Care Operations –

Tree, Shrub, and Other Woody Plant Management – Standard Practices *(Tree Risk Assessment a. Tree Structure Assessment)*

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Tree Care Industry Association, Inc.

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136 Harvey Road – Ste 101
Londonderry, NH 03053
800-733-2622
603-314-5380
Fax: 603-314-5386
E-mail: Rouse@tcia.org
Web: www.tcia.org

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Contents

Foreword (This foreword is not part of the A300 Part 9 American National Standard)

ANSI A300 Standards are divided into multiple parts, each focusing on a specific aspect of woody plant management (e.g. Pruning, Soil Management, Supplemental Support Systems, etc).

These standards are used to develop written specifications for work assignments. They are not intended to be used as specifications in and of themselves. Management objectives may differ considerably and therefore must be specifically defined by the user. Specifications are then written to meet the established objectives and must include measurable criteria.

ANSI A300 standards apply to professionals who provide for, or supervise the management of, trees, shrubs, and other woody landscape plants. Intended users include businesses, government agencies, property owners, property managers, and utilities. The standard does not apply to agriculture, horticultural production, or silviculture, except where explicitly noted otherwise.

This standard has been developed by the Tree Care Industry Association (TCIA), an ANSI-accredited Standards Developing Organization (SDO). TCIA is secretariat of the ANSI A300 standards, and develops standards using procedures accredited by the American National Standards Institute (ANSI).

Consensus for standards writing was developed by the Accredited Standards Committee on Tree, Shrub, and Other Woody Plant Management Operations – Standard Practices, A300 (ASC A300).

Prior to 1991, various industry associations and practitioners developed their own standards and recommendations for tree care practices. Recognizing the need for a standardized, scientific approach, green industry associations, government agencies and tree care companies agreed to develop consensus for an official American National Standard.

The results – ANSI A300 standards – unify and take authoritative precedence over all previously existing tree care industry standards. ANSI requires that approved standards be developed according to accepted principles, and that they be reviewed and, if necessary, revised every five years.

TCIA was accredited as a standards developing organization with ASC A300 as the consensus body on June 28, 1991. ASC A300 meets regularly to write new, and review and revise existing, ANSI A300 standards. The committee includes industry representatives with broad knowledge and technical expertise from residential and commercial tree care, utility, municipal and federal sectors, landscape and nursery industries, and other interested organizations.

Suggestions for improvement of this standard should be forwarded to: ANSI A300 Secretary, c/o Tree Care Industry Association, Inc., 136 Harvey Road - Suite 101, Londonderry, NH 03053.

ANSI A300 (Part 9)-2011 Tree Risk Assessment a. Tree Structure Assessment was approved as an American National Standard by ANSI on February 17, 2011. ANSI approval does not require unanimous approval by ASC A300.

(Continued)

The ASC A300 committee had the following members as of February 17, 2011:

Tim Johnson, Chair
(Artistic Arborist, Inc.)

Bob Rouse, Secretary
(Tree Care Industry Association, Inc.)

Organizations Represented	Name of Representative
Alliance for Community Trees	*Michael Galvin* *Alice Ewen (Alt.)*
American Nursery and Landscape Association	*Warren Quinn* *Craig J. Regelbrugge (Alt.)*
American Society of Consulting Arborists	*Jerry Pulley* *Stephen Miller (Alt.)*
American Society of Landscape Architects	*Ron Leighton*
Asplundh Tree Expert Company	*Geoff Kempter* *Peter Fengler (Alt.)*
Bartlett Tree Expert Company	*Peter Becker* *Dr. Thomas Smiley (Alt.)*
Davey Tree Expert Company	*Joseph Tommasi* *Grant Jones (Alt.)*
International Society of Arboriculture	*Bruce Hagen* *Sharon Lilly (Alt.)*
National Park Service	*Vacant (Robert DeFeo – Observer, designated voter)*
Professional Grounds Management Society	*Thomas Shaner*
Professional Land Care Network	*Bill Brinn*
Society of Municipal Arborists	*Gordon Mann* *Nolan Rundquist (Alt.)*
Tree Care Industry Association	*Dane Buell* *James McGuire (Alt.)*
USDA Forest Service	*Keith Cline* *Ed Macie (Alt.)*
Utility Arborist Association	*Matthew Simons* *William Rees (Alt.)*

Additional organizations and individuals:
Guy Meilleur-American Forests (Observer)
Peter Gerstenberger (Observer)
Sabeena Hickman (Observer)
Andy Hillman (Observer)
Myron Laible (Observer)
Beth Palys (Observer)
Richard Rathjens (Observer)
Mary Reynolds (Observer)
Richard Roux (NFPA-780 Liaison)
Don Zimar (Observer)

ASC A300 mission statement:

Mission: To develop consensus performance standards based on current research and sound practice for writing specifications to manage trees, shrubs, and other woody plants.

American National Standard for Tree Care Operations –

Part 9 – Tree risk assessment a. tree structure assessment

Subclauses 1.1 to 1.3 excerpted from ANSI A300 (Part 1) Pruning.

1 ANSI A300 standards

1.1 Scope

ANSI A300 standards present performance standards for the care and management of trees, shrubs, and other woody plants.

1.2 Purpose

ANSI A300 performance standards are intended for use by federal, state, municipal and private entities including arborists, property owners, property managers, and utilities for developing written specifications.

1.3 Application

ANSI A300 performance standards shall apply to any person or entity engaged in the management of trees, shrubs, or other woody plants.

90 Part 9 – Tree risk assessment standards

90.1 Purpose

The purpose of this clause is to provide guidelines for the practice of tree risk assessment and standards for writing specifications.

90.2 Reason

To assess structural integrity and other factors that affect the level of risk to people or property and to provide information for mitigating risk.

90.3 Implementation

90.3.1 Specifications for tree risk assessment and mitigation should be provided by an arborist competent in tree risk assessment.

90.3.2 Tree risk assessment specifications shall be adhered to.

90.4 Safety

90.4.1 This performance standard shall not take precedence over applicable industry safe work practices.

90.4.2 Performance shall comply with applicable Federal and State Occupational Safety and Health Administration (OSHA) standards, ANSI Z133, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Federal Environmental Protection Agency (EPA) regulations as well as state and local regulations.

