

American National Standard

*ANSI A300 (Part 5)-2012
Revision of ANSI A300 (Part 5)-2005*

*for Tree Care Operations –
Tree, Shrub, and Other Woody Plant
Management – Standard Practices
(Management of Trees and Shrubs During Site
Planning, Site Development, and Construction)*



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for Tree Care Operations –

*Tree, Shrub, and Other Woody Plant Management –
Standard Practices (Management of Trees and Shrubs During Site
Planning, Site Development, and Construction)*

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American National Standard

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Foreword This foreword is not part of American National Standard A300 (Part 5)-2012 *Management of trees and shrubs during site planning, site development and construction*.

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 result – 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 5)-2012 *Management of Trees and Shrubs During Site Planning, Site Development, and Construction* was approved as an American National Standard by ANSI on February 7, 2012. ANSI approval does not require unanimous approval by ASC A300.

(Continued)

The ASC A300 has the following members as of February 7, 2012:

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(SavATree, Inc.)*

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

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Name of Representative

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American Forests

Carrie Gallagher (Alt.)

American Nursery and Landscape Association

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American Society of Consulting Arborists

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American Society of Landscape Architects

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International Society of Arboriculture

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Professional Grounds Management Society

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Professional Land Care Network

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Andy Hillman (Observer)

Tim Johnson (Observer)

Myron Laible (Observer)

Beth Palys (Observer)

Richard Rathjens (Observer)

Mary Reynolds (Observer)

Richard Roux (NFPA-780 Liaison)

Donald 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 5 Management of trees and shrubs during site planning, site development, and construction

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.

50 Part 5 – Management of trees and shrubs during site planning, site development, and construction – standards

50.1 Purpose

The purpose of this clause is to provide standards for developing specifications for the management of trees and shrubs during site planning, site development, and construction.

50.2 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.

50.2.1 The reasons for tree management during site planning, construction, post-construction maintenance phases of development, and future maintenance is to conserve and integrate existing and future trees and shrubs that are appropriate for the owner's, owner's agent, or controlling authority's intended use and development of the site.

50.2.2 Trees and shrubs should be conserved and integrated during site planning and development for a variety of reasons, including economic, social, environmental, and cultural factors.

50.2.2.1 Trees and shrubs should be considered community assets that provide benefits including shade, air quality, storm water interception, heat island mitigation, energy conservation, carbon sequestration, enhanced property values, and community or site character.

50.3 Implementation

50.3.1 Tree management plans and specifications for tree management plans should be written and administered by an arborist qualified in management of trees and shrubs during site planning, development, and construction.

50.3.2 Tree management plans shall be in compliance with applicable ordinances, rules, regulations, and standards.

50.3.3 Decisions on the development of the property should be made with the knowledge of the tree resources present.

50.3.3.1 The arborist should be involved in the initial planning stages and be familiar with the community's development and tree protection ordinances and processes.

50.3.4 Monitoring of the construction process by an arborist should be specified to: ensure compliance with plan requirements; to monitor health and condition of the tree(s); to check for symptoms of stress or signs of damage; and, to initiate remedial action as needed.

50.3.4.1 Monitoring specifications should address scheduling of inspections before and during critical phases, including, but not limited to, the following activities:

- Demolition;
- Grading;

Building construction;
Walkway and path construction;
Road construction;
Excavation;
Trenching and boring;
Drainage system installation; and
Landscaping.

50.3.5 Management specifications shall be adhered to.

50.4 Safety

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

50.4.2 Tree management shall be performed only by arborists or arborist trainees who, through related training or on-the-job experience, or both, are familiar with the standards, practices and hazards of arboriculture related to development, and the equipment used in such operations.

50.4.3 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.

50.4.4 Arborists shall follow appropriate safe work practices.

51 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 Z60, Nursery stock

ANSI Z117.1, Safety Requirements for Confined Spaces

ANSI Z133, Arboriculture – Safety Requirements

ASME B30, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings.

29 CFR 1910, General Industry ¹⁾

29 CFR 1910.146, Permit-required Confined Spaces (PRCS) ¹⁾

29 CFR 1910.268, Telecommunications ¹⁾

29 CFR 1910.269, Electric Power Generation & Distribution ¹⁾

29 CFR 1910.331-335, Electrical Safety ¹⁾

¹⁾ Available from U.S. Department of Labor, 200 Constitution Ave., NW, Washington, DC 20210.

