

DRAFT

The City of New Castle Urban Forestry Manual

STANDARDS AND SPECIFICATIONS

Intent & Purpose

The City of New Castle is a city rich in history having first been settled by the Dutch in 1651. Its strategic location which allowed control of the Delaware River made New Castle an important colonial port, and thus was under the control of the Swedes, the Dutch, and finally Great Britain. In 1704 New Castle became the capitol of the colony, and in 1776 it became the capitol of the State.

As a result of this history many wealthy and important individuals resided in New Castle allowing for a city endowed with wonderful homes, much of which has been preserved. Not only is New Castle rich in many fine examples of various periods of architecture, but it is also blessed with many fine trees. New Castle has established a fine tradition of tree preservation, thanks in part to the work of the Tree Commission. It is the intent of this Urban Forestry Manual to continue to foster the preservation of trees, which give the City a unique visual character. Furthermore since trees are a source of shade, air conditioning and other environmental benefits, and yield both a high quality of life and economic benefits to the community, including enhanced property values the City is dedicated to the planting and protection of one of its greatest natural resources.

Tree Preservation and Management Regulations is the City's primary regulatory tool to provide for orderly protection of specified trees, to promote the health, safety, welfare, and quality of life for the residents of the City, to protect property values and to avoid significant negative impacts on adjacent properties. By assuring preservation and protection through regulations and standards of care, these resources will remain significant contributions to the landscape, streets and parks and continue to help define the unique character of New Castle.

The Urban Forestry Manual is a separately published document issued by the Director of Public Services to establish specific technical regulations, standards and specifications necessary to implement the Ordinance, and to achieve the City's tree preservation goals. These goals are intended to provide consistent care and serve as benchmark indicators to measure achievement in the following areas:

- A. Insure and promote preservation of the existing tree canopy cover within the City limits
- B. Provide standards of maintenance required for protected and city-owned trees
- C. Establish criteria for determining when a tree is unsafe and a possible threat to the public health, safety and welfare
- D. Provide standards for the replacement of trees that are permitted to be removed

- E. Increase the survivability of trees during and after construction events by providing protection standards and best management practices

City of New Castle’s Protected Trees

Section 74-8 of the City of New Castle Code defines a protected tree as:

- A. A Protected Tree shall be any tree listed on the Delaware Urban Community Forestry Advisory Council Recommended Plant List, including those located on private property, that is greater than 30 inches in circumference measured at 54 inches above natural grade, or any Heritage Tree so designated by City Council.
- B. Any tree planted in the right-of-way as authorized by the Public Services Director based upon recommended street trees as defined in the Urban Forestry Manual.

Medium to Large Trees

Acer rubrum	Red Maple
Aesculus X Carnea	Red Horse Chestnut
Alnus glutinosa	Black Alder
Betula nigra	Heritage River Birch
Betula platyphylla	Whitespire Birch
Cornus betulus	European Hornbeam
Celtis occidentalis	Hackberry
Fraxinus Americana	White Ash
Fraxinus pennsylvanica	Green Ash
Ginkgo biloba (male)	Ginkgo
Gleditsia triacanthos inermis	Honolocust
Gymnocladus dioica	Kentucky Coffeetree
Koeleruteria paniculata	Goldenraintree
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tulip Tree
Maclura pomifera inermis (male)	Osage Orange
Metasequoia glyptostroboides	Dawn Redwood
Nyssa sylvatica	Tupelo
Ostrya virginiana	American Hophornbeam
Platanus X acerifolia	London Plantree
Prunus sargentii	Sargent Cherry
Quercus bicolor	Swamp White Oak
Quercus imbricaria	Shingle Oak
Quercus macrocarpa	Bur Oak
Quercus palustris	Pin Oak
Quercus phellos	Willow Oak
Quercus robur	English Oak

Quercus rubra
Quercus shumardii
Robinia pseudoacacia
Taxodium distichum
Tilia Americana
Tilia cordata
Tilia tomentosa
Ulmus parvifolia
Zelkova serranta

Northern Red Oak
Shumard Oak
Blacklocust
Baldcypress
Basswood
Littleleaf Linden
Silver Linden
Chinese Elm
Japanese Zelkova

Protected Street Trees (limited space or overhead wires)

Acer buergeranum
Acer campestre
Acer ginnala
Crataegus punctata inermis
Maackia amurensis
Malus spp.
Prunus Accolade
Cherry
Syringa reticulata
Cornus racemosa (tree form)

Trident Maple
Hedge Maple
Amur Maple
Thornless Hawthorn
Amur Maackia
Crabapple
Accolade Flowering
Japanese Tree Lilac
Gray Dogwood

The Director of Public Services is justified by field conditions such as conflict with utilities or a public nuisance, to have the discretion to modify or add to any condition, practice or standard mentioned within the Manual.

ASSUMPTIONS AND LIMITING CONDITIONS

No responsibility is assumed by the Mayor and Council of New Castle for matters legal in character regarding this Manual. Any legal description that may be provided is assumed to be correct. Care has been taken to obtain reasonable information from reliable sources for this Manual. This Manual has been crafted to conform to current standards of care, best management practices, evaluation and appraisal procedures, diagnostic and reporting techniques and sound arboricultural practices as recommended by the sources listed in the References section.

Section 1.00 DEFINITIONS

Certain terms that are unique to the arboricultural or construction industry are defined to provide a uniform understanding of the terms and concepts used and mentioned in this document and are found in the Definitions Section of both the Manual, and in the Green Infrastructure Ordinance Chapter 74 Article 1 Trees

1. Appraisal (see Tree Appraisal, Section 1.28).

2. **Building Area** means the area of a parcel that upon which, under applicable zoning regulations, a structure may be built without a variance.
3. **Building Footprint** means the two-dimensional configuration of a building's perimeter boundaries measured on a horizontal plane at grade level.
4. **Certified Arborist** is an individual who has demonstrated knowledge and competency through obtainment of the current International Society of Arboriculture arborist certification.
5. **City Arborist** means the person designated as such by the Public Services Director.
6. **Compaction** means compression of the soil structure or texture by any means that creates an upper layer that is impermeable ('cap'). Compaction is injurious to roots and the health of a tree (see Soil Compaction Damage, Section 2.13).
7. **Dangerous** see Hazardous.
8. **Dead Tree** means a tree that is dead or that has been damaged beyond repair or is in an advanced state of decline (where an insufficient amount of live tissue, green leaves, limbs or branches, exists to sustain life) and has been determined to be such by a certified arborist. If the tree has been determined to be dead, removal is permitted under Section 74-14 Hazardous Trees of the City Code
9. **Diameter at Breast Height (DBH)** or Diameter at Standard Height means the diameter of the perimeter tree trunk at four and one-half feet (or 54 inches) above natural grade level.
10. **Director** means the Public Services Director or the Director's designee, unless otherwise specified in the Manual.
11. **Disturbance** refers to all of the various activities from construction or development that may damage trees.
12. **Drip-line Area** means the area within X distance from the trunk of a tree, measured from the perimeter of the trunk of the tree at 54-inches above natural grade, where X equals a distance ten times the diameter of the trunk at 54-inches above natural grade.
13. **Excessive Pruning** means: removing in excess, one-fourth (25 percent) or greater, of the functioning leaf, stem or root area. Pruning in excess of 25 percent is injurious to the tree and is a prohibited act. Excessive pruning typically results in the tree appearing as a 'bonsai', 'lion's-tailed', 'lolly-popped' or overly thinned (see 'Standards for Pruning Protected Trees', Section 5.02).
 - Unbalanced Crown. Excessive pruning also includes removal of the leaf or stem area predominantly on one side, topping, or excessive tree canopy or crown raising. Exceptions are when clearance from overhead utilities or public improvements is required or to abate a hazardous condition or a public nuisance.
 - Roots. Excessive pruning may include the cutting of any root two (2) inches or greater in diameter and/or severing in excess of 25 percent of the roots.
14. **Hazardous Tree** refers to a tree that possesses a structural defect which poses an imminent risk if the tree or part of the tree that would fall on someone or something of value (target)(see Determining if a tree is Hazardous, Section 4.00).
 - Structural defect means any structural weakness or deformity of a tree or its parts. A tree with a structural defect can be verified to be hazardous by a certified arborist and confirmed as such by the City Arborist. For the purpose of tree removal information required by the City, the tree report shall include a completed ISA-TREE HAZARD EVALUATION FORM, or an approved equivalent. The City Arborist retains