91 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. All standards are subject to revision, and parties to agreements based on this American National Standard shall apply the most recent edition of the standards indicated below.

ANSI Z133, *Arboriculture – Safety requirements*

29 CFR 1910, General industry[1]

29 CFR 1910.268, Telecommunications[1]

29 CFR 1910.269, Electric power generation, transmission and distribution[1]

29 CFR 1910.331 - 335, Electrical safety-related work practices[1]

92 Definitions (Definitions are considered part of the ANSI A300 Part 9 standard)

92.1 aerial assessment: An assessment of all or part of the crown from a position aloft.

92.2 aerial patrol: An assessment of a tree or a population of trees conducted from a helicopter, fixed-wing plane, satellite, or other means.

92.3 arborist: An individual engaged in the profession of arboriculture who, through experience, education and related training, possesses the competence to provide for, or supervise the management of, trees and other woody plants.

92.4 arborist trainee: An individual undergoing on-the-job training to obtain the experience and the competence required to provide for, or supervise the management of, trees and woody plants. Such trainees shall be under the direct supervision of an arborist.

92.5 buttress roots: Roots at the trunk base that help support the tree and equalize mechanical stress.

92.6 controlling authority: An agency, organization, or corporate entity with the legal authority and/or obligation to manage individual trees or tree populations.

92.7 crown area: Crown surface area in profile relative to overall height and/or original or expected spread for that species under similar conditions. See live crown ratio.

92.8 crown density: The amount, compactness, or depth of foliage of a tree crown.

92.9 crown symmetry: The distribution of branches relative to the trunk.

92.10 failure (tree failure): Breakage of stem or branches, or loss of mechanical support in the root system.

92.11 included bark: Bark that becomes embedded in a union between branches or stems.

92.12 live crown ratio: Live crown height relative to overall plant height.

92.13 mitigation: The process of diminishing risk.

92.14 patrol: A tree condition assessment conducted, as specified, by foot, vehicle, or from aircraft or satellite.

92.15 pneumatic soil excavation: The removal of soil using pressurized air.

92.16 reaction wood: Wood formed in response to the effects of mechanical stress or loading.

92.17 residual risk: Risk remaining after mitigation.

92.18 risk: Combination of the probability of an event and its consequence.

92.19 risk analysis: Systematic use of information to identify and estimate risk.

92.20 risk assessment: Overall process of risk analysis and risk evaluation.

92.21 shall: As used in this standard, denotes a mandatory requirement.

92.22 should: As used in this standard, denotes an advisory recommendation.

92.23 site history: An account of management practices, changes, events, or disturbances that have occurred at a site.

92.24 sounding: The process of striking a tree with a mallet or other appropriate tool and listening for tones that indicate certain defects.

92.25 specifications: A detailed, measurable plan or proposal for performing a work activity or providing a product, usually a written document.

92.26 standard, ANSI A300: The performance parameters established by industry consensus as a rule for the measure of extent, quality, quantity, value or weight used to write specifications.

92.27 structural defect: A feature, condition, or deformity of a tree or tree parts that indicates a weak structure and contributes to the likelihood of failure.

92.28 target: People or property that could be injured or damaged by the failure of a tree or tree parts.

92.29 tree risk: The likelihood and consequences of failure of tree or tree parts.

92.30 tree risk assessment: A systematic process used to identify, analyze and evaluate tree risk.

93 Tree structure assessment practices

93.1 Tree structure assessment objectives

The objective shall be defined based on context, the intended use of the site, and scope of the assignment.

93.2 General

93.2.1 Arborists assessing tree structure and failure potential shall have appropriate training and experience.

93.3 Scope of work

93.3.1 The arborist should perform tree structure assessments on only those trees specifically identified in the scope of work.

93.3.2 The scope of work specification should include, but is not limited to:
1) Tree location, selection criteria;
2) Level and details of risk assessment;
3) Type of report (e.g. oral, written) to be developed;
4) The time frame for reporting;
5) To whom the report should be presented; and,
6) Mitigation.

93.3.3 The arborist shall not be required to perform a higher level of assessment than specified by the scope of work.

93.4 Levels of tree risk assessment

93.4.1 The level and detail of tree risk assessment shall be specified.

93.4.2 One or more of the following inspection levels shall be specified:

93.4.2.1 Level 1

93.4.2.1.1 Level 1 assessments shall be a limited visual assessment of an individual tree or a population of trees near specified targets, such as along roadways or utility rights-of-way, to identify specified conditions or obvious defects.

93.4.2.1.2 Level 1 assessments shall be from a specified perspective such as foot, vehicle, or aerial patrol.

93.4.2.1.3 Level 1 assessment methodology shall be specified.

93.4.2.2 Level 2

93.4.2.2.1 Level 2 assessments shall include a 360-degree, ground-based visual inspection of the tree crown, trunk, trunk flare, above-ground roots, and site conditions around the tree in relation to targets.

93.4.2.2.1.1 When sounding is specified, a mallet or equivalent tool should be used to detect large hollows and loose bark in the trunk, root collar, and above ground buttress roots.

93.4.2.2.2 Use of hand tools, trowels, binoculars, or probes, shall not be precluded from a Level 2 assessment.

93.4.2.2.3 An assessment shall include the identification of conditions indicating the presence of structural defects.

93.4.2.3 Level 3

93.4.2.3.1 Level 3 assessments shall include all Level 2 requirements.

93.4.2.3.2 A level 3 assessment employing advanced methodologies should be used when the extent and severity of conditions or defect cannot be determined by a Level 2 assessment.

93.4.2.3.3 Level 3 assessments shall include, but are not limited to, one or more of the following tree assessment methods:

- Aerial assessment of branch or stem defects;
- Drilling;
- Evaluation of target risk;
- Increment boring;
- Investigation of tree or site history related to possible or defined defects;
- Lean assessment;
- Probing;
- Pull testing;
- Radiation assessment (e.g. radar, x-ray, gamma ray);
- Resistance drilling;
- Sonic assessment;
- Sounding; and,
- Sub-surface root and/or soil assessment.

93.4.2.3.4 Tools and work practices that damage the tree beyond the scope of normal work practices shall be avoided.

93.5 Target identification

The arborist should consult with the owner, owner's agent, or controlling authority to assess known and foreseeable targets (static target, transient target, or moveable target) within likely striking distance of the specified tree(s) or tree parts.