52 Definitions (Definitions are considered part of the ANSI A300 Part 5 standard)

52.1 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.

52.2 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.

52.3 conservation: The deliberate retention, protection, replanting, and management of existing forests, trees, shrubs, or plants during the development process.

52.4 critical root zone (CRZ): The minimum volume of roots necessary to have for tree health and stability.

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

52.6 development effects: Site development and building construction related actions that have an affect on the health, structure, stability, or live parts of trees including roots which may be affected by changes to the soil, soil chemistry, or ground water flow.

52.7 drip line: The soil surface delineated by the branch spread of a single plant or group of plants.

52.8 root protection zone (RPZ): The soil area surrounding a tree defined by a specified measurement, in which excavation, compaction, and other construction-related activities should be avoided or mitigated. The RPZ may extend beyond the tree protection zone (TPZ).

52.9 rootzone: The volume of soil containing the roots of a plant.

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

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

52.12 site survey: A map showing relevant, existing site features and vegetation on a site proposed for development.

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

52.14 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.

52.15 suitability for conservation: A relative rating system that combines tree health and structure with species tolerance of development activities.

52.16 tree inventory: A comprehensive list of individual trees containing descriptive and desired information for all or a portion of the project area.

52.17 tree management report: A comprehensive report listing the needs and recommendations for treatment of individual trees or groups of trees on a construction site or adjacent site.

52.18 tree preservation (conservation) ordinance: A local requirement defining the retention, protection, management, and mitigation of trees within a community, or on a construction or development site.

52.19 tree protection plan: A written directive included in the construction plans and specifications to control work around protected trees during all phases of the project.

52.20 tree protection zone (TPZ): The area surrounding a tree defined by a specified distance, in which excavation and other construction - related activities should be avoided. The TPZ is variable depending on species, factors, age and health of the plant, soil conditions, and proposed construction. The zone may be accomplished by physical barriers or soil protection layers or treatments.

52.21 tree protection zone barriers: Devices such as fencing, berms, or signage installed to define and limit access to tree protection zones, or soil protection layers, as appropriate to accomplish the tree protection plan.

52.22 tree resource evaluation: A written document describing the tree resources present on the site and adjacent properties encroaching on the project site, with information collected or provided from an inventory or survey such as: tree species, size, location, condition, plant community, structure, health, and population estimate.

52.23 tree survey: A map or plan with a list and description of trees within all or a portion of the project area and adjacent areas encroaching on the project area, based on defined criteria, such as location, species, or tree size.

53 Management of trees and shrubs during site planning, site development, and construction practices

53.1 Objectives

Objectives for managing and conserving trees and shrubs on a construction or development site shall be established.

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

53.1.2 Objectives should include, but are not limited to, one or more of the following:

Determining the tree resources present on a development site prior to planning and design;

Conserving the benefits that trees provide including energy conservation, air quality, shade, natural elements, and character;

Avoiding damage to the trees to be conserved, including physical contact, grade

changes, and soil compaction;
Improving coordination of existing trees with new landscape designs;
Developing long term management plans for new and existing plants;
Minimizing conflicts between trees and new hardscape and buildings; and
Conserving trees.

53.2 The management of trees and shrubs shall be incorporated into the following different phases of the site development process:

Planning;
Design;
Pre-construction;
Construction;
Landscape; and,
Post-construction.

53.3 Planning Phase

Purpose: The planning phase includes the initial site evaluation where trees on the existing site are surveyed, located, and evaluated for their health, longevity, and benefits to the site. This information is used in deciding which trees are best candidates for conservation, and should be reviewed before decisions on site design are considered.

53.3.1 A resource evaluation should be conducted for all the trees on the site or at minimum, the trees in the proposed development area.

53.3.1.1 The trees within all, or the affected portion of, the project area and adjacent areas encroaching on the project area should be included based on defined criteria, such as species, size, condition, spacing, and structure.

53.3.2 The evaluation data should be integrated into the site design.

53.3.3 The site survey should locate the trees on the site plan or map.

53.3.4 Trees that are candidates for retention and incorporation into the site design should be identified.

53.3.5 Landscape and site plans should incorporate the trees and areas to be retained and protected.

53.3.6 An arborist or other qualified person shall complete the tree resource evaluation showing all

relevant features on the site and trees with roots and canopies of adjacent trees and considering the proposed use of the site.