discretionary right to approve or amend a hazardous rating, in writing, and recommend any action that may reduce the condition to a less-than significant level of hazard. If the tree has been determined to be hazardous, removal of the tree is permitted under Section 74-14 of the City Code.

15. **Injury** means a wound resulting from any activity, including but not limited to ‘excessive pruning’, cutting, trenching, excavating, altering the grade, paving or compaction within the tree protection zone of a tree. Injury shall include bruising, scarring, tearing or breaking of roots, bark, trunk, branches or foliage, herbicide or poisoning, or any other action foresee ably leading to the death or permanent damage to tree health.
16. **Protected Tree** means: See Section 74-8 of this code, and the list of protected trees as mandated by this Urban Tree Manual.
17. **Protective Tree Fencing** means a temporary enclosure erected around a tree to be protected at the boundary of the tree protection zone. The fence serves three primary functions: 1) to keep the foliage crown, branch structure and trunk clear from direct contact and damage by equipment, materials or disturbances; 2) to preserve roots and soil in an intact and non-compacted state; and 3) to identify the tree protection zone in which no soil disturbance is permitted and activities are restricted.
18. **Nuisance Trees** means either an individual tree or shrub on any private property or in any street, or a type or species apt to destroy, impair or otherwise interfere with any street improvements, sidewalks, curbs, street trees, gutters, sewers, or other public improvements, including above and below ground utilities, or may cause significant damage to private property.
19. **Recommended Practice** means an action, treatment, technique or procedure that may be implemented for superior care or preservation of trees.
20. **Removal** means any of the following:
 - Complete tree removal such as cutting to the ground or extraction of the tree.
 - Taking any action foresee ably leading to the death of a tree or permanent damage to its health or structural integrity, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or trenching, excavation, altering the grade, or paving within the drip-line of the tree.
21. **Root Buffer** means a temporary layer of material to protect the soil texture and roots. The buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, capped by a base course of 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top.
22. **Site Plan** means a set of drawings (e.g. preliminary drawings, site plan, grading, demolition, building, utilities, landscape, irrigation, tree survey, etc.) that show existing site conditions and proposed landscape improvements, including trees to be removed, relocated or to be retained. Site plans shall include the following minimum information that may impact trees:
 - Surveyed tree location, species, size, dripline area (including trees located on neighboring property that overhang the project site) and street trees within 30-feet of the project site.
 - Paving, concrete, trenching or grade change located within the tree protection zone.
 - Existing and proposed utility pathways.

- Walls, tree wells, retaining walls and grade change barriers, both temporary and permanent.
 - Landscaping, irrigation and lighting within dripline of trees, including all lines, valves, etc.
 - Location of other landscaping and significant features.
 - All of the final approved site plan sheets shall reference tree protection instructions
- 23. Soil Compaction** means the compression of soil particles that may result from the movement of heavy machinery and trucks, storage of construction materials, structures, paving, etc. within the tree protection zone. Soil compaction can result in atrophy of roots and potential death of the tree, with symptoms often taking 3 to 10-years to manifest
- 24. Soil Fracturing** means the loosening of hard or compacted soil around a tree by means of a pneumatic soil probe that delivers sudden bursts of air to crack, loosen or expand the soil to improve the root growing environment.
- 25. Street Tree** means any publicly owned tree, shrub or plant growing within the street right-of-way, outside of private property. In some cases, property lines lie several feet behind the sidewalks.
- 26. Target** is a term used to include people, vehicles, structures or something subject to damage by a tree.
- 27. Topping** means the practice of cutting back large-diameter branches or truncating the main stem.
- 28. Tree Appraisal** means a method of determining the monetary value of a tree as it relates to the real estate value of the property, neighborhood or community. When required, a certified arborist determines the appraisal by adjusting a tree's basic value by its condition, location and species using the most recent edition of the Guide for Plant Appraisal, published by the Council of Tree and Landscape Appraisers
- 29. Tree Protection and Preservation Plan** means a plan prepared by a certified arborist that outlines measures to protect and preserve trees on a project. This plan shall include requirements for pre-construction; treatments during demolition and/or construction; establish a tree protection zone for each tree; tree monitoring and inspection schedule.
- 30. Tree Protection Zone or (TPZ)** means, unless otherwise specified by a project arborist or City Arborist, the area of temporary fenced tree enclosure. Within the TPZ, roots that are critical for tree survival are typically found in the upper three foot soil horizon, and may extend beyond the drip-line area. Protecting the roots in the TPZ is necessary to ensure the tree's survival. The TPZ is a restricted activity zone where no soil disturbance is permitted, unless otherwise approved. TPZ must be identified for each tree and shown on all applicable improvement plans for a development project.
- Determining the TPZ. Unless otherwise specified, the approved minimum TPZ shall be formulated in the following way: the TPZ radius shall be 10 times the DBH of the trunk. For example: a 2-foot DBH = a 20-foot radius from the perimeter of the trunk—or a 40-foot TPZ. The City Arborist retains discretionary right to extend or modify the TPZ at any time.
- 31. Tree Report** means a report submitted to the City for review that is prepared by a certified arborist retained by the property owner or agent. • Tree Survey Report. In

the case of an application for development, a tree survey report is required to provide information about all trees on the site including: inventory of all trees, location, species, size, condition, maintenance needs, potential impacts of disturbance, recommended mitigation measures, tree appraisal value, etc.

- 32. Trenching** means any excavation to provide irrigation, install foundations, utility lines, services, pipe, drainage or other property improvements below grade. Trenching within the TPZ is injurious to roots and tree health and is prohibited, unless approved. If trenching is approved within the TPZ, it must be in accordance with instructions and table outlined in this Manual

SECTION 2.00 - PROTECTION OF TREES DURING CONSTRUCTION

The objective of this section is to reduce the negative impacts of construction on trees. Disruption of this environment by construction activities interrupts the tree's physiological processes causing depletion of energy reserves and a decline in vigor, often resulting in the tree's death. The tree protection regulations are intended to guide a construction project to insure that appropriate practices will be implemented in the field to eliminate undesirable consequences that may result from uninformed or careless acts, and preserve both trees and property values.

2.01 TREE PROTECTION AND PRESERVATION PLAN

Prior to commencement of a development project over 5,000 square feet, the developer or owner shall have prepared a Tree Protection and Preservation Plan if any activity is within the drip-line of a Protected Tree. The Tree Protection Plan will be prepared by a certified arborist to assess impacts to trees; recommend mitigation to reduce impacts to a less than significant level and identify construction guidelines to be followed through all phases of a construction project. The City has the option of accepting or rejecting the Tree Protection and Preservation Plan, if in the City's opinion a more suitable means of tree preservation is feasible.