93.6 Risk analysis and reporting

93.6.1 The analysis of the assessment data should include one or more of the following as appropriate to the level of assessment:

Specified objectives;
Tree species;
Tree condition;
Type, severity, and location of defect(s);
Presence or absence of reaction wood and compensatory growth;
Live crown ratio and crown density;
Site conditions and characteristics;
Site and maintenance history;
Past failure patterns;
Local weather, climatic events; and,
Risk mitigation.

93.6.2 The type of report (oral, written) required shall be specified in the scope of work.

93.6.2.1 Written reports should include:

Identification and location of the specified tree(s);
A description of the methods used;
Tree risk assessment data;
Recommendations for mitigating risk or additional assessments; and,
Recommendations for monitoring and follow-up.

93.6.2.1.1 All recommendations other than removal of the tree should contain an advisory that not all potential structure and stability concerns associated with trees can be eliminated.

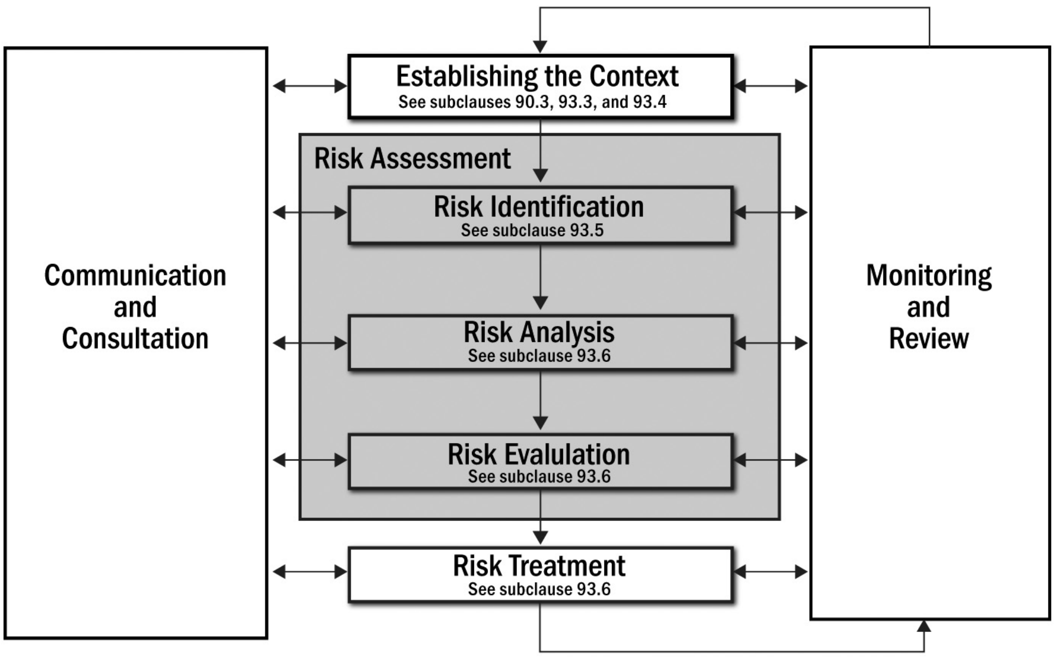
93.6.2.1.2 All recommendations should include a statement addressing residual risk following mitigation.

93.6.3 Monitoring and follow-up recommendations should be made based on the objective and the outcome of the mitigation.

93.6.4 Owner determination

93.6.4.1 It shall be the responsibility of the owner, the owner's agent, or the controlling authority to schedule repeat or advanced assessments, determine actions, and implement follow-up recommendations, monitoring, and/or mitigation.

Annex A – Risk assessment flow chart
(This annex is not part of the ANSI A300 Part 9 standard.)



This flow-chart adapted for ANSI A300 Part 9 Annex from an original flow chart published in ISO/IEC 31010-2009 Risk management – Risk assessment techniques international standard. Visit www.ansi.org or www.iec.ch for more information or to order.

Annex B – Tree structure assessment checklist
(This annex is not part of the ANSI A300 Part 9 standard.)

B-1 Visual tree assessments may include, but are not limited to:

- **1)** Dead parts
- **2)** Weakly attached branches and codominant stems
  - Broken hanging branches
  - Branch aspect ratio
  - Included bark
  - Multiple branches at one point
  - Epicormic branches and shoots
- **3)** Codominant stems
  - Included bark
- **4)** Cracks into or through the wood; ribs, seams
- **5)** Wood decay
  - Missing or decayed wood
  - Potential indicators of decay
  - Abnormal growth patterns
  - Positive indicators of decay
  - Cavities and other openings
  - Fungal fruiting structures
  - Carpenter ants
  - Termites
- **6)** Cankers
- **7)** Tree architecture
  - Unusual tree architecture or taper
  - Live crown ratio
  - Height to diameter ratio
  - Lean
  - Branch distribution
  - Crown position – dominant, codominant, intermediate, suppressed
- **8)** Root and Root collar
  - Severed
  - Decay
  - Restrictions to growth
  - Girdling
  - Root plate lifting, soil cracks
  - Undermined
  - Broken
  - Basal flare
  - Related soil issues

B-2 Decay assessments may include, but are not limited to:

- **1)** Sounding for bark separation and wood hollows
  - Mallets
- **2)** Probing for decay
  - Increment borer
  - Small diameter drill bits
  - Resistance recording drill
- **3)** Sonic measurements
  - Two point sonic devices
  - Multipoint sonic devices - Picus tomography
- **4)** Other methods under development
  - Radar, tree and soil applications

Thermograph
X-ray, gamma ray

5) Root collar and root inspection
6) Aerial inspection
7) Pull testing
8) Modeling wind pattern and force – Wind Rose
9) Interpreting results of advanced assessment

Weather extremes – wind, snow, and ice levels that trees can withstand
Stem and branch strength loss/decay formula
Asymmetric decay
Guideline for action
Root loss assessment

PiCUS Tree Tomography Methods at a Glance

argus electronic gmbh
Erich-Schlesinger-Straße 49d
18059 Rostock
Germany
www.argus-electronic.de
www.picus-info.com

1. Overview

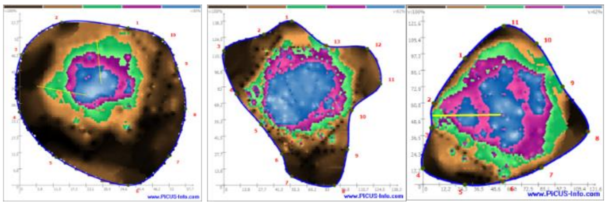
Currently there are two tomographic methods available for trees: Sonic Tomography (SoT) and Electric Resistance Tomography (ERT). Both methods use different physical ideas and thus, do show different information of the tree. SoT gives information about the integrity of the mechanical structure of the wood while ERT shows – so to say – “chemical” information.