53.3.7 Specifications, methods, and practices to mitigate tree and site conditions should comply with existing ordinances or requirements.

53.3.8 Tree resource evaluation scope

53.3.8.1 The scope of the tree resource evaluation shall be established.

53.3.8.2 Trees adjacent to the site that will be impacted by the construction or may affect the construction activity should be included in the resource evaluation.

53.3.8.3 If a condition is observed requiring attention beyond the original scope of the tree resource evaluation, the condition shall be reported to an immediate supervisor, the owner, project manager, or the person responsible for authorizing the work.

53.3.9 Tree resource conservation

53.3.9.1 The arborist shall communicate the tree resources present on the site as found in the tree resource evaluation.

53.3.9.2 The arborist shall note the trees' function in the ecosystem, the incentives for conservation, and mitigation potential for the site.

53.3.9.3 The existing tree canopy and proposed tree canopy shall include recommendations for adequate space for the trees to be retained or planted.

53.3.9.4 Trees adjacent to the site that will be impacted by the construction or may affect the construction activity should be included in resource conservation.

53.3.9.5 Suitability ratings for tree conservation should be assigned; see **Annex A-2**.

53.4 Design phase

Purpose: The purpose of including trees in the design phase is to review the trees found to be worthy of conservation on the site and determine how they can be incorporated into the new site design and shown on the plans.

53.4.1 A tree management report/plan shall be developed for trees to be conserved on the site.

53.4.2 The tree management report/plan should include an evaluation of impacts on trees and shrubs from proposed site development and construction; see **Annex A**.

53.4.3 Tree conservation

53.4.3.1 Tree conservation should be integrated with the site development plan. Documentation should include and is not limited to locations of:

- a. trees to be retained;
- b. tree and root protection zones;
- c. tree protection zone barriers;
- d. tree protection plans;
- e. soil erosion controls;
- f. soil compaction controls;
- g. staging and storage areas;
- h. existing and proposed utilities; and,
- i. other on-site activities.

53.4.3.1.1 Level 1 assessment methodology shall be specified.

53.4.3.2 Tree conservation should be implemented at appropriate times for tree retention and the development of the site.

53.4.3.2.1 Consequences for non-compliance shall be specified.

53.4.3.2.2 Mitigation measures shall be identified.

53.4.4 The construction plans and specifications shall include a tree protection plan and details.

53.4.5 Grading and demolition plans should detail all relevant site features.

53.4.6 Grading and demolition plans shall denote all trees to be retained and removed.

53.4.7 Grading and demolition plans shall include tree protection plans for working around trees to be retained.

53.4.8 Tree protection measures shall be in place before any grading or demolition work begins.

53.5 Pre-construction phase

Purpose: The purpose of the pre-construction

phase is to assure that all parties involved in the site development and construction are aware of the tree conservation plans, tree protection plans, goals of the tree conservation, construction practices to follow, and penalties for non-compliance.

53.5.1 Tree protection plans, objectives and specifications shall be communicated to the project manager, property owner, and the contractors.

53.5.2 Tree protection zone barrier(s) shall be installed prior to any activities performed on the site that may impact the root zone or above ground parts of the tree.

53.6 Construction phase

Purpose: The purpose of the construction phase is to verify that all the tree protection is in place and followed during the construction work.

53.6.1 Implementation of the tree protection plans shall be monitored by an arborist.

53.6.2 Levels of compliance shall be documented and reported to the project manager or owner, owner's agent, or controlling authority as required in the scope of work.

53.6.3 Tree health and condition should be monitored during the construction phase.

53.6.4 In the event of damage to barriers or trees, the damage should be reported, documented, and corrective measures specified and implemented as required in the scope of work.

53.7 Landscape phase

Purpose: The purpose of the landscape phase is to ensure that all the tree protection practices followed throughout the construction process are followed during the installation of landscape features, irrigation, and plants, or amended to maintain appropriate tree protection while allowing for defined landscaping activities.