2.02 PRE-CONSTRUCTION REQUIREMENTS

The following six steps shall be incorporated within the Tree Protection and Preservation Plan prior to building permit issuance.

A. Site Plan

On all improvement plans for the project, plot accurate trunk locations and the 'dripline areas' of all trees or groups of trees to be preserved within the development area. (see Site Plan, Section 1.00). In addition, for Protected and Street Trees the plans shall accurately show the trunk diameter, tree canopy, drip-line and clearly indicate the tree protection zone to be enclosed with the specified tree fencing as a bold dashed line.

B. Verification of tree protection

The project arborist or contractor shall verify, in writing, that all pre-construction conditions have been met (tree fencing, erosion control, pruning, etc.) and is in place.

Written verification must be submitted to and approved by the Building Official prior to demolition, grading or building permit issuance.

C. *Pre-construction meeting:*

Land development activities involving over 5,000 square feet of land disturbing activity for property containing protected trees will require a pre-construction meeting.

D. *Protective Tree Fencing for Protected Trees or Street Trees*

Fenced enclosures shall be erected around trees to be protected to achieve three primary goals, (1) to keep the foliage crowns and branching structure clear from contact by equipment, materials and activities; (2) to preserve roots and soil conditions in an intact and non-compacted state and; (3) to identify the tree protection zone (TPZ) in which no soil disturbance is permitted and activities are restricted, unless otherwise approved

2.03 TREE PROTECTION FENCING

A. *Type of fencing*

The fences shall enclose the entire area under the canopy drip-line or TPZ of the tree(s) to be saved throughout the life of the project, and shall be at a minimum constructed of orange nylon type material at least 4 foot in height and appropriately marked as a Tree Protection Area. The Public Service Director, or the Building Official may approve other suitable fencing.

B. *Tree fencing*

Tree Fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection granting the Certificate of Occupancy, except for work specifically required in the approved plans in which case the project arborist or City Arborist shall grant permission to enter the TPZ.

C. *Tree Protection Zone or (TPZ)*

Each tree to be retained shall have a designated TPZ identifying the area sufficiently large enough to protect the tree and roots from disturbance. The recommended TPZ area can be determined by the formula outlined. The TPZ shall be shown on all site plans for the project. Improvements or activities such as paving, utility and irrigation trenching and other ancillary activities shall occur outside the TPZ, unless authorized by the City Arborist, or by project approval. Unless otherwise specified, the protective fencing shall serve as the TPZ.

1. *Activities prohibited within the TPZ include:*

- Storage or parking vehicles, building materials, refuse, excavated spoils or dumping of poisonous materials on or around trees and roots. Poisonous materials include, but are not limited to, paint, petroleum products, concrete or stucco mix, dirty water or any other material which may be deleterious to tree health.
- The use of tree trunks as a winch support, anchorage, as a temporary power pole, sign posts or other similar function.

- Cutting of tree roots by utility trenching, foundation digging, placement of curbs and trenches and other miscellaneous excavation without prior approval of the City Arborist.
 - Soil disturbance or grade change
2. **Activities permitted or required within the TPZ include:**
- **Mulching.** During construction, wood chips may be spread within the TPZ to a 4-to 6-inch depth, leaving the trunk clear of mulch to help inadvertent compaction and moisture loss from occurring. The mulch may be removed if improvements or other landscaping is required. Mulch material shall be 2-inch unpainted, untreated wood chip mulch or approved equal.
 - **Root Buffer.** When areas under the tree canopy cannot be fenced, a temporary buffer is required and shall cover the root zone and remain in place at the specified thickness until final grading stage.

C. Tree Pruning, Surgery and Removal

1. Pruning limitations:

- **Minimum Pruning:** If the project arborist recommends that trees be pruned, and the type of pruning is left unspecified, the standard pruning shall consist of ‘crown cleaning’ as defined by ISA Pruning Guidelines. Trees shall be pruned to reduce hazards and develop a strong, safe framework.
 - **Maximum Pruning:** Maximum pruning should only occur in the rarest situation approved by the City Arborist. No more than one fourth (25 percent) of the functioning leaf and stem area may be removed within one calendar year of any protected tree, or removal of foliage so as to cause the unbalancing of the tree. It must be recognized that trees are individual in form and structure, and that pruning needs may not always fit strict rules. The project arborist shall assume all responsibility for special pruning practices that vary from the standards outlined in this manual
 - **Tree Workers.** Pruning shall not be attempted by construction or contractor personnel, but shall be performed by a qualified tree care specialist or certified tree worker, according to specifications contained within this Manual.
2. **Surgery.** Prior to construction, if it is necessary to promote health and prolong useful life or the structural characteristics, then trees shall be provided the appropriate treatments (e.g. cavity screening, bark tracing, wound treatment, cables, rods or pole supports) as specified by the project arborist
3. **Tree Removal Procedure.** When Protected Trees are removed and adjacent trees that are to be preserved (as shown on the approved site plans) must be protected, then the following tree removal practices apply:

• Tree Removal

Removal of trees that extend into the branches or roots of Protected Trees shall not be attempted by demolition or construction personnel, grading or other heavy equipment. A certified arborist or tree worker shall remove the tree carefully in a manner that causes no damage above or below ground to trees that remain.

- *Stump Removal*

Before performing stump extraction, the developer shall first consider whether or not roots may be entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting the stump. Removal shall include the grinding of stump and roots to a minimum depth of 24-inches but expose soil beneath stump to provide drainage. In sidewalk or small planter areas to be replanted with a new tree, the entire stump shall be removed and the planting pit dug to a depth of 30 inches. If dug below 30-inches, compact the backfill to prevent settling. Large surface roots three feet from the outside circumference shall be removed, including the spoils and backfilled with City approved topsoil to grade, and the area tamped to settle the soil.

2.04 ACTIVITIES DURING CONSTRUCTION & DEMOLITION NEAR TREES

Soil disturbance or other injurious and detrimental activity within the Tree Protection Zone (TPZ) is prohibited unless approved by the City based on a tree report. If an injurious event inadvertently occurs, or soil disturbance has been specifically conditioned for project approval, then the following mitigation is required:

A. Soil Compaction

If compaction of the soil occurs, it shall be mitigated as outlined in Soil Compaction Damage, Section 5.08.

B. Grading Limitations within the Tree Protection Zone

- Grade changes outside of the TPZ shall not significantly alter drainage to the tree.
- Grade changes within the TPZ are not permitted.
- Grade changes under specifically approved circumstances shall not allow more than 6-inches of fill soil added or allow more than 4-inches of existing soil to be removed from natural grade unless mitigated.
- Grade cuts exceeding 4-inches shall incorporate retaining walls or an appropriate transition equivalent.
- Tree well plans may be proposed for consideration.

C. Trenching, Excavation and Equipment Use

1. Excavation. Any approved excavation, demolition or extraction of material shall be performed with equipment sitting outside the TPZ. Methods permitted are by hand digging, hydraulic or pneumatic air excavation technology. Avoid excavation within the TPZ during hot, dry weather.

- If excavation or trenching for drainage, utilities, irrigation lines, etc., it is the duty of the contractor to tunnel under any roots 2-inches in diameter and greater.
- Prior to excavation for foundation/footings/walls, grading or trenching within the TPZ, roots shall first be severed cleanly 1 foot outside the TPZ and to the depth of the future excavation. The trench must then be hand dug and roots pruned with a saw, sawzall, narrow trencher with sharp blades or other approved root pruning equipment.