Both methods do have advantages and limitations. SoT for instance suffers from cracks in the tree that do interfere with the acoustic waves sent through the trunk.

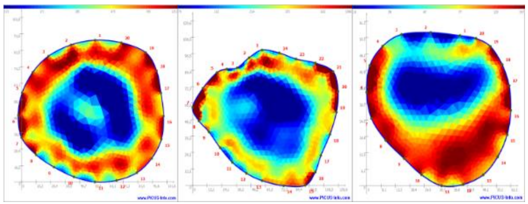
Combining both SoT and ERT method we can overcome those limits and derive more and better conclusions about the tree. In particular it is possible to:

- Finding out about the **type of a defect**: what are we looking at in the tomogram: is it a hollow, or decay or just a crack?
- What **stage of decay** is in the tree: incipient or advanced or old?
- Measuring the **size of the defect more precisely**.
- Detect **decay below ground level**
- Avoid wrong conclusions!

This document briefly describes how SoT and ERT work on trees and how the results can be understood.



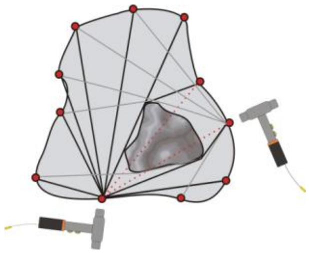
Sonic Tomograms

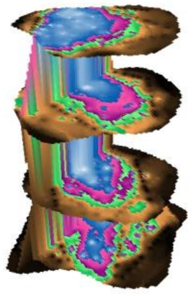


Electric Resistance Tomograms

2. Sonic Tomography (SoT)

Sonic Tomographs are instruments that detect decay and cavities in standing trees non-invasively. The instruments measure the velocity of sound waves in wood. The acoustic velocity depends on the modulus of elasticity and the density of the wood itself. Most damage and disease causes fractures, cavities, or rot and reduces the wood's elasticity and density.

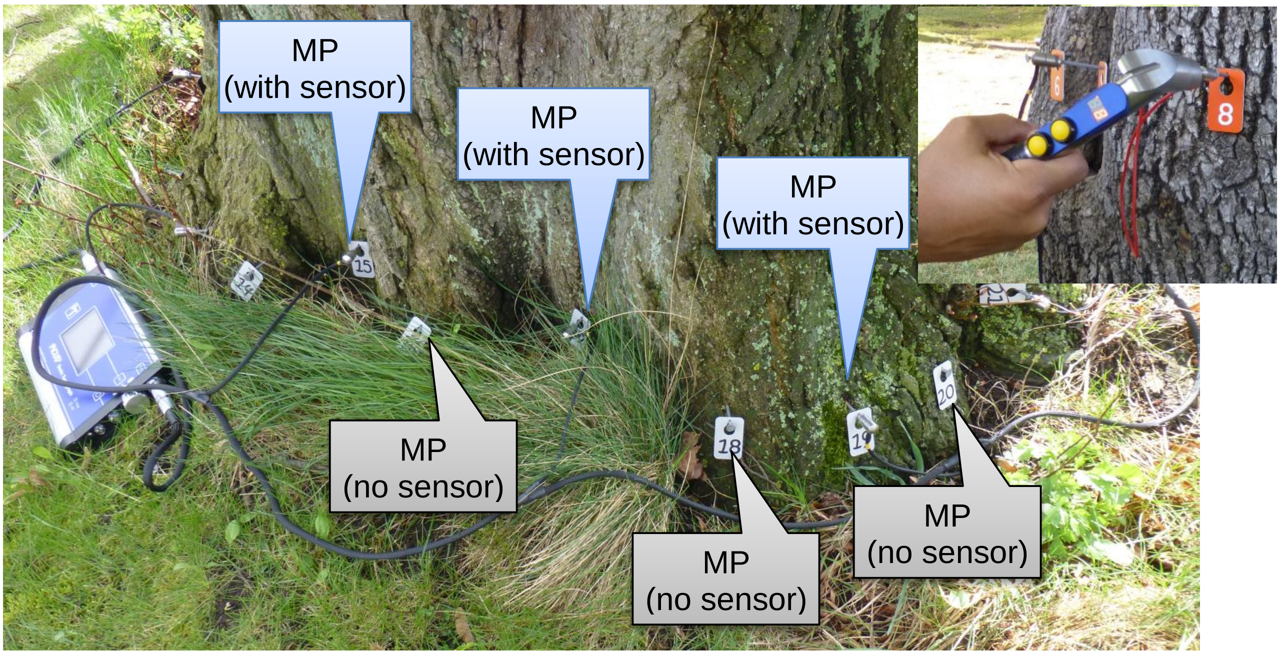




The sketch displays the basic working principle, in that sound waves cannot take a direct path through the wood (red dotted line) if there is a cavity between the transmitter and receiver.

The acoustic waves are created manually with a little hammer, sonic sensors (receivers) record the signals. Little pins are used for coupling the sensors to the wood. Number and positions of the test points are critical to the accuracy of the scan.

The PiCUS technology differentiates between sensors and measuring points (MP). A MP is a simple nail. For a PiCUS scan a virtually unlimited number of measuring points (nails) can be used because of that technology. The photo below shows a setup of 12 sensors on 24 MP. The electronic hammer can create sonic signals on all 24 MP!



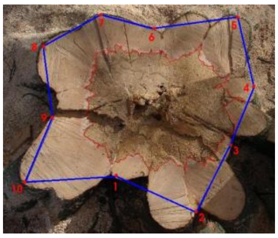
PiCUS 3 on a *tilia cordata* tree

2.1. How to record a sonic tomogram

Taking sonic measurements involves four basic steps:

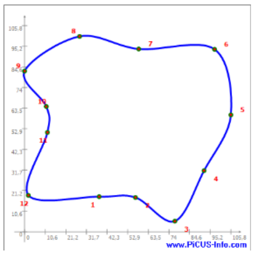
1. **Determine the level, number and positions of measuring points**
   Care must be taken when selecting the level of tomography and the locations of the measuring points (MP). Inappropriate MP locations may lead to inaccurate tomograms.

