TOWN OF WINDSOR

TREE TECHNICAL MANUAL



October 2003

STANDARDS AND SPECIFICATIONS
TOWN OF WINDSOR
2003

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TOWN OF WINDSOR
TREE TECHNICAL MANUAL
STANDARDS AND SPECIFICATIONS

INTRODUCTION

The purpose of the Tree Technical Manual is to establish procedures and standards for the preservation, protection, and maintenance of trees within the Town of Windsor. The manual supplements and supports the Town of Windsor Zoning Ordinance Section 27.36 – Tree Preservation and Protection. The manual regulates the following:

REGULATED TREES:

Protected Trees:

- Trees that have been identified within the Town of Windsor Zoning Ordinance as protected trees.

Street Trees and Trees on Publicly Owned Property:

- All trees growing within the street public right-of-way, publicly owned parcels, and within private parkway strips.

Designated Trees:

- Trees that have been designated by the Town Council to be saved or protected on public or private property. These trees are subject to discretionary review.

DEFINITIONS

This document contains terminology that is unique to the arboricultural or construction industry. These terms are defined under Section 9.00 -Definition and Terminology at the back of the manual.

ASSUMPTIONS AND LIMITING CONDITIONS

- No responsibility is assumed by the Town of Windsor, for matters legal in character, related to 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.
- Any visual aids that may be contained within this document (sketches, diagrams, tables, etc.) should not be construed as engineered data for construction.
- This manual has been prepared to conform to current standards for the best care, management practices, evaluation and appraisal procedures, reporting, and sound arboricultural practices referenced in the manual..

SECTION 1.00 SITE PLAN

Disclosure of all trees on and near the site

The property owner or designee shall provide accurate information to the project arborist to develop the tree protection measures and to enable accurate recommendations to insure their survival. The site plan shall accurately show the surveyed location, species, size of trunk and leaf canopy; show the dripline of any neighboring trees that may overhang the site and street trees that are within 30-feet on each side of the project. A "Tree Disclosure Statement" (see Section 10.00 for copy of form) must be completed prior to obtaining any type of permit. Failure to show a tree on the plans and later determined to be affected by construction may require the work to stop until mitigation can be agreed upon by the property owner and the Town.

Plans submitted to the Town

In addition to the above information, final improvement plans shall include and show the following information: show the tree protection zone of any tree to be retained and denote the required fencing around the protected zone of each tree or group of trees (to be clearly identified as such on all plans as a bold-dashed line); permeable paving located within the dripline area; approved utility pathways; grade changes; surface and subsurface drainage and aeration systems to be used; walls, tree wells, retaining walls and grade change barriers, both temporary and permanent; landscaping and irrigation within dripline of trees.

Plans must show tree protection

Protective tree 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.

SECTION 1.10 EVALUATION PROCESS

SINGLE RESIDENTIAL LOTS

When a single developed residential lot applies for a permit for an addition, remodel, pool, or other exterior modification that would impact a protected tree or trees an arborist report will be required. The report may be prepared by the applicant's certified arborist and may be subject to peer review or the applicant may deposit a fee for preparation of the report by a Town arborist.

Applicants are strongly encouraged to consider alternate designs that minimize the impacts to regulated trees. Permits may be denied if removal is suggested. Review and decisions for removal of a regulated tree will be at the Planning Directors discretion. These permits are not subject to provisions related to security deposits. However, the applicant may be requested to plant an equivalent tree of the same species on-site to mitigate removal of a regulated tree.

PRE-APPLICATION – PROPOSED DEVELOPMENT

It is strongly recommended that a preliminary tree inventory be prepared and submitted to the Town prior to submittal of a preliminary Tentative Map or site plan to determine what trees are present on the property. Submittal of an inventory will allow discussion between developer and the Planning Department regarding the nature and degree of tree preservation that will be required, prior to beginning design work on the project. This phase is expected to generate

information that will aid effective design of the project. The pre-application tree inventory is recommended but is not mandatory.