53.7.1 Tree conservation measures shall be in place during the installation of the landscape, irrigation, and lighting.

53.7.2 Tree protection plans shall be implemented through site landscape and lighting installation.

53.7.3 Levels of compliance should be documented and reported by the project arborist.

53.7.3.1 The project manager shall be made aware of non-compliance with the tree protection plan.

53.8 Post-construction phase

Purpose: The purpose of the post-construction phase is to recognize that trees may change as their sites change and to ensure that any specifications for continuing care and monitoring of the conserved trees are acknowledged and followed.

53.8.1 Continuing care shall be specified according to changes in tree health and condition.

53.8.2 A remedial and long-term maintenance plan should be specified for both existing and new landscaping to specify the level of care to be provided and to guide maintenance over the life of the project.

53.8.2.1 Specifications for remedial and post-construction care should consist of, but are not limited to, one or more of the following:

- Soil moisture management;
- Mulching;
- Integrated pest management;
- Pruning (see *ANSI A300 Part 1 – Pruning standard*);
- Thinning and spacing of new landscape;
- Monitoring period, including length and frequency;
- Nutrient management (see *ANSI A300 Part 2 – Soil Management standard*);
- Maintenance/removal of tree support systems (see *ANSI A300 Part 3 – Supplemental Support Systems standard*); and,
- Lightning protection (see *ANSI A300 Part 4 – Lightning Protection Systems standard*).

53.8.2.1.1 Pruning shall not be performed to compensate for root loss.

53.8.2.1.2 Pruning should be performed to reduce windsail when considered necessary.

53.8.2.2 Long-term tree and landscape maintenance plans should be included in CC&R's (covenants, conditions and restrictions), deeds, and permit conditions.

53.8.2.3 Responsibility for maintenance and care should be transferred with the property when ownership changes hands.

53.8.3 Tree health and condition should be monitored for a specified period following construction.

53.8.4 Post-construction treatments and monitoring shall be specified according to factors such as, but not limited to:

- The extent of construction activities,
- Tree protection plan;
- Compliance with the tree protection plan; and
- Consideration that most tree damage is not easily detected until years after construction.

53.8.5 An appropriate layer of organic mulch should be applied to as much of the TPZ as possible to conserve soil moisture and tree health.

53.8.5.1 The mulch should be spread in a manner that avoids soil compaction.

53.8.6 Temporary irrigation shall be considered before, during, and after excavation and trenching within the TPZ to mitigate stress from water loss.

53.8.6.1 Irrigation method and schedules should consider soil profile and conditions, topography, climate, time of year, species, extent of root loss and tree health.

53.8.6.2 Installation of irrigation systems shall be designed and installed to provide water to remaining roots within the TPZ.

54 Tree protection practices prior to and during demolition, construction, and landscaping

54.1 Objectives for tree protection during construction shall be specified.

54.1.1 Specifications should include, but are not limited to one or more of the following:

- Avoid/minimize the physical loss of soil and roots that will compromise the health and structural stability of trees;
- Avoid compaction and soil structure damage that will compromise the health of the trees;
- Maintain root zone conditions favorable for

root function, growth, and development;
Minimize changes to the ground water flow or supply; and,
Direct root growth away from infrastructure or use methods and materials to minimize root and infrastructure conflict.

54.2 Written plans outlining tree protection measures (tree protection plan) shall be prepared by a qualified arborist.

54.3 The tree protection plan should be completed prior to site design and plan development and included on construction plans.

54.3.1 The tree protection plan shall begin with the tree survey and tree resource evaluation.

54.3.2 The tree protection plan shall be developed in coordination with the proposed grading, demolition, excavation, utilities, construction and landscaping plans.

54.4 The arborist shall review preliminary grading, demolition, excavation, utilities, construction and/or landscaping plans.

54.5 The arborist shall communicate all tree protection specifications clearly to all persons involved in the development process.

54.6 A pre-construction meeting shall be held to communicate the objectives of the tree protection plan.

54.7 A tree protection zone (TPZ) shall be delineated around all trees to be protected during a project.

54.7.1 The area and dimensions of the TPZ should be calculated on the basis of species tolerance, age, and health, root structure, rooting depth and soil conditions.

54.7.1.1 Arborists should specify a distance of 6 to 18 times the trunk diameter (DBH) depending on species tolerance to root loss, tree age and health.

54.7.1.2 When the distance of 6 to 18 times the trunk diameter (DBH) cannot be met, appropriate mitigation or determination that the work will not impact tree health and stability shall be performed.