2. **Measure the geometry of the tree at the level you are working at**



Cross section of a tree

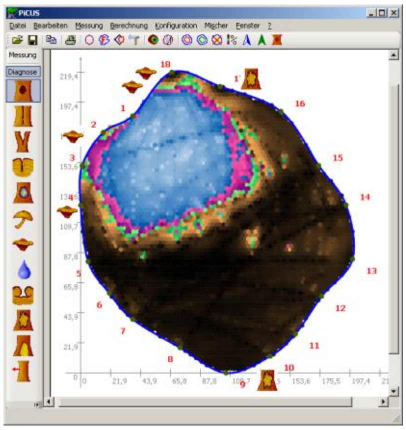
Using Triangulation method and electronic calipers to measure positions of all MP



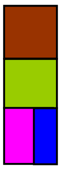
Graphic representation of that measurement in PC program

3. **Take the sonic measurements**

Each measuring point (nail) is tapped with the electronic hammer in order to create sonic waves.



4. **Calculate the tomogram, Interpretation**
   The tomograph main unit itself or the PC calculates the sonic tomogram when all readings have been taken. The tomogram shows the relative and apparent ability of the wood to transmit acoustic waves. Different colours display the various properties of the wood:



Areas of good wood, where the fastest velocities can be found, are represented in (dark) browns. The meaning of green varies according to the defect. It often describes the distance between healthy and damaged wood, but can also indicate early fungus infection. Violets and blues represent damaged areas.

2.2. Advantages of the PiCUS Tomograph

- Extremely **quick tapping**
- **Less cables**: sensors are assembled to a sensor-cable-harness
- **Unlimited number of measuring points**: 10, ... 15, … 20, … 50
- **Sensors are small** land light-weight: pins are not deep in the wood. Pin diameter < 3 mm!
- **No special pins needed**, regular nails from hardware store work well. No extra after-sales costs!!!
- New **compact system design**: just one main control unit, no extra sensor-supply boxes

- **Low weight** of the tomograph, approx. 4 kg only! All gear fits into a small shoulder bag if needed. Ruggedized transportation case is supplied.
- **NO PC** needed in the field. Can operate the entire tomography scan with or without PC
- Preview sonic tomogram shown on screen on-site
- **Three-point-measurements** (no PC needed) to quick-test the tree to help to decide whether a full tomogram is needed
- Main control unit saves scans on non-volatile memory.
- **Inbuilt GPS**
- Inbuilt semi-automatic **tree height measurement**
- **Precise and fast geometry** of any tree using triangulation functions and PiCUS calliper

Left: Tomography in rain – the operator needs to be protected. The sensors? Not so much.
Middle: Tomography in the tropics in Panama.
Right: Ruggedized transportation case.

3. Electric Resistance Tomography (ERT)

Electrical Resistance Tomographs using electric current/voltage to examine the tree. The resulting measurements are displayed in a two-dimensional map showing the apparent electrical resistance of the wood, called an *Electrical Resistance Tomogram* (ERT).

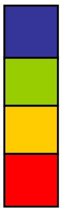
The electric resistance of the wood is influenced most of all by the

- water content
- chemical elements which change according to the status of wood and
- cell structure: reaction wood or roots do have different resistances compared to “normal wood”

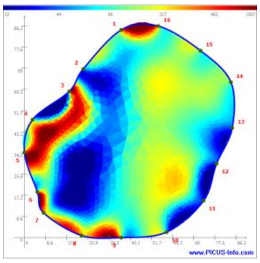
When used in **combination with a Sonic Tomograph**, an ERT offers you more information about the tree:

- distinguish between different types of damage (for instance crack/cavity vs. decay) in many cases
- detect early stages of decay
- get information about areas above or below the measuring level. This is interesting for analysing root decay problems.

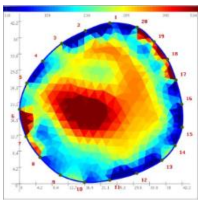
In order to analyse an ERT, the operator will need knowledge about the specific type of tree species. **Each species has its own typical resistance** (water/moisture) **distribution**.
The ERT are coded with rainbow colours:



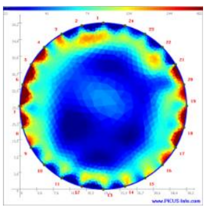
Blues indicate areas of low resistance (high water content, etc.)
Greens and yellows show increasing resistance
Red colours indicate areas of high resistance (lower water content, etc.)



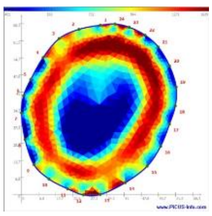
How to read resistance tomograms
The main aspect of interpreting ERTs is the distribution of high and low conductive areas. You are looking to see where high resistance is and where low resistance is. This information needs to be compared with the normal resistance distribution in sound trees of this particular species. The interpretation of the ERT is most accurate when done in combination with the SoT. So far we have identified **three types of typical resistivity distributions** in trees.



ERT type 1



ERT Type 2

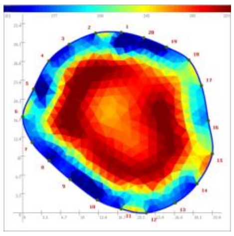


ERT Type 3

The table below shows general rules of interpretation for *ERT Type 1* trees. *ERT Type 1* trees usually have lower resistance (blue in ERT) in the sapwood on the edge and high resistance in the heartwood (red in ERT) in the centre:

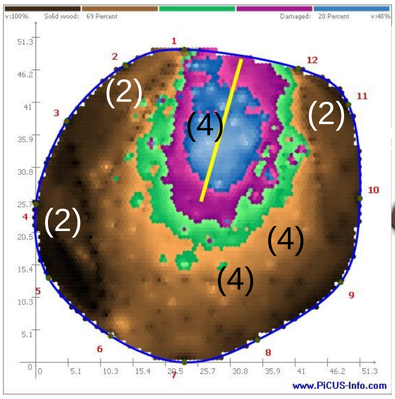
The table helps to evaluate the **centre** of the tree

SoT **Sonic velocity [m/s]**	**ERT** **Resistivity [Ω*m]**	**Conclusion**
High (brown)	High (red)	Healthy
High (brown)	Low (blue)	Still safe, but early decay
Low (blue/violet)	High (red)	Cavity / dead decay
Low (blue/violet)	Low (blue)	Active decay



3.1. Example 1: Different stages of decay

The example shows a Linden tree with decay and cavity. Linden trees belong to ERT type 1. Areas shown in brown colours show high sonic velocity (= sound wood), areas in blue/purple show decay or the cavity.