TENTATIVE MAP/SITE PLAN - FORMAL APPLICATION

The primary Tree Protection and Preservation Plan for each project will be prepared and submitted in conjunction with the Tentative Map or Site Plan. At this stage of design the basic parameters of development such as lot layout, building envelopes, and street improvements will be available for review in relationship to project trees. The initial report shall be based on this level of information only, and may be used to modify the plan where necessary to preserve a greater number of trees, or better preserve those that are healthy.

IMPROVEMENT PLAN

The secondary Tree Protection and Preservation Plan for each project shall be based on all the data initially collected for the primary Tree Protection and Preservation Plan, and shall be prepared at the time that Improvement Plans, which illustrate the details of construction, including grading, building footprints, drainage, and underground utilities, are submitted. This secondary plan shall include data on expected construction impacts based on the Improvement Plans, recommendations for modifying the plan to improve tree preservation and recommendations for protection and mitigation of impacts.

SECTION 2.00 TREE PROTECTION AND PRESERVATION PLAN

All plans must meet the basic criteria outlined in the following section. The Town requires the use of the Town arborist for project review. A deposit will be collected at the time of the submittal of fees for the project. If an applicant does not use the Town arborist and submits an arborist report it shall be subject to peer review at a cost born by the applicant. The Town will subsequently have the final decision related to recommendations when the Town's arborist and the applicant's arborist recommendations are in conflict. The arborist must be certified through a program of the International Society of Arborist (ISA). This program is the standard of performance for appropriate training, experience and knowledge about tree care.

2.10 Who Can Prepare a Tree Protection and Preservation Plan

The Town requires the use of a Town arborist in preparing reports and plans for projects. Applicants are strongly encouraged to abide by this requirement. However, if circumstances warrant the submittal of the applicant's certified arborist report a peer review fee will be charged. This option is at the Planning Directors discretion.

Town Contracted Arborist

The applicant deposits a fee with the Town to contract with a Town appointed arborist. The Town maintains a list of arborists who have met specific criteria and have agreed to abide by the identified criteria in preparing, reviewing, recommending, and submitting a plan for tree protection and preservation. To have a Town arborist prepare the plan, contact the Planning Department to determine the appropriate deposit fee amount for preparation of the plan, submit a preliminary site plan and a written proposal statement of the project. The written statement should include the name, phone number, and address of the contact person of the project, as well as the project address and assessor's parcel number.

Applicant Contracted Certified Arborist

The applicant has the option of contracting with a certified arborist to prepare a Tree Protection and Preservation Plan. The plan must meet the requirements identified in this manual. The plan would be subject to peer review and the cost shall be born by the applicant.

2.20 PLAN CONTENT

All Tree Protection and Preservation Plans must include the following basic information:

1. The location of all Regulated Trees that are greater than 6 inches in trunk diameter at a height of 4.5 feet above surrounding grade, including all that will be preserved, removed, or transplanted.

2. All trees that overhang the proposed project site and are located on immediately adjacent properties.

3. The report cover shall include the arborist's name, certification number, project reference name and address, and report date.

4. A cover letter describing the project site, the date of inspection, and summarizing the total number of trees present, the number of trees that require removal, and the number of trees that can effectively be preserved.

5. A site plan shall be included in the report that identifies the location of each tree, including its report reference number. Each site plan shall also illustrate the recommended Tree Protection Zone (TPZ). The site plan will be either a plot plan for a single home, or a Tentative Map or Improvement Plan for a subdivision.

   Each type of site plan must include as much information pertinent to tree construction impacts as is available for that particular stage of design, including building setback lines, building footprints, fences, grading, drainage, and utilities. Pre application plans will have minimal, if any, specific information regarding the development. Tentative Maps will provide a greater amount of information, and Improvement Plans will provide all details of construction and grading.