54.7.2 Warning signs shall be posted to alert equipment operators and contractors about the protected status of the TPZ.

54.7.3 Activities within the TPZ that compact the soil or physically damage roots shall be avoided or mitigated.

54.8 Barriers

54.8.1 Fencing or other barriers to the TPZ shall be installed prior to site clearing, grading and demolition, and maintained through construction and landscaping.

54.8.2 Specifications for barriers should include, but are not limited to:
The type of fencing;
Other barriers;
Manner of installation; and,
Conditions for encroachment into the TPZ.

54.8.3 When the soil or root area needs to be protected, protection should be accomplished using methods that avoid compaction and soil disruption.

54.8.4 When areas within a tree's TPZ cannot be fenced, alternative methods to protect the tree and soil shall be developed.

54.9 Demolition

54.9.1 Restrictions regarding demolition methods and the location, type and size of equipment on soil and within the TPZ shall be included in the tree protection plan.

54.9.2 Clearing of vegetation within the TPZ shall be performed manually.

54.9.3 Soil protection measures shall be taken while working within the TPZ of trees.

54.9.4 Soil protection measures shall be in place prior to vehicle and heavy equipment traffic in the TPZ.

54.9.5 Routes should be established that direct traffic around the TPZ.

54.9.6 Equipment and methods used to clear vegetation adjacent to the TPZs shall be specified to avoid damage to the tree and to the soil.

54.9.7 The appropriate equipment and methods to address the specific site conditions shall be used to avoid soil compaction.

54.9.8 When removing pavement within the TPZ, damage to tree roots shall be minimized.

54.9.8.1 Pavement removal equipment should be positioned on undisturbed pavement, soil protection surface within the TPZ, or outside the TPZ.

54.9.9 Stump removal shall be performed in a manner that limits disturbance to the roots of trees to be retained.

54.9.9.1 Stumps with roots entangled with the roots of trees designated for retention should be ground shallow or cut low and mulched.

54.9.10 The movement and/or parking of vehicles and equipment within the TPZ shall be prohibited unless sufficient measures are taken to prevent soil compaction and contamination.

54.9.11 The pruning or removal of trees adjacent to a TPZ shall be performed by a qualified arborist to avoid damage to remaining trees.

54.9.12 When permitted, burning of brush and woody debris shall be in designated areas using methods to protect conserved trees from damage (i.e., damage caused by by-products such as smoke, sparks, and heat).

54.9.13 Soil, construction materials, petroleum products, water, toxic building wastes, building refuse, equipment, and vehicles shall not be stored within the TPZ.

54.9.14 Protection measures shall be in place before soil, construction materials, petroleum products, water, toxic building wastes, building refuse, equipment, and vehicles are stored adjacent to the TPZ.

54.10 Disposal of building wastes

54.10.1 Disposal of building waste products, petroleum products, concrete, stucco mix, concrete tank-rinse, solvents, paint, etc., shall be performed in compliance with federal, state, and local regulations and shall not be permitted within the TPZ.

54.10.2 Disposal methods and spoil zones shall be established for cleaning construction equipment

and storing toxic materials, and shall avoid flow, leakage, or seepage into the TPZ.

54.11 Fill soil (grade change)

54.11.1 Fill within the TPZ should not be permitted unless mitigated in a way to maintain suitable air and water availability to existing roots.

54.11.2 Fill outside the TPZ shall not significantly affect drainage around the tree. If water is directed towards the TPZ and tree, measures should be taken to divert or control surface flow.

54.11.3 When fill within the TPZ cannot be avoided, soil texture, depth, and compaction shall be specified to minimize impact to the tree.

54.11.4 Compaction of fill within the TPZ should be avoided. If compaction of fill is required within the TPZ, an alternative fill material or construction method shall be considered.

54.11.5 When fill must be placed within the TPZ, a well installation shall be considered around the trunk flare area. The minimum radius of the well should be at least 24 inches (61 cm) away from the trunk flare. A method that avoids severing buttress roots and lateral roots during well construction should be specified; see figure **54.11.5**.

54.12 Excavation/Trenching

54.12.1 Design changes or alternative building methods shall be considered to avoid root loss due to excavation, soil compaction, and trenching within the TPZs of trees designated for retention.

54.12.2 Where structural footings are required within the TPZ, alternative building methods, such as discontinuous footings, piers and structural grade beams, should be used to minimize the need for root pruning.