Sonic Tomogram (SoT)

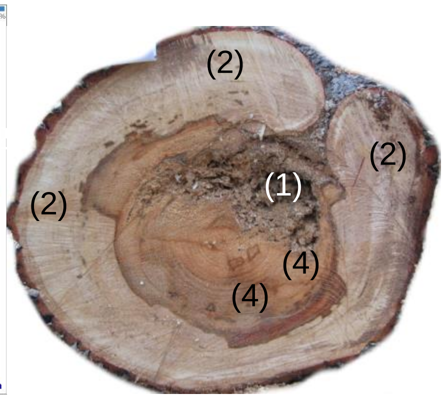
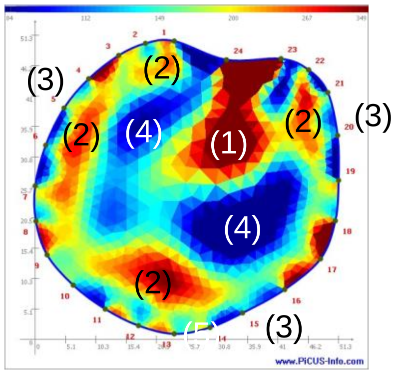


Photo of cross section



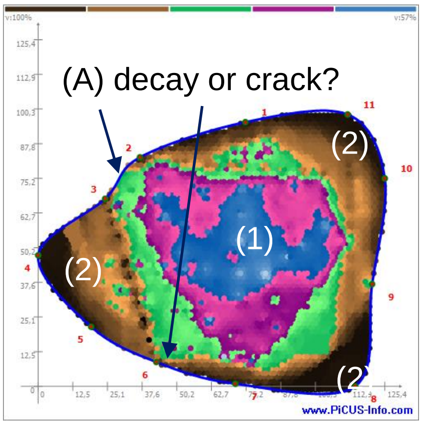
Electric resistance tomogram

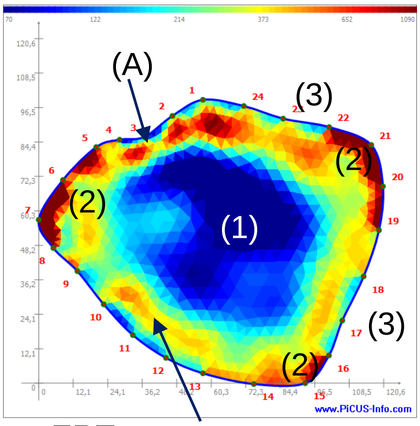
(1) Low V*) and high R*): Cavity, or dead dry wood
(2) High V and medium R: sound wood
(3) Low R at the very edge: normal sapwood.
(4) Medium V and Low R: active decay but wood is still relatively dense

*) V = velocity, R = Resistance

3.2. Example 2: decay or crack?

The example shows a *castanea sativa* in Rostock. The SoT seems to show that the left part of the tree is separated from the right part. What is the reason for the separation – decay breaking through or just a bark inclusion (crack) at positions (A)?





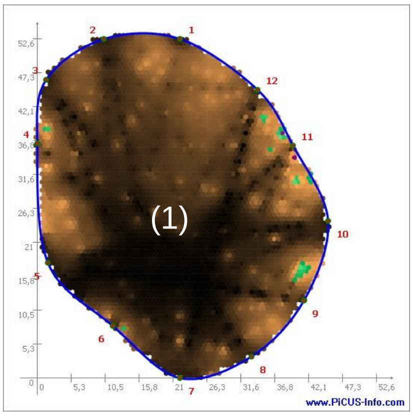
SoT ERT (A)

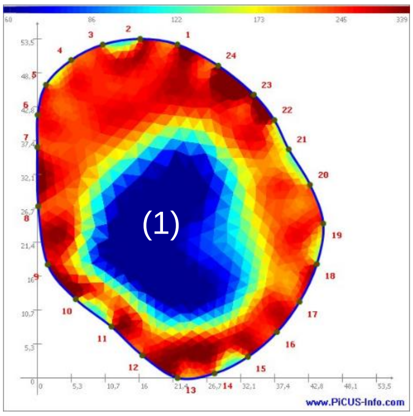
(1) Low V*) and low R*): advanced wet
(2) High V and high R: sound wood
(3) Low R at the very edge: normal sapwood.

The wood near (A) does not transmit acoustic waves well. But the material has a high R. Thus, there is no decay! It is a "regular" bark inclusion!
The ERT shows the size of the defect more precisely than the SoT due to the bark inclusions. All red/yellow area will be good material! The defect is a little smaller than the SoT shows.

3.3. Example 3: incipient decay

The SoT of the linden tree in this example does not show a problem. However, the electric resistance of the wood is already changed due to incipient decay like the ERT proves.





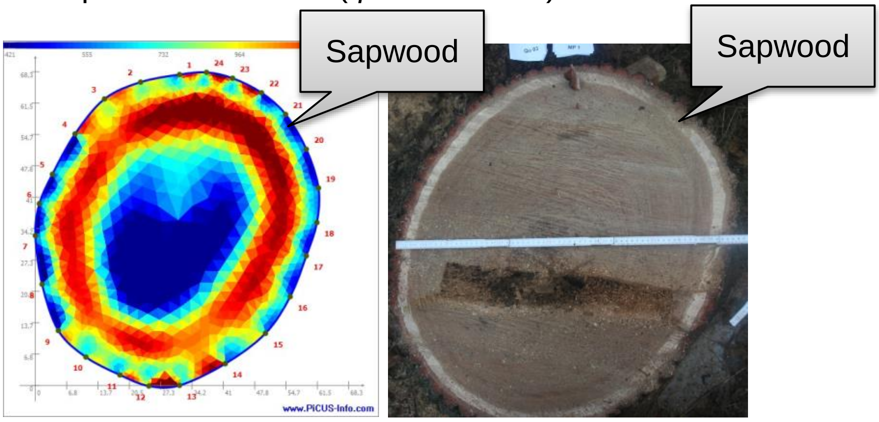
SoT ERT

(1) High V*) and low R*): still good sonic propagation but wet! Incipient decay.

