American National Standard
for Tree Care Operations –

Part 8 – Root Management

Subclause 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.

80 – Root Management standards

80.1 Purpose

The purpose of this standard is to provide industry concensus guidelines for root management and standards for writing specifications.

80.2 Reasons for root management

The reasons for root management may include but are not limited to promoting tree health, stability, and longevity, and managing the interaction of tree roots with soil, infrastructure, property, and other plants. Root management practices for agriculture, horticultural production, or silvicultural purposes are exempt from this standard unless this standard, or a portion thereof, is expressly referenced in these standards for these other related areas.

80.3 Implementation

80.3.1 Root management specifications should be written and administered by an arborist with related training and experience.

80.3.1.1 Root management shall be implemented by a qualified professional, familiar with the practices and hazards associated with root management and the equipment used in such operations.

80.3.1.2 Specifications for root management shall include objectives, scope of work, and timing.

80.3.1.3 Specifications for root management should include, but are not limited to: objectives; treatment area; methods; materials; equipment; and, timing.

80.3.2 Practices that minimize damage to roots shall be preferred (see Annex A).

80.4 Safety

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

80.4.2 Personnel shall follow appropriate safe work practices.

80.4.3 Performance shall comply with applicable Federal and State Occupational Safety and Health Administration (OSHA) standards, ANSI Z133, and other federal, state, and local regulations.

80.4.4 The site shall be inspected for visible above–ground hazards prior to beginning any root management procedure.

80.4.5 The location of utilities and other obstructions both below and above ground shall be taken into consideration prior to root management operations. Utilities and other obstructions include, but are not limited to: gas; electric; communications; sewer; drainage; and, signage.

80.4.6 Job briefings shall be performed as outlined in ANSI Z133.

81 Normative references

ANSI A300 for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices, all Parts

ANSI Z60, Nursery stock

ANSI Z133 for Arboricultural Operations – Safety Requirements

ASTM A-475, Standard Specification for Zinc-Coated Steel Wire Strand

Federal Standard: FF-T-276b, Thimbles, Rope

29 CFR 1910, Occupational Safety and Health Standards (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)]

29 CFR 1910, Subpart S – Electrical, §§ 1910.331 - 335, Safety-related work practices[1)]

[1)] *Available from U.S. Department of Labor, 200 Constitution Ave. NW, Washington, D.C. 20210, or www.osha.gov.*

82 Definitions (Definitions are considered part of the ANSI A300 (Part 8)-2013 Root Management standard.)

82.1 adventitious root: Root arising from parts of the root or the stem.

82.2 aggregate: Materials such as sand, gravel, or rock, often used under paved surfaces, as backfill, or for other purposes.

82.3 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 ornamentals.

82.4 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.

82.5 berm: Soil added above grade for a specified purpose, such as a planting bed or barrier.

82.6 callus: Undifferentiated, non-lignified tissue, usually developed in response to wounding.

82.7 crown: Upper part of a tree, measured from the lowest branch, including all the branches and foliage.

82.8 decay: (v.) Decomposition of woody tissues by microorganisms. (n.) Wood that is decomposed.

82.9 fill: Soil, sand, gravel, rocks, or other material placed over the existing soil surface to raise the finished grade to some specified level.

82.10 flare (trunk flare, root flare): The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots.

82.11 hardscape: Built infrastructure such as pavement, sidewalks, curbing, storm drains, walls, and footings.

82.12 hydraulic soil excavation: The removal of soil using pressurized water.

82.13 mitigation: 1. Reducing or alleviating unfavorable conditions. 2. The process of diminishing risk.

82.14 mulch: A material applied to the soil surface to protect the soil, deter erosion, moderate soil temperature, conserve moisture, inhibit weeds; or improve soil structure.

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

82.16 qualified professional: An individual possessing skills, experience, training, education, certificates, degrees, registration, certification, or licensing as needed to perform job tasks.

82.17 radial trenching: Removing soil and other material in trenches radiating from the trunk.

82.18 root barrier: A device designed to direct root growth.

82.19 root channel: An underground system

used to direct root growth and increase soil volume.

82.20 root collar: The transition zone between the flare and the root system.

82.21 root collar examination: The process of exposing and assessing the root collar.

82.22 root cutting: Severing roots non-selectively.