6. Assessment data shall be included for each tree, consisting of the following information:

   - Botanical and common name,
   - Trunk diameter measured at 4.5 foot height, and number of trunks,
   - Estimated height,
   - Estimated actual dripline size,
   - Recommended Tree Protection Zone,
   - Health rating using the following guidelines:

Excellent health (5) health and vigor are exceptional, no pest, disease, or distress symptoms

Good health (4) health and vigor are average, no significant or specific distress symptoms, no significant pest or disease

Fair health (3) health and vigor are somewhat compromised, distress is visible, pest or disease may be present and affecting health, problems are generally correctable

Marginal health (2) health and vigor are significantly compromised, distress is highly visible and present to the degree that survivability is in question

Poor health (1) decline has progressed beyond the point of being able to return to a healthy condition again, long-term survival is not expected. This designation includes dead trees.

- Structural rating using the following guidelines:

Good structure (4) some minor structural problems may be present which do not require corrective action

Moderate structure (3) normal, typical, structural issues present, which can be corrected with pruning

Marginal structure (2) serious structural problems are present which may or may not be correctable with pruning, cabling, bracing, etc.

Poor structure (1) hazardous structural condition which cannot be effectively corrected with pruning or other measures, may require removal depending on location and the presence of targets

- Comments and observations regarding health or structure, which are not covered by the rating system.

- Estimate of the impacts of proposed development activities on long-term health and structural integrity based on existing tree condition, tree species characteristics, and the nature and extent of proposed activities. Development impacts must consider all phases of construction including demolition, grading, pre-construction, construction, drainage, soil compaction, underground utilities and accessibility.

- Recommendations for removal or preservation based on the development impacts expected from the proposed plan. Recommendations to include specific preservation, protection, mitigation, and pruning measures required too promote health and survivability following project completion. Recommendations may also include reasonable modifications to the plan that could reduce impacts including actions such as warping sidewalks around trees, realigning roadways, moving driveways, or changing the location of underground utilities.

- Recommendations for modification of the proposed plan to reduce or eliminate impacts to the tree. An emphasis on the preservation of mature or significant sized or species of trees may justify modification of the plan, and the Town will look to the arborist report for this specific information.

- The monetary value that each tree recommended for preservation contributes to the real estate value of the property, determined by using the most current edition of the Guide for Plant Appraisal published by the Council of Tree & Landscape Appraisers, and the most recent 'Form for Northern California' published by the International Society of Arboriculture.

7. All Tree Protection and Preservation Plans must be submitted in a bound format that includes report cover, cover letter, tree evaluation data with recommendations, and site plan.

SECTION 3.00 TREE PROTECTIVE FENCING

3.10 Fencing Requirements

Construction Project: - Multi-Unit/Lot Residential and Non-Residential

All trees to be preserved shall be protected with five or six (5' - 6') foot high chain link fences. (DWG # 004). This detail shall appear on grading, demolition and improvement plans.

Single Residential Lot/Unit: -

All trees to be preserved shall be protected with a minimum four (4') foot high continuous barrier without entry points. (DWG # 001)

3.15 Tree Protection Zone

The Tree Protection Zone (TPZ) is illustrated on the Improvement Plans and represents the area around each tree, or group of trees, which must be protected at all times with tree protection fencing. No encroachment into the TPZ is allowed at any time without approval from the project arborist, and unauthorized entry may be subject to civil action and penalties.

The TPZ is defined within Chapter 27.60 of the Town of Windsor Zoning Ordinance.

3.20 Tree Protection Fencing

Prior to initiating any construction activity on a construction project, including demolition or grading, temporary protective fencing shall be installed at each site tree. Fencing shall be located at the Tree Protection Zone (TPZ) illustrated on the Improvement Plans.