*) V = velocity, R = Resistance

3.4. Example 4: Detecting hardwood/sapwood using ERT

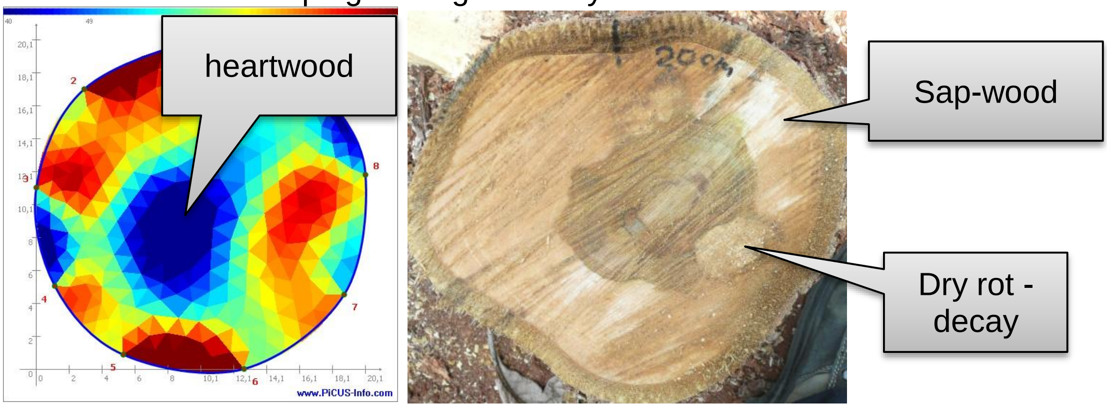
Some tree species develop a distinct sapwood area. If the resistance of the sapwood is different from the rest of the tree then the ERT can measure the thickness of that layer. The example shows an oak (*quercus robur*).



ERT (120 cm above ground) Stump (20 cm)

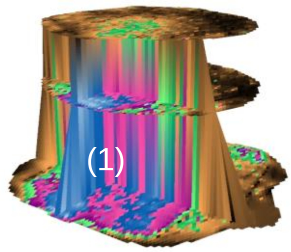
3.5. Example 5: Detecting hardwood/sapwood in teak (tektona grandis)

Teak wood develops a distinct heartwood, which is the most valuable part of the wood. The electric resistance of that heartwood is apparently low. The example shows a teak tree in Mexico that is developing a dangerous dry rot.

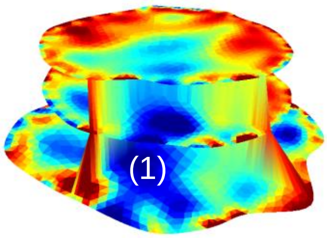


4. 3D Scans

The most accurate way of getting 3D information of trees is to record several levels and calculate the 3D image of the tree. The example below shows a beech tree with *ganoderma* infection. The SoT shows little damage in the 3ed level, but the blue colour in the ERT (low resistance) indicates wet material – an early stage of the fungus.



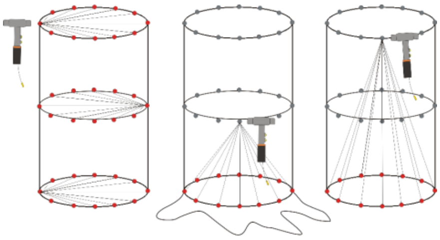
SoT



ERT

(1) Slow V + low R = active fungus

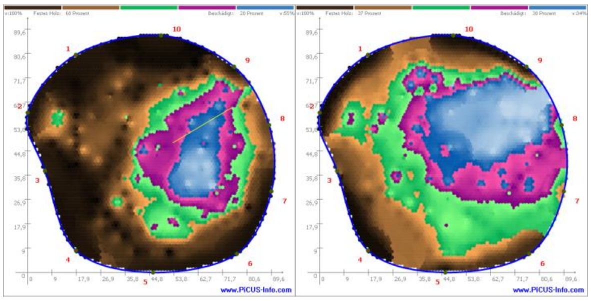
The sketches below show options to record 3D acoustic data. Red dots represent sonic sensors, grey dots are the measuring points - “just” nails. Because of the unlimited number of measuring points (the nails) – the data can be collected in many different configurations.



Data collection options for sonic scans.

5. Timelines

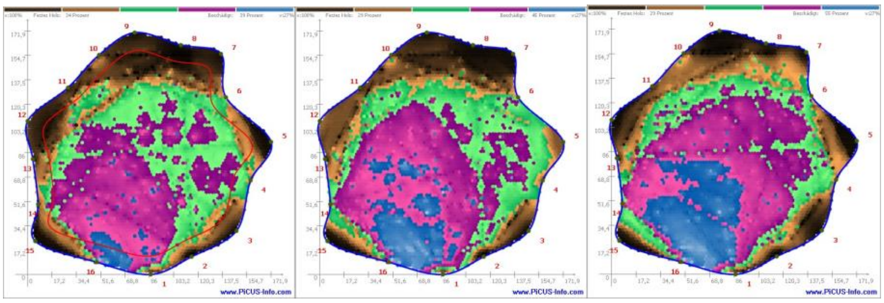
Trees can be tomographed every couple of years to find out about the progress of a decay. When doing so it is important to use the same MP-positions all the time.



SoT 2007 20110

The example shows the progress of a fungus infection in a beech tree. The tree was tested in 2007 and in 2011.

The fast progression of the decay does not inspire confidence about the future of that tree.



SoT 2006 2008 2010

Tomograms of an oak. The size of the damaged area seems to stay constant. Apparently the tree did find a way to stop the fungus growing into good wood.