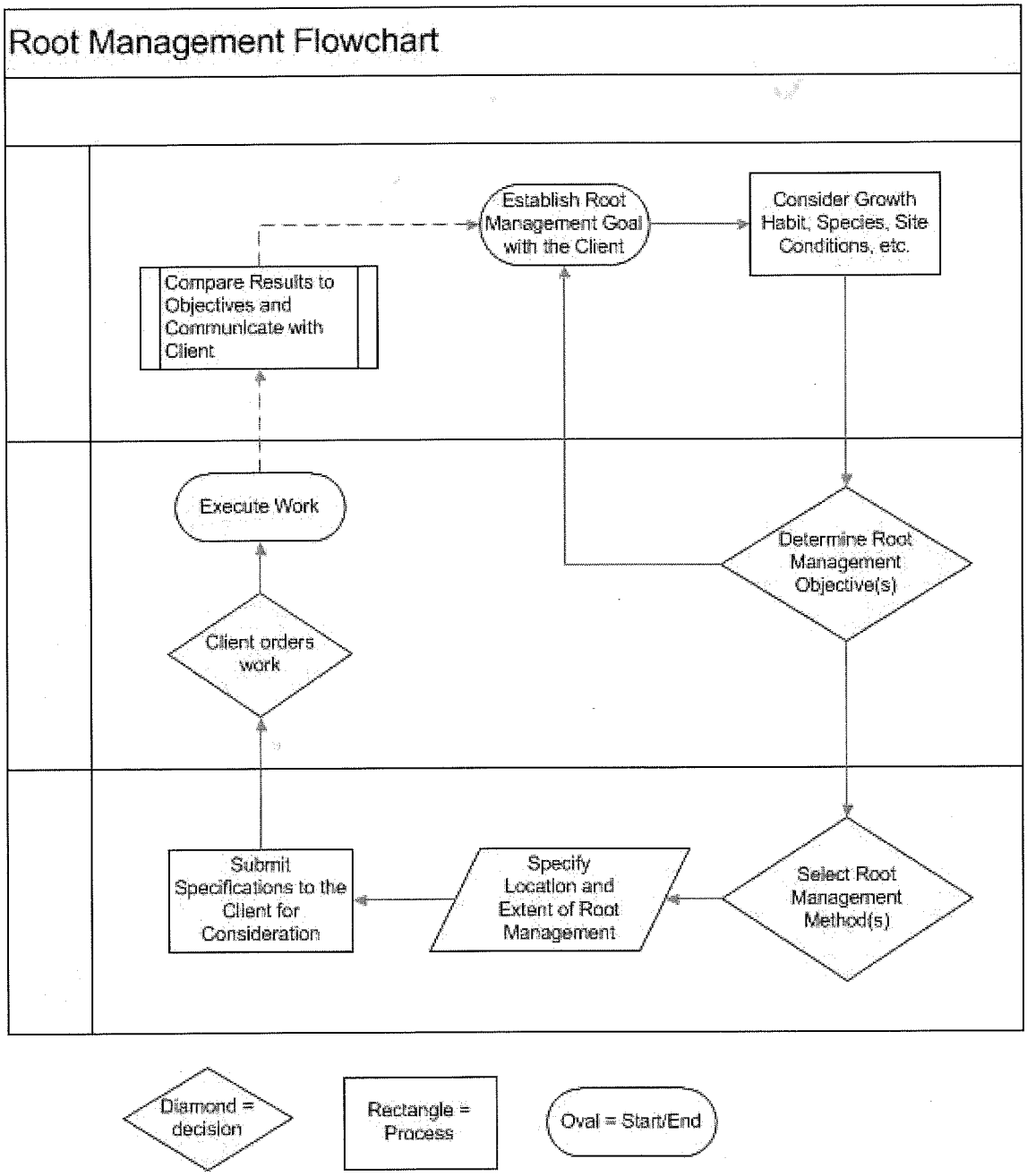
82.23 root pruning: Severing roots selectively.

82.24 root, buttress: A major lateral root radiating from the base of the trunk.

82.25 root, circling: A root that encircles all or a portion of a trunk but does not contact it.

82.26 root, girdling: A root that encircles all or a

The following flowchart is the recommended procedure for normal root management operations:



portion of a trunk and contacts the trunk or a buttress root.

82.27 root, surface: A lateral root that is visible above grade.