2. *Heavy Equipment.* Use of backhoes, steel tread tractors or any heavy vehicles within the TPZ is prohibited unless approved by the City Arborist. If allowed, a protective root buffer is required. The protective buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, layered by 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top. This buffer within the TPZ shall be maintained throughout the entire construction process.

- *Structural design.* If injurious activity or interference with roots greater than 2-inches will occur within the TPZ, plans shall specify a design of special foundation, footing, walls, concrete slab or pavement designs subject to City Arborist approval. Discontinuous foundations such as concrete pier and structural grade beam must maintain natural grade (not to exceed a 4-inch cut), to minimize root loss and allow the tree to use the existing soil.

D. Tunneling & Directional Drilling Required Practices

If trenching or pipe installation has been approved within the TPZ, then the trench shall be either cut by hand, air-spade, hydraulic vac-on excavation or, by mechanically boring the tunnel under the roots with a horizontal directional drill and hydraulic or pneumatic air excavation technology. In all cases, install the utility pipe immediately, backfill with soil and soak within the same day. Installation of private utility improvements shall be tunnel bored beneath the tree and roots.

E. Street Trees

There is an exclusion for street trees in the publicly owned right-of-way (ROW). Street Trees that are in conflict with utility infrastructure where the conflict cannot be resolved may be removed if approved by Director (e.g., a tree planted directly on top of a damaged sewer lateral.)

2.05 DAMAGE TO TREES

A. Reporting

Any damage or injury to trees shall be reported within 6-hours to the project arborist and job superintendent or the Director so that mitigation can take place. In the event of injury, the following mitigation and damage control measures shall apply:

1. *Root injury:* If trenches are cut and tree roots 2-inches or larger are encountered they must be cleanly cut back to a sound wood lateral root. The end of the root shall be covered with either a plastic bag and secured with tape or rubber band, or be coated with latex paint. All exposed root areas within the TPZ shall be backfilled or covered within one hour. Exposed roots may be kept from drying out by temporarily covering the roots and draping layered burlap or carpeting over the upper 3-feet of trench walls. The materials must be kept wet until backfilled to reduce evaporation from the trench walls.
2. *Bark or trunk wounding:* Current bark tracing and treatment methods shall be performed by a qualified tree care specialist within two days.

3. *Scaffold branch or leaf canopy injury*: Remove broken or torn branches back to an appropriate branch capable of resuming terminal growth within five days. If leaves are heat scorched from equipment exhaust pipes, consult the project arborist within 6 hours.

B. Penalty for damage to street trees

In the event that street trees or their roots have been damaged, the contractor or property owner shall be subject to the penalty rate of \$100.00 per inch of damage. Measurement of the damage shall be the width of the wound measured across the grain at the widest point.

2.06 INSPECTION SCHEDULE

The project arborist or Landscape Architect retained by the applicant shall conduct the following required inspections of construction sites containing protected trees. Inspections shall verify that the type of tree protection and/or plantings are consistent with the standards outlined within this Manual. For each required inspection or meeting, a written summary of the changing tree related conditions, actions taken, and condition of trees shall be provided to the Building Official.

INSPECTION SCHEDULE

- A. *Inspection of Protective Tree Fencing*. The Director shall be in receipt of a written statement from the applicant or project arborist verifying that he has conducted a field inspection of the trees and that the protective tree fencing is in place prior to issuance of a demolition, grading, or building permit, unless otherwise approved.
- B. *Pre-Construction Meeting*. Prior to commencement of construction for any project over 5,000 square feet, the applicant or contractor shall conduct a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, project arborist, or City Arborist.
- C. *Special activity within the Tree Protection Zone*. Work in this area (TPZ) requires the direct onsite supervision of the project arborist.
- D. *Landscape Architect Inspection*. For land development projects, prior to the issuance of a certificate of occupancy, the applicant or contractor shall call for the Landscape Architect to perform an on site inspection of all plant stock, quality of the materials and planting. The City shall be in receipt of written verification of Landscape Architect approval prior to scheduling the final inspection, unless otherwise approved.

2.07 PAVEMENT AND HARDSCAPE CONFLICTS WITH TREE ROOTS

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks or curbs (hard-scape). Improper or careless extraction of these elements can cause severe injury to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the TPZ of a Protected Street Tree.

A. Removal and Replacement of Pavement or Sidewalk:

1. Removal of existing pavement over tree roots shall include the following precautions: Break hard-scape into manageable pieces with a jackhammer or pick and hand load the pieces onto a loader. The loader must remain on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within one hour, then wet the chips and base rock and keep moist until overlay surface is applied.
2. Replacement of pavement or sidewalk: An alternative to the severance of roots greater than 2- inches in diameter should be considered before cutting roots. If an alternative is not feasible remove the sidewalk, grind roots only as approved by the City Arborist and replace sidewalk using #3 dowels at the expansion joint if within 10-feet of a street tree. Use wire mesh reinforcement within if within 10-feet of the trunk of a protected or street tree.

The following remedies should be considered before cutting tree roots that may result in tree instability or decline:

- Grinding a raised sidewalk edge.
- Ramping the walking surface over the roots or lifted slab with pliable paving.
- Routing the sidewalk around the tree roots.
- Install flexible paving or rubberized sections.
- On private property, new sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are: permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, porches elevated on posts and brick or flagstone walkways on sand foundations.

B. Conflicts and associated costs can be avoided or reduced by the following

- Plant deep rooted trees that are proven to be non-invasive.
- Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.
- Follow soil loosening planting techniques to promote deep rooting.
- Install root barrier only along the hard-scape area of the tree (but allow roots to use open lawn or planter strip areas).
- Dedicate at least 10-linear feet of planting space for the growth of each tree.

C. Alternative Base Course Materials

When designing hard-scape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix.

SECTION 3.00 - REMOVAL, REPLACEMENT AND PLANTING OF TREES

A Protected Trees may not be removed without City review and approval, except in certain emergencies. The purpose of City review is to verify that the removal is allowed

under City law, and to prevent unnecessary tree removal. Removed trees must be replaced by the owner of the tree. This section describes the type and size of tree required, and the planting techniques to be used. It also describes how to determine the replacement value of a tree that cannot be replaced in its original location, and the circumstances in which the City may require a security deposit to assure the survival of trees during development projects.

3.01 TREE REMOVAL

A. Allowable Removal

A written permit is required to remove a Protected Tree, except in emergency situations outlined in Hazardous Trees, Section 4.00. Removal of Protected Trees is allowed according to section 74-15 of the City Code.

B. Permit Application

Tree Removal Applications are available at the Public Services Department. The following is a checklist of items necessary for City review for tree removal. Additional information may be required by the reviewing staff. Response will generally be mailed to the applicant within 30 days. The removal permit must be on site during the removal.

C. Failure to Obtain Required Permit

Those individuals who fail to obtain the required Tree Removal Permit may, among other penalties established in this code, be required to pay a double permit fee.

3.02 TREE REMOVAL CHECKLIST

- Completed City of New Castle Tree Removal Application
- Arborist letter report from a certified arborist on company letterhead to include the following information for each tree:
- A written narrative describing the tree species (common and scientific); location (in relation to street, structures and property line); size (DBH, height & crown spread); condition (foliage, vigor, structural integrity, etc.); life expectancy and prognosis (is the tree hazardous, severe decline, property damage, etc.?)
- check or money order for \$30.00

3.03 HAZARDOUS TREE REMOVAL

To remove a Protected Tree that has been verified as hazardous, as defined within 74-15 of the City Code and Urban Forestry Manual, written approval from the Director is required and must be available on site when the tree is being removed, unless emergency conditions exist (see Emergency Removal Conditions, Section XXXX).