Individual residential lot fencing shall be a minimum 4' height at all locations, and shall form a continuous barrier without entry points around all individual trees, or groups of trees. Barrier type fencing such as Tensar plastic fencing is recommended, but any fencing system that adequately prevents entry, will be considered for approval by the Town. The use of post and cable fencing is not acceptable. (Standard DWG 001)

Construction project fencing shall be five or six (5'-6') foot high chain link fencing. The fences are to be mounted on two-inch diameter galvanized iron posts, driven into the ground to a depth of a least 2-feet or other methods as approved by the Building Official or Planning Director (prior to installation) at no more than 10-foot spacing shall form a continuous barrier without entry points around all individual trees, or groups of trees. (Standard DWG 004)

- Fencing shall be installed in a professional manner with steel fence posts. Plastic fencing shall be attached to each post at 5 locations with plastic electrical ties, metal tie wire, or flip tie.

- Fencing shall serve as a barrier to prevent encroachment of any type by construction activities, equipment, materials storage, or personnel.

- All encroachment into the fenced TPZ must be approved in writing and supervised by the project arborist. Approved TPZ encroachment may require additional mitigation or protection measures that will be determined by the project arborist at the time of the request.

- Contractors and subcontractors shall direct all equipment and personnel to remain outside the fenced area at all times until project is complete, and shall instruct personnel and sub-contractors as to the purpose and importance of fencing and preservation.

- Fencing shall be upright and functional at all times from start to completion of project. Fencing shall remain in place and not be moved or removed until all construction activities at the site are completed.

SECTION 4.00 PROTECTION OF TREES DURING CONSTRUCTION

INTRODUCTION

The objective of this section is to reduce the negative impacts of construction on trees to a less than significant level. Trees vary in their ability to adapt to altered-growing conditions. Mature trees have established stable biological systems in the preexisting physical environment. 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. Typically, this reaction may develop from one to twelve years or more after disruption. 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.

Typical negative impacts that may occur during construction include:

- mechanical injury to roots, trunk or branches
- compaction of soil, which degrades the functioning roots and inhibits the development of new ones and restricts drainage, which desiccates roots and enables water mold fungi to develop
- changes in existing grade which can cut or suffocate roots
- alteration of the water table - either raising or lowering
- microclimate change, exposing sheltered trees to sun or wind
- sterile soil conditions, associated with stripping off topsoil.

Prior to commencement of a development project, a property owner shall have prepared a Tree Protection and Preservation Plan. The plan shall 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. Projects protecting only street trees with fencing are exempt from preparing a Tree Protection and Preservation Plan.

4.10 PRE-CONSTRUCTION REQUIREMENTS

The following six steps shall be incorporated prior to permit issuance.

Site Plan

On all improvement plans for the project, plot accurate trunk locations and the dripline areas of all trees or groups of tree within the development area. The plans shall accurately show the trunk diameter, dripline and clearly indicate the tree protection zone to be enclosed with the specified tree fencing as a bold dashed line.

Verification of tree protection

The project arborist 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 Planning Department prior to demolition, grading, or building permit issuance.

Pre-construction meeting

The demolition, grading and underground contractors, construction superintendent and other pertinent personnel are required to meet with the project arborist and the building official (or their designee) at the site prior to beginning work to review procedures, tree protection measures and to establish haul routes, staging areas, contacts, watering, etc.

Protective Tree Fencing for Protected Trees, Street Trees, or Designated 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.

- **Type I Tree Protection**

The fences shall enclose the entire area under the **TPZ** of the tree(s) to be saved throughout the life of the project, or until final improvement work within the area is required, typically near the end of the project

Parking Areas: If the fencing must be located on paving or sidewalk that will not be demolished, the posts may be supported by an appropriate grade level concrete base.

- **Type II Tree Protection**

For trees situated within a **narrow planting strip**, only the planting strip shall be enclosed with the required chain link protective fencing in order to keep the sidewalk and street open for public use.

- **Type III Tree Protection**

Trees situated in a small tree well or **sidewalk planter pit**, shall be wrapped with 2-inches of orange plastic fencing as padding from the ground to the first branch with 2-inch thick wooden slats bound securely on the outside. During installation of the wood slats, caution shall be used to avoid damaging any bark or branches. Major scaffold limbs may also require plastic fencing as directed by the arborist.