54.12.3 Grade beams set on footings should not require excavation of soil to place the beam.

54.12.3.1 Fill should not be added on top of soil to level or support beams.

54.12.4 Excavation and construction equipment shall be selected, positioned, and operated to avoid damage to tree roots, branches, and trunks.

54.12.4.1 If clearance is inadequate for equipment access, guying branches upward or pruning to raise the crown should be considered prior to beginning excavation and construction work.

54.12.5 Roots should not be ripped or torn during excavation.

54.12.5.1 Roots should be pruned or cut prior to excavation to minimize the damage from ripping.

54.12.5.2 Ripped or damaged roots shall be exposed using the least injurious method and the damaged section cut cleanly and relatively perpendicular to the length of the root.

54.12.6 Exposed roots should be covered with moisture retaining material such as wet burlap, or moist fill soil, and a covering such as a tarpaulin, to prevent drying of soil and roots.

54.12.6.1 The covered area should be monitored and kept moist to avoid root desiccation.

54.13 Utilities

54.13.1 Utilities that cannot be routed around the TPZ should be installed by tunneling at a depth adequate to protect the specified roots.

54.13.2 When trenching around roots two-inches (5 cm) in diameter and greater, the least destructive methods should be used to minimize damage to specified roots; see **Annex D**.

54.13.3 Utilities should be routed in a common trench or grouped as closely as permitted.

54.13.4 Utilities should be placed under pavement areas or as far from the trees as possible to maximize potential root soil volume.

54.14 Pavement

54.14.1 Shallow “no-dig” pavement systems shall be considered for driveways or patios built near or over the TPZ.

54.14.2 When paving covers more than one-third of the TPZ, a permeable paving material should be used to allow for aeration and water penetration.

54.14.3 Soil under permeable surfaces should not be compacted to more than 85 percent Proctor density.

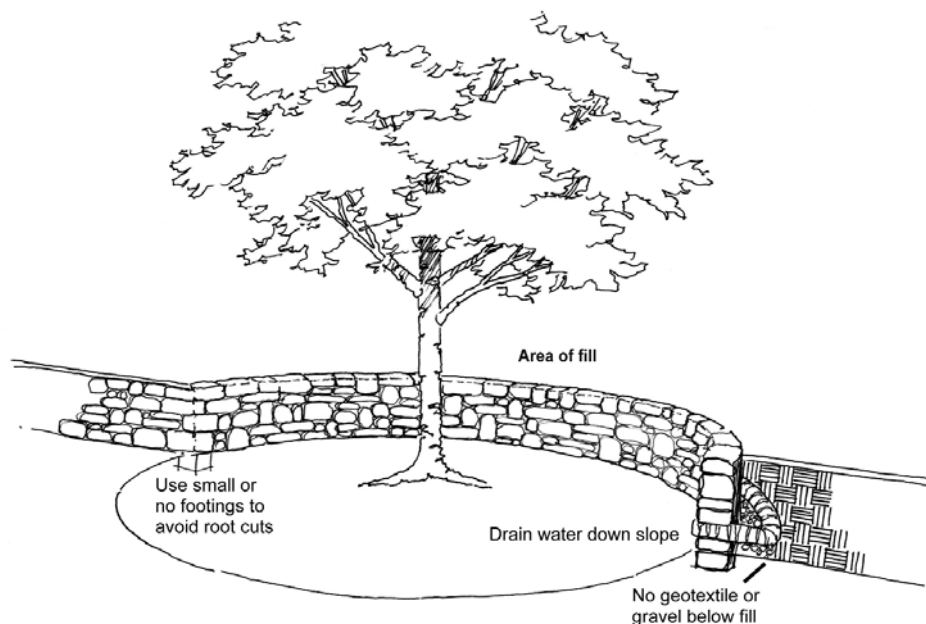


Figure 54.11.5 Adapted with permission from *Best Management Practices, Managing Trees During Construction*. 2008. Fite, Kelby and Smiley, E. Thomas. Copyright 2008, International Society of Arboriculture, Champaign, IL.

Annex A – Management report information

(This annex is not part of the ANSI A300 Part 5 standard.)