3.04 REQUIRED TREE REPLACEMENT

When a Protected Tree is to be replaced on site, the following standards shall apply:

- A. *Species* The replacement trees shall be the same species unless the Director determines that another species would be more suitable for the location. Factors to be considered include the long term health of the tree in the location and its compatibility with the adjacent uses as well as design considerations.
- B. *Location* The location of the replacement tree on site shall be approved by the Director. If it is not possible or desirable to replace the tree on site, Section 3.05 shall apply.

3.05 ALTERNATIVES WHEN PROTECTED TREES CANNOT BE REPLACED

In some circumstances, crowding or other physical constraints make it impossible or undesirable to replace a tree of equal value in the same place. In that case, the value of the tree shall be computed under the Tree Value Replacement Standard in Section 3.06. Once the value has been determined, that sum of money shall be used in the following order of preference, as approved by the Director:

- (1) to provide additional trees elsewhere on the site;
- (2) to add or replace street trees or other public landscaping in the vicinity, or
- (3) to add trees or other landscaping to other City property.

3.06 TREE CANOPY REPLACEMENT STANDARD

Often it is not possible to replace a large, older tree with a single equivalent tree. In such cases, the following tree canopy replacement ratio shall be used:

TABLE 3-1
Tree Canopy - Replacement Standard

Column 1	Column 2	Column 3
Canopy of the Removed Tree	Replacement Tree	Alternative Tree
4'-9'	Two 24" B&B	One 36" B&B
10'-27'	Three 24" B&B	Two 36" B&B
28'-40'	Four 24" B&B	Two 48" B&B
41'-56'	Six 24" B&B	Two 48" B&B Two 36" B&B
57'+	Two 24" B&B Two 36" B&B Two 48" B&B	

*Add half of the difference between the two to the narrowest measurement for the average canopy.

Note: Basis of this table is determined by the growth of one 24" box size tree, growing at a rate equivalent to 9 feet of canopy over the course of ten years.

How to use Table 3-1, Tree Canopy Replacement Table:

- Column 1. Determine the leaf canopy of the removed tree by measuring the distance across the canopy at the widest point and narrowest point. Add half of the difference between the two to the narrowest measurement for the average canopy. The leaf canopy diameter of the tree (this information is typically supplied within the arborist report) is used to determine number and size of replacement trees in Column 2.
- Column 2. Determine the number of replacement trees. The planting of new trees should equal to the leaf canopy of the removed tree within a period of ten years. The minimum replacement for removal of any Protected Tree shall be two 24-inch box trees.
- Column 3. Alternative size of trees may be desired. The property owner shall have the option to plant an alternative size tree to accommodate site specific landscape needs or constraints, such as space, design or soil volume limitations.

Example of Tree Canopy Replacement Ratio:

The removal of a tree with a 39' crown spread will require four 24inch box trees to satisfy the criteria of this Section. Methodology-e.g. the average canopy of a new tree is 4' wide + the expected canopy growth of 6" per year x 10 years = a 9' net canopy of one replacement tree. Thus, four 9' trees = 36' of new canopy, and is a close approximate to the original 39' canopy tree.

3.07 TREE VALUE REPLACEMENT STANDARD

When the value of a tree needs to be determined for establishing the amount of security required, or for any other purpose, the value shall be determined by using the most recent edition of the Guide for Plant Appraisal published by the Council of Tree and Landscape Appraisers.

3.08 SECURITY DEPOSITS

As a condition of a development approval, the Director may require that the developer post security of between 25% and 100% of the value of the trees to be preserved, as determined under Section 3.05. The security may be a cash deposit, letter of credit, or surety bond and shall be filed with the Finance Department. It shall be in a form satisfactory to the City Solicitor. The security shall be posted before issuance of any grading or building permits. The guarantee period shall be specified; in general, it shall be at least two years after expected completion of construction. If the trees fail to survive, the developer shall replace them; if the developer fails to do so, the City may use the security to provide off site trees and/or landscaping as described in Section 3.05.

3.09 TREE AND SHRUB PLANTING SPECIFICATIONS

Planting specifications apply for trees and shrubs that are:

- 1) planted as a replacement for a Protected Tree,
- 2) to be planted as a street tree within the City right-of-way or other public land;
or
- 3) planted as part of a landscape plan

Using the following specifications will result in consistent city-wide plantings, and superior tree growth and vitality. To achieve this, the landscape architect shall incorporate these items into their specifications.

3.10 PLANTING STOCK

A. Quality

Plants shall be sound, healthy, vigorous, and free of plant disease and insect pests and their eggs. Container stock shall not be root bound or have girdling roots. Trees shall not have been topped or headed. Landscape Architect shall inspect and verify, in writing, that all plant material to be installed on the site meets the above standards and is acceptable. Plants and trees with broken tops, branches or injured trunks shall be rejected.

B. Miscellaneous Materials

- Mulch. Screened untreated wood chips 1/2- to 1-inch in size, spread to a 2-inch depth out to the edge of the root ball. The mulch should be kept at least two inches away from the trunk and shall be applied to each tree.

3.11 PLANTING SITE PREPARATION

A. Soil Preparation and Conditioning

- All debris, wood chips, pavement, concrete and rocks over 2 inches in diameter shall be removed from the planting pit to a minimum of 24-inch depth, unless specified otherwise

B. Planter Pit

- Trees in a confined planter pit or sidewalk area: The planting hole shall be excavated to a minimum of 30-inches deep x the width of the exposed area. Scarify the sides of the pit. Soil beneath the root-ball shall be compacted to prevent settling.
- Trees in all other areas: Excavate the hole's width a minimum of three times the diameter of the container, and deep enough to allow the root ball of the container to rest on firm soil. Scarify the sides and the bottom of the pit.
- The height of the container root ball should be 1-2-inches higher than grade level, except when structural urban tree soil mix is used, in which case the tree may be planted at level grade.

3.12 PLANTING THE TREE

A. Perform percolation test

If the soil is dry, add a few inches of water in the hole. Let it drain before planting the tree

B. Depth

To check the proper depth of the rootball, place the tree in the hole and lay a pole or shovel across the original grade - the top of the root ball should be 1 to 2-inches higher

C. Container and Roots

Remove tree from the container and trim the root ball in the following way:

- Thick circling roots: straighten and/or cut cleanly
- Thin roots: make three to four vertical cuts 1/2-inch deep around rootball, spread the bottom out if necessary

D. Placing the Tree

Locate the tree in the hole, and rotate the tree to direct the main branches away from the street side, if possible.

E. Filling the Hole

Fill the hole halfway up with original soil and gently tamp out air pockets with a pole or shovel handle. Add about 1-inch of water, and let drain. Fill the rest of the hole to grade, water the fill soil, and let drain.

F. Staking

Stake only if conditions require it. Place the stakes at the edge of the root ball (drive them 2-feet into undisturbed ground), and avoid contact with the branches. If in a windy area, set the stakes in a plane at right angles to the wind. Remove the nursery stake. Loosely place two ties in a figure eight around the trunk, as low as needed to hold the tree upright and nail to the stake. Stakes shall be trimmed so that the branches clear the top of the stake. Do not install a cross-brace.