6. Contact information

argus electronic gmbh
Erich-Schlesinger-Straße 49d
18059 Rostock
Germany
Tel.: +49 (0) 381 / 49 68 14 4-0
e-mail : lothar.goecke@argus-electronic.de

www.argus-electronic.de

Tree diagnosis

Assessment of traffic safety

Protecting people from trees, or protecting trees from people? This is the question tree experts and the relevant authorities are often confronted with. The decisions to make are often difficult. The most frequent urban stress factors suffered by trees are damages resulting from road works, car accidents, soil compaction, vibration, air pollution, de-icing salt, etc. They result in damages at and to trees, such as frequent rotting or instability, which threaten not only their own survival but may also become dangerous for people.

The RINNTECH concept

Any tree examination initially requires a detailed visual inspection of the tree including its root, trunk/stem, crown and location. If the visual inspection and diagnosis of the tree is not sufficient to judge the traffic safety of trees or to provide objective evidence of findings, we use the following technical methods, depending on the requirements of the individual case:

- Tree tomography using the ARBOTOM®
- Root diagnosis using the ARBORADIX™
- Drill resistance measurement using the RESISTOGRAPH®
- DYNATIM™ load analyses

Using these methods, we can determine the inner status of trees and draw conclusions as to their breakage safety and their stability. They are often applied in various steps.

Recording the vitality, growth, and damages

The tree ring structure often provides the answer to the question as to what has damaged or killed a tree, and who is responsible.

The RINNTECH concept

After a visual inspection of the tree status, we perform anatomic investigations and tree ring analyses using LINTAB™ and TSAP™. Pointer years and sudden changes in growth trends are clear indications of external stress factors. In many cases, only an increment analysis can tell whether or not a tree still is sufficiently vital, and whether it still makes sense to invest money into arboricultural care.

VIDEO

The ARBOTOM® in use:

Watch a report on SWR TV.

Play

MORE INFORMATION

For more information, please refer to the following documentations.

ARBOTOM® documentationRESISTOGRAPH® documentation

Current software

Windows:

ARBOTAX (Version 3.05)

ARBOTAX (Version 2.53)

ARBOTOM (Version 4.02)

ARBOTOM (Version 3.42)

ARWILO Win (Version 4.08)

DECOM (Version 3.18)

DECOM (Version 2.38n)

DynaTim (Version 5.03)

DynaTim (Version 4.28)

LignoVision (Version 2.13)

LignoVision (Version 1.55)

TSAP (Version 4.89)

ArboStApp (Version 1.49)

TuboCalc (Version 1.09)

Android:

RESISTOGRAPH 2

***by downloading you agree to our GTCT/ AGB**

blackmaplelandscap · Oct 7, 2025 · 3 min read

Understanding the Importance of Root Collar Excavation for Healthy Trees

Trees are essential to our environment. They provide shade, enhance the beauty of our landscapes, and support wildlife. Sadly, many trees face health challenges stemming from inadequate planting and maintenance techniques. One often neglected practice is root collar excavation. This article explores the importance of root collar excavation and how it maintains tree health.

What is Root Collar Excavation?

Root collar excavation involves the careful removal of soil and debris from around the root collar of a tree. The root collar is the area where the trunk meets the roots, and it significantly affects the tree's health. Over time, soil can build up around this area, causing various issues such as root rot and reduced nutrient uptake.

By excavating the root collar, arborists can access the root system, improving air circulation and moisture retention. This practice not only helps identify existing problems but also prevents future health concerns.

Why is Root Collar Excavation Important?

Preventing Root Rot

One of the key reasons for conducting root collar excavation is to prevent root rot. When soil collects around the root collar, it creates a damp environment conducive to fungal growth. An estimated **15%** of trees affected by root rot die due to the condition. By excavating the root collar, arborists can remove excess soil and lower the risk of rot, allowing trees to thrive.

Enhancing Nutrient Uptake

Trees need various nutrients to grow healthy and strong, with the root collar playing a vital role in this process. When soil is piled high, it can suffocate roots and hinder their ability to absorb essential nutrients. Excavating the root collar enhances access to the root system, enabling trees to take in nutrients effectively. Studies show that trees receiving proper nutrient intake can grow **25-30%** faster than those lacking key resources.

Improving Air Circulation

Air circulation is critical for the health of a tree's root system. Soil compacted around the root collar can limit airflow, leading to harmful conditions for roots. By excavating the root collar, arborists can improve air circulation, creating a healthier environment for root growth. Increased airflow can reduce the risk of diseases by as much as **40%**, encouraging robust root development.

Aiding in Tree Assessment

Root collar excavation is fundamental for evaluating a tree's overall health. By exposing the root collar, arborists can inspect roots for signs of disease, damage, or decay. For instance, uncovering the roots can reveal issues like girdling roots that hinder growth. This assessment is essential for making informed decisions regarding tree care, including treatments or the potential need for removal.

How is Root Collar Excavation Performed?

Step 1: Preparation

Before starting the excavation, arborists evaluate the tree and its surroundings. This assessment includes checking the tree's health, identifying visible problems, and deciding on the appropriate approach.

Step 2: Excavation

Using specialized tools, arborists carefully remove soil and debris around the root collar. This process requires precision to avoid damaging sensitive roots. Arborists generally work in a circular motion around the base, gradually revealing the root collar.

Step 3: Inspection

After exposing the root collar, a thorough inspection of the roots is conducted. Arborists check for disease, damage, or decay, assessing the overall condition of the root system.

Step 4: Treatment

If issues are found during the inspection, arborists may recommend treatment options. For example, they might prune damaged roots or apply fungicides to combat fungal infections.

Step 5: Backfilling

Once the inspection and treatments are complete, the area around the root collar is backfilled with soil. Care is taken to ensure that soil levels are not too high, maintaining proper air circulation and moisture retention around the roots.

Final Thoughts

Root collar excavation is vital for keeping trees healthy and vibrant. By preventing root rot, enhancing nutrient uptake, improving air circulation, and aiding in assessment, this process contributes significantly to tree care.

For homeowners and arborists, recognizing the importance of root collar excavation means fostering healthier trees and more beautiful landscapes. If you suspect your trees may have problems related to their root collars, reach out to a professional arborist. They can assess the situation and recommend the best action plan.

Close-up view of a tree's root collar during excavation

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BLACK MAPLE LANDSCAPING
LANDSCAPING SERVICES

2950 Northridge Rd.
Alexandria, OH 43001

Mail:
BlackMapleLandscaping@gmail.com
Tel:740-817-2621