A-1 Some factors to consider when evaluating suitability for conservation (adapted from N. Matheny and J. Clark. 1998. Trees and Development – A technical guide to tree preservation during land development. International Society of Arboriculture. Champaign IL)

A-1.1 Tree health

Healthy, vigorous trees are better able to tolerate impacts than are non-vigorous trees. Typical construction impacts include: root injury, demolition of existing structures, changes in soil grade and moisture, and soil compaction.

A-1.2 Structural integrity

Trees with significant wood decay and/or other structural defects or conditions that may present a high failure risk should be carefully evaluated before conserving in areas where high risk of injury to people or damage to property is likely.

A-1.3 Species response

There is a wide variation in the response of individual species to construction impacts and changes in the environment.

A-1.4 Tree age and longevity

While having significant emotional, heritage, and aesthetic appeal, old trees may have limited physiological capacity to adjust to an altered environment. Young trees are better able to generate new tissue and respond to change. Tree protection may vary based on the age and importance of a tree to the site.

A-1.5 Cost-benefit analysis

The relationship between cost of conservation and the benefits of the tree should be considered. The cost to establish a new tree and the time it takes for the tree to grow and produce the benefits should be compared to the cost of retaining existing trees.

A-1.6 Invasiveness

Native and non-native plants may have invasive characteristics. These characteristics plus local regulations and guidelines may affect conservation decisions.

A-2 Example of suitability ratings

A-2.1 Good: Trees in this category are in good health and structural stability and have the potential for longevity at the site.

A-2.2 Moderate: Trees in this category are in fair health and/or have structural defects that may be mitigated with treatment. These trees may require more intense management and monitoring, and may have shorter life-spans than those in the “good” category.

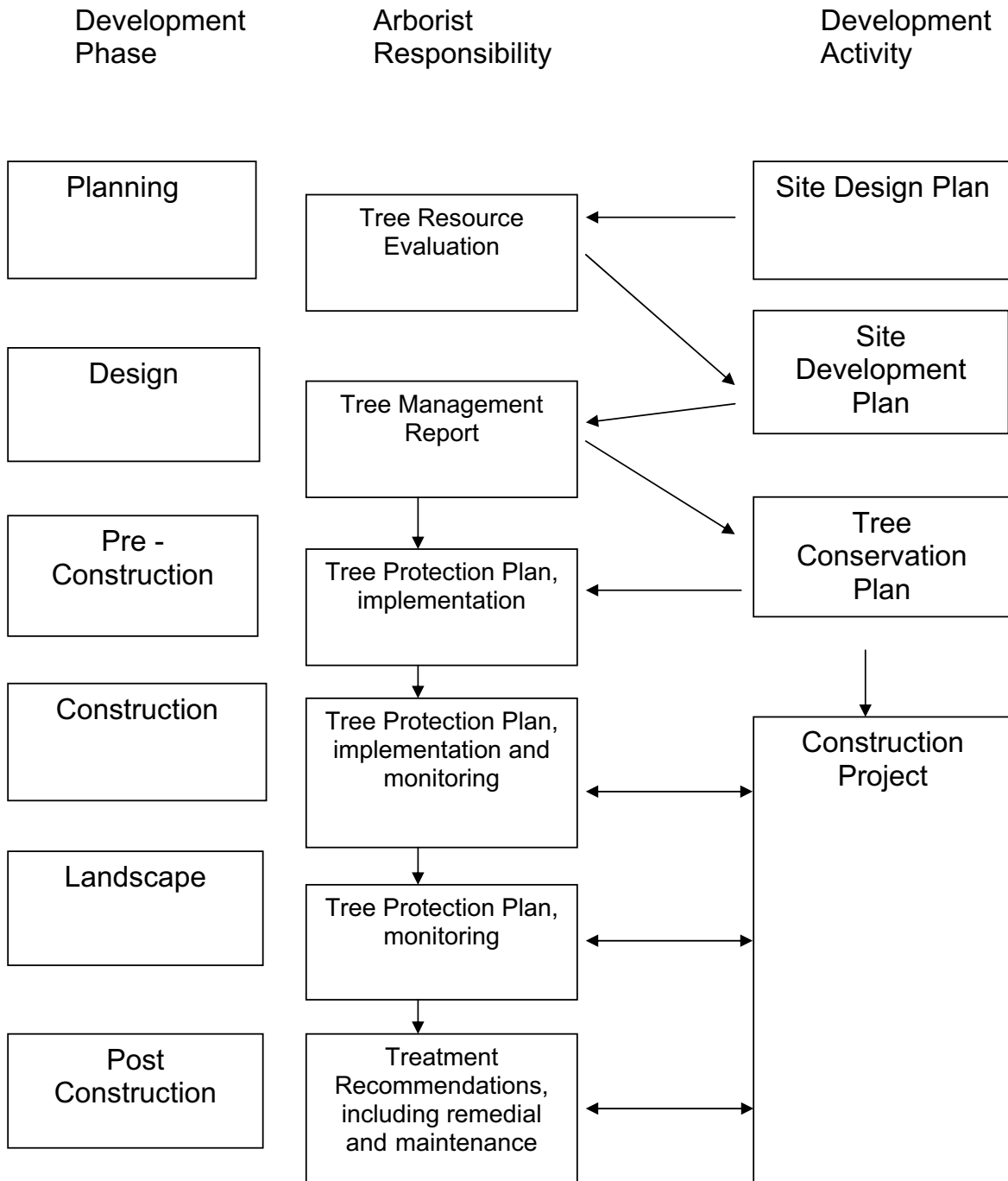
A-2.3 Poor: Trees in this category are in poor health or have significant defects in structure that cannot be mitigated with treatment. These trees can be expected to decline regardless of management. The species or individual tree may possess characteristics that are incompatible or undesirable in landscape settings or be unsuited for the intended use of the site.