G. Berm, Mulch and Water

In non-turf areas, form a soil berm 3 to 4-inches high at the outermost edge of the root ball. Place 1 to 2-inches of mulch or bark over root ball and berm, keeping the mulch away from the trunk a minimum of 2-inches. Fill the berm with water to capacity

3.13 PLANTING IN DIFFICULT SOIL CONDITIONS

A. Turf Areas

In turf areas that receive regular watering, the watering berm may be eliminated. The turf shall be maintained a minimum of one foot from the new tree stem, and mulch placed on top of the root-ball. The mulch shall not be touching the tree stem.

B. Alternate Specifications

Occasionally, tree planting must occur in poor or difficult soil where standard planting techniques will result in poor-to-average performance or mortality (such as unique or unusual regional geology, slope, soil volume, restrictive physical or chemical properties, poor drainage, etc.). In this case, the responsible party must investigate alternative solutions to enable long term tree growth. Alternative planting specifications or plans that vary from the native or typical soil conditions shall be submitted to the City Arborist for approval prior to installation.

4.00 HAZARDOUS TREES

Property owners are responsible for the trees on their own property. The City does not require advance permission for removal of Protected Trees in emergencies. However, it does require documentation of the problem after the fact. This is to avoid the unlawful removal of sound trees on the grounds that they are hazardous. If there is no immediate danger, and the structural deficiency can be corrected, it should be. If the City determines that there was no reasonable basis for believing there was an emergency, the property owner may face penalties for violating City law.

The health and safety of a tree are two distinct and separate functional characteristics. A vigorous and healthy tree may not necessarily be of sound wood or structure. To remove a dangerous Protected Tree, it must first be evaluated and the tree determined to be “hazardous” as defined in this section. This must be verified in writing by submitting to the Public Services Director a report from a certified arborist stating that the tree is a hazard and must be removed. The same process will follow as that required for the removal of a nuisance tree as mandated in section 74-14 of the City Code.

Should an application be made that the certified arborist recommends immediate removal that involves a potential immediate hazard to life or property, the Public Services Director may authorize immediate action in the removal of the tree.

A. Tree Hazard Responsibility

On private property, it is the responsibility of the property owner to mitigate or abate a known hazardous condition of a Protected Tree that may be of questionable structure or deemed as hazardous. Most tree hazards can be prevented with regular checkups by a tree care professional and timely maintenance action by the property owner. Street trees on city property that may be a public safety hazard should be reported to Public Works at 322-9813.

B. Recognizing Tree Hazards

Determining whether or not a tree’s defects, constitutes a condition that presents an imminent hazard to an area requires a high degree of knowledge and experience. Hazard tree assessment of a protected or designated tree should only be evaluated by an arborist who is familiar with tree physiology and can interpret the external signs of weaknesses, who can perform internal checks if necessary and recommend mitigation

4.01 EMERGENCY REMOVAL CONDITIONS

A. Abatement

When a tree has partially failed or it is apparent it is about to fail and persons or property are threatened the tree may be removed without City review or approval. The City does not require an arborist report before the removal in this instance.

B. Authorization

Such cases must be substantiated after the fact by the property owner and tree professional with photographs, abatement information, insurance claim or other relevant information and completion of a Protected Tree Removal Application. The information is to be submitted to the Public Services Director within five days of emergency removal. All other authorizations are subject to the standard procedure outlined in Removal of Protected Trees, Section 3.00 of this manual.

4.02 CRITERIA USED BY THE CITY TO DETERMINE IF A TREE IS HAZARDOUS

A. Definition of Hazardous

City Ordinance Chapter 74 defines ‘Hazardous’ as: an imminent hazard or threat to the safety of persons or property. If a tree possesses a structural defect that may cause the tree or part of the tree to fall on someone or something of value (i.e. ‘target’), and the condition is determined to be imminent, the tree is considered hazardous.

B. Evaluation Form

The City uses the national standard, an ISA - HAZARD EVALUATION FORM as a basis to determine the hazard rating of a tree this form, or an approved equivalent, must be completed by a certified arborist.

C. Authorization

If the hazardous condition or target cannot be mitigated or reduced to a less than significant level then the tree shall be authorized by the City and removed by the property owner to abate the condition.

4.03 DETERMINING A TREE’S HAZARD RATING

For the purpose of removal, if a tree is declared a hazard it must be rated for the level of hazard to persons or property by using the Hazard Rating Formula, or other professional methodology acceptable to the City.

A. Failure Potential Rating

Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The scope of the professional evaluation will include structural defects in the tree (including branches, trunk and roots; and if necessary, shall employ the use of the most current methods of internal decay inspection available); soil/slope

and/or creek bank stability; individual species susceptibility to failure; pruning; history; decay weaknesses and any other compromising or pertinent factors considered by the consultant.

B. Target Rating

Evaluation of potential targets shall include people, structures or property use and occupancy that are imminently threatened. Property use shall consider what structures or activities are under or around the tree (e.g. building, parking, pedestrian, recreational, utility lines, hard-scape, etc.). Occupancy shall consider frequency of the use (occasional, intermittent, frequent or constant), and whether the target will be present when failure occurs.

- Consideration shall be given as to whether the target can be reasonably removed or isolated to reduce the hazard rating to a less than significant level. A target means people or property (public or private).
- A tree may be a potential hazard if it is: (a) a tree with the potential to fail; (b) in an environment that increases the likelihood of failure and; (c) a tree that would strike a target.

C. Additional Factors

Evaluation of other factors that contribute to aggravating conditions shall be considered, such as: size of the affected defect (i.e. a small branch vs. the entire tree uprooting); significant potential of fire, utility line contact or catastrophic effects, etc.

4.04 TREE EVALUATION CHECKLIST

This part is intended to further help the property owner understand tree defects and how they may be interpreted by an arborist. Many tree defects are not readily apparent because decay or structural damage may be internal. Also, poor tree health may not reflect poor tree structure. Hazardous trees must be carefully evaluated. The following checklist of criteria that is typically used by professionals may indicate potential or current tree hazards. The checklist is not meant to be a comprehensive guide, however, it is an outline of indicators that may alert a property owner to potential hazards and suggest action to avert a tree failure and liability. If you answer 'yes' to one or more of the checklist items, you should contact an arborist to discuss how to reduce the potential hazard.

A. Hazard Evaluation Questionnaire

- Target: If the tree or branch falls will it hit cars, houses, structures, power lines or people? If so, immediate action may be necessary.
- Dead Branches: Are there dead tops or branches? Is the tree dead?
- Cracks: Are there deep, open cracks in the trunk or branches? These are major starting points for trunk and branch failure.
- Crotch Cracks: Are there deep, open cracks below joining trunks or stems?
- Tree Architecture: Has the tree grown beyond its species specific shape into a hazardous form? Is the tree leaning?
- History: Has the tree recently lost large branches?

- Edge Tree: Were neighboring trees recently removed, leaving tall trees exposed at the edge that may be subject to unexpected wind dynamics and blow-over?
- Living Branches: Do live branches bend abruptly upward or downward where tips of large branches were cut off? These may pull out of trunks that are weakened by rot or cracks. Beware of large branches on rotten or cracked trunks.
- Topping: Are large branches growing rapidly from topping cuts? These sprouts have weak attachments and may weaken further as they grow. Is there decay below topping cuts?
- Storm injury: Are there broken branches, split trunks, or injured roots? Are branches close to power lines?
- Root Rot: Are there fungus fruit bodies (mushrooms) on roots or near the trunk? Were roots injured by construction?
- Rots and Cankers: Are there hollows or cankers (dead spots) in the trunk or major branches, some with fungus fruit bodies?
- Construction injury: Have roots, trunk, or branches been injured?
- Is there a new lawn or garden over injured roots? The added fertilizer may stimulate the growth of fungi that will rot the supporting roots while the top gets heavier. A moderate storm could cause the tree to fall.
- Guying of trees. Staking and guying of small to medium size trees may benefit from the additional support. Discretion must be exercised that the guying does not hide weaknesses, such as toppling over, that result from poor quality nursery stock or girdling roots.