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

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

82.30 soil volume: The volume of soil available to trees and other woody plants for root development.

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

82.32 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.

82.33 stem: A woody structure bearing buds, foliage, and giving rise to other stems.

82.34 tracing: The removal of loose, damaged tissue from in and around the wound.

82.35 utilities: Facilities associated with services such as telephone, data, CATV, electricity, gas, steam, energy transmission and distribution, water and sewage, and transportation.

82.36 wood-chip mulch: A material placed on the soil surface composed of ground wood, bark, and leaves usually generated by sending tree parts through a wood chipping machine.

82.37 wound: Damage to plant tissue caused by pests, pruning, mechanical damage, or other natural forces.

83 Root management practices

83.1 Root management objectives

83.1.1 Arborists developing objectives and specifications, and managing roots shall have sufficient training and experience.

83.1.2 Arborists developing objectives and specifications, and managing roots should visually inspect the tree(s) and the site.

83.1.3 Soil volume, fill, air and water movement, drainage, and the distance between roots and infrastructure should be considered.

83.1.4 Root management objectives shall be established with the owner or owner's agent.

83.1.5 Root management objectives shall be defined based on potential tree benefits, the intended use of the site, tree stability, and the scope of the assignment.

83.2 General

83.2.1 If a condition is observed requiring attention beyond the original scope of the work, the condition should be reported to an immediate supervisor, the owner, or the person responsible for authorizing the work.

83.2.2 Root management practices should include, but are not limited to, one or more of the following:

Inspection of the tree, including the trunk, flare, root collar, detectable roots, and soil volume;
Selective root pruning;
Non-selective root cutting; and,
Directing or redirecting roots.

83.2.3 Tools and equipment should be maintained according to manufacturer's recommendations.

83.2.4 Equipment, tools, and work practices that damage living tissue, bark, or soil beyond the scope of work shall be avoided.

83.2.5 Wound treatments that are damaging to tree tissues outside the scope of work shall not be used.

83.2.6 Wound treatments shall not be used to cover wounds, except to manage dessication or pests, or for aesthetic purposes.

83.2.7 Tracing of wounds shall remove only dead, loose, and damaged tissue.

83.2.8 Evaluation of decay, callus and woundwood growth, and response growth in the trunk and crown shall be considered.

83.3 Trunk, flare, and root inspection

83.3.1 Objectives of inspections shall be established.

83.3.2 The method, area, depth, and limitations of inspection shall be specified.

83.3.3 Tools and equipment used for inspection shall be specified.

83.3.4 Inspection should include, but is not limited to, one or more of the following:

- Conditions in the crown that may reflect root conditions;
- Stem tissue connecting the crown and the roots;
- Girdling of the buttress roots or stems by roots or other materials, and the tree's response;
- Tree association with beneficial and harmful insects;
- Tree association with pathogenic and beneficial microorganisms (e.g. mycorrhizae);
- Wounds, and the tree's response to wounds;
- Mechanical damage to detectable roots and response;
- Indications of root disease and response; and,
- Graft unions in grafted trees.

83.3.5 Mulch, soil, and other materials should be removed as needed to allow for the inspection.

83.3.6 Soil excavation for root collar examination

83.3.6.1 Small adventitious roots that interfere with excavation or examination should be moved or pruned.

83.3.6.2 Adventitious roots should be considered for retention.

83.3.6.3 Temporary protection of newly exposed rootzone, root tissue, and stem tissue shall be considered.

83.3.7 Detectable flare and root diseases and disorders should be diagnosed.

83.3.8 If significant structural defects are observed, a risk assessment should be recommended, see ANSI A300 (Part 9) – *Tree Risk Assessment* standard.

83.3.9 The flare and buttress roots should remain visible after inspection.

84 Root management practices – root pruning and cutting

84.1 Root pruning and cutting objectives

84.1.1 Root pruning and cutting objectives shall be established.

84.1.2 The extent and method of root pruning or cutting shall be based on the objectives, species tolerance, environmental factors, timing, age, health, lean, and structural condition of the tree(s).