- **Duration**

Tree fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project permit, except for work specifically required in the approved plans in which case the project arborist or Town Arborist must be consulted.

- **Warning Sign**

Warning signs shall be prominently displayed on each fence. The signs shall be a minimum of 8.5 x 11-inches and clearly state: **WARNING - *Tree Protection Zone* – DO NOT ENTER - *This fence shall not be removed. Unauthorized removal is subject to a penalty.***

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 shall be determined by the formula outlined (see Definitions). 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 Town Arborist, or by project approval. Unless otherwise specified, the protective fencing shall serve as the TPZ.

A. All construction activities are prohibited within the TPZ including but not limited to:
    - 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 harmful 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 Town Arborist.
    - Soil disturbance or grade change.
    - Discharge drainage.

B. 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 unscreened chipped bark, 0"-2" in particle size. Shredded redwood, recycled lumber, and bark screened for uniformity of size shall not be used.
    - When areas under the tree canopy cannot be fenced, the project arborist shall provide a written recommendation on how to protect the root zone. This recommendation shall be reviewed and approved by the Town, prior to implementation or any work within the tree canopy.
    - Irrigation, aeration, fertilizing or other beneficial practices that have been specifically approved for use within the TPZ.

C. Erosion Control
    - If a tree is adjacent to or in the immediate proximity to a grade slope of 8% (23 degrees) or more, then approved erosion control or silt barriers shall be installed outside the TPZ to prevent siltation and/or erosion within the TPZ.

Tree Pruning, Surgery and Removal

Prior to construction, various trees may require that branches be pruned clear from structures, activities, building encroachment or may need to be strengthened by means of mechanical support or surgery. The most compelling reason to prune is to develop a strong, safe framework and tree structure. Such pruning, surgery or the removal of trees shall adhere to the following standards:

A. 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 Town 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 or Designated 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.

B. 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.

C. 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, the following tree removal practices apply:

    1. 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.
    2. 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 Town approved topsoil to grade, and the area tamped to settle the soil.

4.20 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 Town 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:

Soil Compaction: If compaction of the soil occurs, it shall be mitigated as outlined below in "Injury Mitigation".

Grading Limitations within the Tree Protection Zone:

a. Grade changes outside of the TPZ shall not significantly alter drainage to the tree.
b. Grade changes within the TPZ are not permitted.
c. 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.
d. Grade fills over 6-inches or impervious overlay shall incorporate an approved permanent aeration system, permeable material or other approved mitigation.
e. Grade cuts exceeding 4-inches shall incorporate retaining walls or an appropriate transition equivalent.

Trenching, Excavation, and Equipment Use

Trenching, excavation or boring activity within the TPZ is restricted to the following activities, conditions and requirements if approved by the Town Arborist. Mitigating measures shall include prior notification to and direct supervision by the project arborist.

a. **Notification**. Contractor shall notify the project arborist a minimum of 24 hour in advance of the activity in the TPZ
b. .
c. **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.
    1. If excavation or trenching for drainage, utilities, irrigation lines, etc., it is the duty of the contractor to tunnel under/around any roots 2-inches in diameter and greater.
    2. If excavation for foundation/footings/walls or grading is required within the root zone the project arborist shall be contacted to supervise any work. Roots shall not be disturbed or cut without the arborists express direction either provided for in the arborist

report or as directed and supervised by the arborist and only when no other alternative may be reached. Any trenching must then be hand dug and roots pruned with a saw, sawzall, narrow trencher with sharp blades or other approved root pruning equipment.

d. **Root Severance**. Roots that are encountered shall be cut to sound wood and supervised by an on-site arborist. No cuts shall be made without the express direction and supervision of the arborist. Roots shall be cut cleanly before they are torn from the ground. Roots 2- inches and greater must remain injury free.
e. **Heavy Equipment**. Use of backhoes, steel tread tractors or any heavy vehicles within the TPZ is prohibited unless approved by the Town 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 Town arborist approval. Discontinuous foundations such as concrete pier and structural grade beam must maintain natural grade (not to exceed a 4-inchcut), to minimize root loss and allow the tree to use the existing soil.