4.05 HAZARD REDUCTION AND PREVENTION

Review the following list to reduce hazardous conditions.

- Plant trees that are not problematic and that fit the site The International Society of Arboriculture (ISA) has developed a list to assist you to avoid planting a tree that may become a problem
- A healthy, vigorous tree that receives regular care is less likely to become hazardous than one that is ignored. Prevention is the best solution to the tree hazard problem.
- The risk of a hazard tree may be reduced by removing dead and broken branches, reducing branch end weights, by mechanically supporting weak branches from below, or by cabling and bracing. In some cases, targets may be removed such as by moving picnic tables or other items beneath a precarious tree, fencing to prevent access to such trees, or rerouting pedestrian or vehicular traffic.
- If there are no other options to abate the hazard, the tree may need to be removed entirely Steps outlined in the Tree Removal Procedure should be submitted as soon as possible for review by the City.

The following checklist will help property owners avoid future problems:

- .Inspect your trees carefully at least once each season every year.
- Annually, have a Certified Arborist inspect your trees and provide you with a written report.
- Avoid planting brittle species where falling limbs could injure people or property

- Prune trees when they are young and regularly thereafter. . Use correct pruning methods, always making the pruning cut outside the branch collar. This will allow only the minimum of decay infection.
- Do not allow topping.
- Always plant the right tree in the right place. Select trees based upon their mature height and shape, and make sure the species selected matches the soil and other site characteristics.
- Water thoroughly (generally, until saturation is reached) during dry periods, slowly applying at least 2-inches of water per week .
- Erect barriers around or slightly beyond the root protection zone of trees during construction. Insist that these root protection zones be honored by construction workers.
- Consider cabling or bracing weak forks of branches in larger trees of high value.
- Do not plant trees with a narrowly-forked stem v-crotch, imbedded bark or girdling root ball.

SECTION 5.00 TREE MAINTENANCE GUIDELINES

This chapter establishes the minimum standard of care and maintenance of New Castle’s Protected Trees. These standards and guidelines are based on sound arboricultural principles.

5.01 PROHIBITED ACTS

A. Excessive Pruning

Except for clearance pruning of utility lines, traffic or abating a Public Nuisance, excessive pruning (see Excessive Pruning, Section 1.15) shall be considered a prohibited act.

B. Topping

Topping shall be considered a prohibited act (see Topping, Section 1.33). Seek alternatives to topping (see Crown Reduction, Section 5.20-A).

C. Other prohibited actions

Taking any action forseably leading to the death of a protected tree or permanent damage to its health, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or trenching, excavating, altering the grade, or paving within the dripline area of a tree.

5.02 STANDARDS FOR PRUNING PROTECTED TREES

The most compelling reason to prune trees is to develop a strong, safe framework. All work to be performed on Protected Trees shall be in accordance with the most current edition of the following industry standards.

5.03 PRUNIING MATURE TREES

A. Tree Injury

Climbing and pruning practices shall not injure the tree except for the pruning cuts.

B. Timing of Pruning

To reduce the probability of insect infestation, disease or infection, the following seasonal restrictions apply, except when public safety is a concern

- Pine (Pinus spp.) or Elm (Ulmus spp.): Do not prune May-October
- All species: Do not prune during the flush of spring shoot growth
- Trees with thin bark: Do not prune in summer when sun scald injury may be a factor
- Deciduous trees (leafless in winter): Best pruned November-February
- Hazardous trees of any species may be pruned any time of the year for abatement reasons

5.04 PRUNING DISTRESSED TREES

Distressed trees require as much leaf area as possible to overcome stressed conditions. To avoid additional injury, the following measures shall be followed for these trees.

A. Injury or Disturbance

If a tree has been damaged by injury or disturbance, delay pruning until deadwood becomes evident (typically 1-3 years after injury). Crown cleaning is then recommended.

B. Neglect

Trees that have received little or no care or maintenance may need moderate crown thinning, reduction of end weights or entire crown restoration.

5.05 PRUNING YOUNG TREES

The average life expectancy for trees growing in harsh urban conditions is 7-10 years.

By pruning trees early, it will improve life expectancy and is a proven, cost-effective measure. Added benefits are also reflected in safer trees with fewer branch failures. For trees that serve as a replacement for a Protected Tree, they shall be pruned in the following way:

- Young trees should be pruned during the second year after planting to improve their structure, and only minor crown cleaning every 3-7 years thereafter. Refer to ISA Tree Pruning Guidelines
- Do not top the main leader except to position the lowest main branch. Other main branches should be spaced at least 18-inches apart to alleviate a tight grouping branches.
- Select permanent branching and allow temporary low branching on the lowest part of the trunk to remain.

5.06 FERTIZILING STANDARDS

This section outlines performance standards for fertilizing. Fertilizing mature trees is generally not necessary. Fertilizing may be specified for trees that will be impacted by upcoming disturbance, grade changes or a modified environment. Benefits gained from

the increase stored resources may aid the tree to overcome the stress caused by disturbance. Fertilizing, if specified, shall be performed to the following standards:

- Method of application: The method shall be subsurface injection, on approximate 3-foot centers (within the root ball on young trees; 2-feet out on older trees) and out to the approximate dripline perimeter. Specific situations may justify other variations such as vertical mulch, soil-fracture or surface-broadcast methods.
- Material and Rates: Unless specified otherwise, fertilizer formula shall be a slow-release, complete fertilizer with chelate trace elements (e.g. 22-14-14 or 20-20-20) and mixed at label rates not to exceed 4-pounds nitrogen per 100-gallons of water. Extraordinary cases may require soil and tissue sampling to correct target deficiencies.
- Amount: Unless specified otherwise, volume shall be determined by mixing 10-gallons of water per inch of trunk diameter when measured at 54-inches above natural grade.
- Timing: Timing should not be detrimental to tree health. Best results are derived from applications made during the prior growing season. Apply fertilizer between May through September for best results.

5.07 WATERING SCHEDULE

Newly installed trees planted, including drought tolerant species, are dependent upon supplemental irrigation until established, typically for two years. Periods of extreme heat, wind or drought may require more or less water than recommended in these specifications. The method and amount that is applied may vary depending upon soil composition, heat, wind, planted in turf or ground cover, periods of abnormal rainfall or in poorly drained soils. The watering of Protected Trees or their replacements shall follow these standards:

A. New trees

During the establishment period (1-2 years) trees should be watered thoroughly to their root depth as frequently as needed. A watering schedule is to be submitted at the preconstruction meeting. The schedule is to include watering frequency and quantity. The minimum standards shall be as follows:

- 1-3 months in the ground: 4 times per month or as necessary
- 4-6 months in the ground: 2 times per month or as necessary
- 7-12 months in the ground: 1 time per month or as necessary

B. Amount

Unless otherwise specified, the volume of water applied at each irrigation should be in the range of 10-gallons per inch of trunk diameter when measured at 54-inches above natural grade. The final decision of whether to water or not should be based on accurate soil probe samples that are taken from the root ball.