84.1.3 When establishing objectives, potential for tree decline or destabilization shall be considered.

84.1.4 Tools and equipment shall be specified.

84.2 Root pruning and root cutting practices

84.2.1 The owner should be notified of the risk to tree health and stability prior to the pruning or cutting of roots.

84.2.2 When mitigating or avoiding infrastructure damage, only roots causing or likely to cause damage should be pruned.

84.2.3 Surface roots should be managed by removing soil or reducing soil density in accordance with ANSI A300 (Part 2) – *Soil Management* standard, to meet the objective including, but not limited to raising the grade with porous soil, sand, or mulch.

84.2.4 Selective root pruning or non-selective root cutting shall be specified where needed to meet the objective.

84.2.5 When root removal is unavoidable, selective pruning shall be the preferred method.

84.2.6 Root pruning and cutting tools should be sharp.

84.3 Selective root pruning

84.3.1 The size and/or location of roots to be pruned shall be specified.

84.3.2 Roots should be exposed using the least injurious excavation method prior to pruning.

84.3.3 A pruning cut that removes a root at its point of origin should not cut into the trunk or parent root.

84.3.4 Smaller pruning cuts shall be preferred.

84.3.5 The final cut should result in a flat surface with adjacent bark firmly attached.

84.4 Selective root pruning – girdling roots

84.4.1 Roots that encircle or girdle the trunk or a buttress root should be considered for redirecting or pruning.

84.4.2 Girdling roots should be exposed before pruning cuts are planned or made.

84.4.3 Retention of encircling or girdling roots that are providing more benefit than damage shall be considered.

84.4.4 The trunk and buttress roots shall not be damaged beyond the scope of the work.

84.4.5 If one or more large girdling roots are present, progressive root pruning over a specified time period should be considered.

84.4.6 Root pruning tools shall include, but are not limited to: handsaws; lopping shears; chisels; hand shears; chain saws; reciprocating saws; and, circular saws (see subclause **80.4 Safety**).

84.5 Non-selective root cutting

84.5.1 When non-selective root cutting is necessary, roots shall be cut as far from the trunk as practical.

84.5.2 The location and depth of excavation for root cutting shall be specified.

84.5.3 Minimum distance from the trunk for root cutting should be adjusted according to trunk diameter, species tolerance to root loss, tree age, health, and site condition.

84.5.4 Root cutting distances from the trunk shall be adjusted for disease management, root location, tree species and condition, and, site and soil conditions.

84.5.5 When roots are damaged within six times the trunk diameter (DBH), mitigation shall be recommended.

84.5.6 Roots should be cut with equipment that minimizes cracking the wood and tearing the bark.

84.5.7 Heavy equipment should be located outside the root cut line or remain on existing pavement or on a soil-protecting surface.

84.5.8 Temporary staging areas for excavated soil should be located at a safe distance on the side of the trench furthest from the trunk.

84.5.9 Upon completion of non-selective root cutting, selective root pruning of damaged roots in accordance with subclause 84.3 shall be considered.

85 Managing the direction of root-growth

85.1 Objectives for managing the direction of root growth shall be established prior to beginning operations.

85.2 The type, depth, and location of root direction materials shall be specified to achieve the objective.

85.3 Root direction methods shall include, but are not limited to, one or more of the following:

Designing, installing, and/or maintaining root barriers; and,

Designing, installing, and/or maintaining root channels.

85.4 Managing the direction of root growth shall be considered as an alternative, or in conjunction with, root pruning or cutting.

85.5 Managing the direction of root growth shall be considered following root pruning.

85.6 Use and installation of root management devices should follow manufacturer's recommendations.

85.7 Root barriers should be installed as far from tree trunks as possible.

85.8 Roots that grow over the root barrier should be pruned on the tree trunk side of the barrier.

86 Post root – management care practices

86.1 Specifications for monitoring and maintaining tree health and stability should be established.

86.2 Root damage that affects the stability of the tree should be mitigated *(see ANSI A300 (Part 9) – Tree Risk Assessment standard).*

86.3 Post-root management care should be specified for an appropriate period of time based on the region, site conditions, and species.

86.4 Specifications for post root – management care should consist of, but are not limited to, one or more of the following:

a. soil moisture management;
b. mulching;
c. integrated pest management;
d. pruning (see *ANSI A300 (Part 1) – Pruning standard*);
e. soil management (see *ANSI A300 (Part 2) – Soil Management standard*);
f. maintenance/removal of tree support systems (see *ANSI A300 (Part 3) – Supplemental Support Systems standard*); and,
g. appropriate use of growth regulator.