A-3: The tree management report should include:

- A.** tree locations shown on the land survey or plot plan;
- B.** description of the applicable tree population (information such as: species, size, condition and replacement value);

- C. suitability for conservation ratings (Good, Moderate, Poor);
- D. limits of construction, including demolition, grading and drainage, site and utility construction, and landscape plan;
- E. evaluation of proposed construction impacts to trees;
- F. notes on the proximity of trees to existing and proposed structures, roads, utilities, etc.;
- G. recommendations for retention/removal see **53.4.3**;
- H. recommendations for design changes see **53.4.3**;
- I. tree conservation recommendations and specifications see **53.4.3**; and,
- J. post-construction recommendations and specifications.

Annex B – Management planning flow chart
(This annex is not part of the ANSI A300 Part 5 standard.)



Annex C – Purpose and implementation information

(This annex is not part of the ANSI A300 Part 5 standard.)

C-1 The true value of this standard is in setting the requirements and recommendation for the sequence of evaluating trees on a site for development and formulating a viable tree conservation report.

C-2 Specifications are to be developed using the standard. The standard cannot serve as specifications because each project and conservation approach will vary depending on species of tree; soil condition; development objectives; construction/demolition activity; etc.

C-3 Agencies with land or resource preservation or conservation ordinances or tree preservation requirements often require a tree conservation plan to be filed (much like an environmental impact statement) if triggered by specific criteria adopted by the town, city, or jurisdiction such as number of trees affected; size and species of trees affected; lot size; type/zoning of development. *ANSI A300 Part 5* is the standard for what the required plan should contain. Actual contents of the plan should also be altered based on the scope of specific projects.

Annex D – Preferred methods to avoid damage to roots

(This annex is not part of the ANSI A300 Part 5 standard.)

When encountering roots two-inches (5 cm) in diameter or greater, the roots should be tunneled around or bored underneath. The preferred methods available for avoiding damage to the roots include:

D-1 Hand excavation with tools. When a root is encountered, avoid contact with the root and excavate around it, leaving it intact.

D-2 Pneumatic excavation. Tools and equipment are available to use compressed and high pressure air to remove the soil around roots without damaging the larger roots. Proper pressure and technique are important to reduce damage to roots. Smaller absorbing roots may be damaged during this process, similar to hand excavation.

D-3 Hydraulic excavation. Tools and equipment are available to use high-pressure water to wash the soil around roots without damaging the larger roots. Proper pressure and technique are important to reduce damage to roots. Smaller absorbing roots may be damaged during this process, similar to hand excavation.

D-4 Trenchless pipe installation. Tools and equipment are available to install pipes of varying diameter under roots without requiring a trench. The depth should be calculated so the process places the pipes under the roots to be avoided. The trenchless entry points should be located in an area that avoids root damage. Smaller roots may be damaged during this process, similar to hand excavation.

A300 Part 5 - Site Planning, Site Development



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