Alternative Methods to Root Cutting

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

1. Ramping the walking surface over the roots.
2. Routing the construction work around the tree roots.
3. Utilization of a grade beam foundation design to span large roots where required.

Tunneling & Directional Drilling

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.

Emergency utility repairs shall be exempt if work is within the TPZ. The Town Arborist shall be contacted after any such repairs that may result in significant tree damage or removal.

Injury Mitigation

A mitigation program is required if the approved development will cause drought stress, dust accumulation or soil compaction to trees that are to be saved. To help reduce impact injury, one or more of the following mitigation measures shall be implemented and supervised by the project arborist as follows:

a Irrigation Program. Irrigate to wet the soil within the TPZ to a depth of 24-inches to 30-inches. Or, apply sub-surface irrigation at regular specified intervals by injecting on approximate 3-foot centers, 10- gallons of water per inch trunk diameter within the TPZ. Duration shall be until project completion or monthly until seasonal rainfall totals at least 8-inches of rain, unless specified otherwise by the project arborist.

b. Dust Control Program. During periods of extended drought, wind or grading, spray wash trunk, limbs and foliage to remove accumulated construction dust.

c. Soil Compaction Damage. Compaction of the soil is the largest killer of trees on construction sites due to suffocation of roots and ensuing decline of tree health. If a compaction event to the upper 12-inch soil horizon within the tree protection zone has or will occur by any means, then one or more of the of the following mitigation measures shall be implemented.

1. Type I Mitigation. If an approved paving, hardscape, or other compromising material encroaches within the TPZ, an aeration system shall be designed by the project arborist and used within this area (subject to approval by the Town Arborist).
2. Type II Mitigation. If inadvertent compaction of the soil has occurred within the TPZ, the soil shall be loosened by one or more of the following methods to promote favorable root conditions: vertical mulching, soil fracturing, core-venting, radial trenching or other method approved by the Town Arborist.

4.30 DAMAGE TO TREES

Reporting

Any damage or injury to trees shall be reported within 6-hours to the project arborist and job superintendent or Town Arborist so that mitigation can take place. All mechanical or chemical injury to branches, trunk or to roots over 2-inches in diameter shall be reported in the monthly inspection report. 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.

Damage to street trees

In the event that street trees or their roots have been damaged, the contractor or property owner is responsible for the replacement and/or maintenance cost to repair the damage. Measurement of the damage shall be the width of the wound measured across the grain at the widest point. The contractor/property owner shall be required to replace any lost trees and/or pay for the cost to repair the damage, prior to the Town granting final occupancy or a final on the project.

4.40 INSPECTION SCHEDULE

The project arborist shall conduct the following required inspections of construction sites containing regulated trees. Inspections shall verify that the type of tree protection and/or plantings are consistent with the standards outlined within this Manual and/or the Conditions of Approval for discretionary projects. 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 Town of Windsor. Monthly Inspection Reports shall be submitted to the project planner or building department, as specified at the pre-construction meeting.

Inspection of Protective Tree Fencing. The Town Arborist 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.

Pre-Construction Meeting. Prior to commencement of construction, the applicant or contractor shall conduct a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, project arborist, and building official.

Inspection of Rough Grading. The project arborist shall perform an inspection during the course of rough grading adjacent to the TPZ to ensure trees will not be injured by compaction, cut or fill, drainage and trenching, and if required, inspect aeration systems, tree wells, drains and special paving. The contractor shall provide the project arborist at least 48 hours advance notice of such activity.

Monthly Inspections. The project arborist shall perform monthly inspections to monitor changing conditions and tree health. The project planner/building official shall be in receipt of an inspection summary during the first week of each calendar month or, immediately if there are any changes to the approved plans or protection measures

Special activity within the Tree Protection Zone. Work in this area (TPZ) requires the direct onsite supervision of the project arborist.