5.08 SOIL IMPROVEMENT

During development, compaction of the soil is the largest single factor responsible for the decline of trees. Ninety percent of the damage to the upper eighteen inches of soil occurs during the first pass of heavy equipment - and cannot be reversed. Every effort to avoid compaction of soil porosity within the tree protection zone shall be taken at all times when required by the conditions of Plan Approval for a project or as mitigation for injury

or a prohibited action, the following performance standards for improvement of compacted or damaged soil shall be implemented:

- **Aeration**
Soil that is damaged or compacted within the dripline of protected or designated trees shall be loosened or aerated to promote root growth and enhance tree vitality. One of the following aeration methods shall be specified in an effort to correct compacted soil conditions:
- **Vertical Mulching:** auger holes 2 to 4-inch diameter, 2 to 3-feet deep, on 4-foot centers and backfilled with porous material such as perlite, vermiculite or volcanic rock
- **Radial Trenching:** with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.
- **Soil-fracturing** with a pneumatic air-driven device
- **Subsurface injections** under moderate hydraulic pressure using a three foot probe and applied on 3-foot centers under the dripline

SECTION 6.00 TREE REPORTS

An arborist report is needed for development projects and tree removal permits. The report must be prepared by a certified arborist for the applicant and submitted to the City for the purpose of providing accurate information and opinion regarding the condition, welfare, maintenance, preservation or value of a Protected Tree.

A. When a written report is required

Generally, there are two circumstances in which tree reports are required:

- 1) when a tree removal permit is sought, and
- 2) to complete and verify a site plan, assess tree impacts and establish tree protection for development of sites with greater than 5,000 square feet of land disturbing activity.

Types of report formats are: Letter Report, Tree Survey, Tree Protection and Preservation Plan and Tree Appraisal.

B. Who may prepare the report

The tree report is to be prepared by a certified arborist retained by the applicant or property owner. This person shall possess a current ISA certification (see Certified Arborist, Section 1.00); be a member of the American Society of Consulting Arborists; or a member of good standing in another nationally recognized tree research, care, and preservation organization.

6.01 REPORT FOR INDIVIDUAL TREE REMOVAL PERMIT

A. Tree Removal Permit

The procedure involves three steps which must be completed and approved to remove a Protected Tree. The information contained within the application will be reviewed by the City Arborist for written response within approximately 10 working days.

B. Submittals

For this purpose, the following information is to be submitted to the City for review:

- A completed application for the protected tree removal (delivered to the Public Services Department 900 Wilmington Rd. New Castle, DE 19720)
- A filing fee (\$30.00) for review and records management.
- An arborist report prepared by a certified arborist

C. Authorization

To remove a street tree the property owner must contact the Director of Public Services. For a protected tree on private property, the permit from the Public Services Department must be on site when the tree is being removed. For a Protected Tree involving an application for in property development, the approved plans serve as the approval and no separate written permit is needed.

6.02 TYPE OF REPORT LETTER FORMAT

A. Letter Report

A brief format is acceptable for (1) and (2) below, and can generally be used for assessing one or two trees. The report is to be on letterhead stationery of the individual preparing the report, including their ISA Certification number.

1. Removal

If for a tree removal (i.e., an application request for a single tree removal only, not in connection with a property development), the report shall provide information and determination whether the tree is dead, hazardous or constitutes a nuisance.

2. Development

If for development on a single family residential lot (not a subdivision), the report shall also clearly indicate whether or not any protected or designated tree is so close to the 'building area or building footprint' that it will be killed or permanently injured by disturbance. The report must make specific recommendations to protect and preserve the tree during the course of construction that are consistent with the specifications within this Manual

6.03 LETTER REPORT SUBMITTALS

A. Standard information

All letter reports shall contain the following information: Arborist name and certification number; purpose of the report and for whom; site address; date of the inspection(s); a to-scale diagram of the tree(s) location, accurate size of the trunk diameter (measurement taken at 54-inches above natural grade); perimeter of leaf canopy; proximity to structures; condition of the tree health (and/or decay presence), condition of the tree structure, imminent danger of failing (ISA Hazard Rating);

interface with utility services; conclusion and recommendation(s), photographs (encouraged) and Tree Protection Instructions (if needed).

B. Specific situations

Other conditions may require the following additional information on an as needed basis if requested by the reviewing City staff: tree protection plans; appraised value); and any other supporting information, photographs, diagrams, etc. that may be necessary.

6.04 TYPE OF REPORT TREE SURVEY FORMAT

A more extensive ‘Tree Survey Report’ is required for all development projects involving over 5,000 square feet of land disturbing activity except those identified in Section 6.01 above. The report shall inventory all Protected Trees on site, including trees to be removed, relocated and retained on the property (including trees on neighboring properties that overhang the project site) and all street trees in the right-of-way within 30-feet of the project site.

6.05 SURVEY REPORT SUBMITTALS

All Tree Survey Reports shall contain the following information: Arborist name and certification number; cover letter; title page; table of contents (if necessary); purpose of the report and for whom; site address; date of the inspection(s); site plan (showing each tree location by number that correlates with the tree inventory on plans; tree inventory data (include tree species, size, health, structure, etc. for all protected trees on the project site, including those to be removed (tables may be used); condition of the protected trees (include information with respect to health, structure, decay, imminent danger of falling, existing property lines, structures and utility services) conclusion, recommendation(s) and rated for suitability for preservation.

All Protected Trees to be retained on a development site shall be shown on approved plans and shall be protected during the construction process.

6.06 TREE PRESERVATION AND PROTECTION REPORT

A. Scope & Construction Phasing

The tree protection and preservation plan shall identify, but not be limited to, written recommendations for the health and long-term welfare of trees that are to be followed during the following distinct phases and conditions: pre-construction; during construction, post construction, demolition activities; methods of avoiding injury, damage treatment and inspections. Schedules shall be included.

B. Tree Protection Zone

The tree protection and preservation plan shall establish a tree protection zone (TPZ) for each tree to be fenced and clearly outline site-specific measures for protection of the trees during construction. After project approval, any changes to the protection

measures must be approved in writing, by the City Arborist. The tree protection plan shall include the following site plan elements:

6.07 SITE PLAN

Plans must show tree protection fencing identified within the arborist report, both written and diagrammatic, shall be clearly shown as a bold, dashed line on the approved site plans submitted for demolition, grading, construction, building permit or any other aspects that are relevant to the project.

REFERENCES

- Palo Alto Technical Tree Manual
- American National Standards Institute (ANSI). Safety Requirements for Tree Care Operations. ANSI Z133.1-2000. New York: American National Standards Institute (ANSI), 1994.
- American National Standards Institute (ANSI). Specifications for Acceptance of Nursery Trees at the Time of Delivery. ANSI 760.1. New York: American National Standards Institute (ANSI), 1996.
- American National Standards Institute (ANSI). Performance Specifications of the Pruning of Trees Shrubs & Other Wood Plant Maintenance. ANSI A-300 (Part 4)-2002. New
- ICMA IQ Report Trees: The Green Infrastructure November 2002
- USDA Southern Region Brochure Benefits of Urban Trees
- National Arbor Day Foundation. Tree City - USA. Bulletin No. 1-50.
- Minnesota Department of Natural Resources How to Detect, Assess and Correct Hazard Trees in Recreational Areas June 1995
- American Society of Consulting Arborists, Dorothy Abeyta, Guide to Report Writing for Consulting Arborists. Savoy, IL: International Society of Arboriculture (ISA), 1995.
- California Department of Forestry and Fire Protection, Urban Forestry Program Guidelines for Developing and Evaluating Tree Ordinances