Landscape Architect Inspection. For discretionary development projects, prior to temporary or final 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 and that the irrigation is functioning consistent with the approved construction plans. The Town shall be in receipt of written verification of Landscape Architect approval prior to scheduling the final inspection, unless otherwise approved.

4.50 PAVEMENT AND HARDSCAPE CONFLICTS WITH TREE ROOTS

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks or curbs (hardscape). 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 tree.

Removal and Replacement of Pavement or Sidewalk

- Removal of existing pavement over tree roots shall include the following precautions: Break hardscape 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 woodchips over the exposed area within one hour, then wet the chips and base rock and keep moist until overlay surface is applied.

- 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 Public Works Arborist and replace sidewalk using wire mesh reinforcement and #3 dowels at the expansion joint if within 10-feet of a street tree. Use a wire mesh reinforcement if within 10-feet of the trunk of a protected or street tree.

Note: Any work in the right-of-way requires an encroachment permit from the Engineering Department.

Alternative Methods to Prevent Root Cutting

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

4. Grinding a raised sidewalk edge.
5. Ramping the walking surface over the roots or lifted slab with pliable paving.
6. Routing the sidewalk around the tree roots.
7. Install flexible paving or rubberized sections.
8. 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.

Avoiding Conflict

Conflicts and associated costs can be avoided or reduced by the following planting practices:

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

Alternative Base Course Materials

When designing hardscape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix. An approved structural soil mix will allow a long-term cost effective tree and infrastructure compatibility that is particularly suited for the following types development projects: repair or replacement of sidewalk greater than 40-feet in length; subdivisions with new street tree plantings; planting areas that are designed over structures or parking garages; confined parking lot medians and islands or other specialized conditions as warranted.

SECTION 5.00 APPRAISAL METHODS

A certified arborist must prepare the appraisal by using the most current edition of the 'Guide for Plant Appraisal', published by the Council of Tree and Landscape Appraisers.

The Trunk Formula Method

Applies to trees that are too large for practical replacement (transplanting) and shall be appraised by: determining the basic tree value and adjusting this value by a condition and location ratings. The appraised 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. The Trunk Formula or Replacement Method Forms for Northern California established by the International Society of Arboriculture must be used to compute the appraised value. All trees with a stem larger than 4-inches in diameter when measured at 12-inches above natural grade shall be calculated in this manner.

SECTION 6.00 REMOVAL, REPLACEMENT AND PLANTING OF TREES

Protected trees may not be removed without Town review and approval, except in certain emergencies. The purpose of the Town review is to verify that the removal is allowed under Town law, and to prevent unnecessary tree removal.

In some cases, a removed tree must be replaced by the property owner or, in the case of street trees, developer. 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 Town may require a security deposit to assure the survival of trees during development projects.

6.10 TREE REMOVAL

Allowable Removal

A written permit is required to remove a protected tree, except in emergency situations outlined in this manual. The written permit is issued by the Planning Department. Removal of Protected trees is allowed if:

1. A Protected Tree is determined to be dead, hazardous, a detriment to or crowding an adjacent protected tree, or a Public Nuisance.
2. A protected tree trunk is touching or the basal flare is under the building footprint of an existing building (for example, uplifting foundation, contact or damage to eves, gutter, etc.).
3. On projects other than a single-family residence, a Protected Tree if it reduces the otherwise-permissible buildable area by more than 25%.
4. In the case of street trees, authorized by the Town in connection with development.
5. In the case of a Designated Tree the Planning Director reviews and acts the removal. The Town arborist may be required to be on-site during removal.

Permit Application

Tree Removal Permits are available at the Town of Windsor Planning Department. The following is a checklist of items necessary for Town review for tree removal. The reviewing staff may require additional information. Responses will generally be mailed to the applicant within 10 days. The removal permit must be on site during the removal.

1. Completed Tree Removal Permit.
2. Arborist report from a certified arborist. The applicant may request the Town Arborist prepare the report or they may obtain a report from an independent arborist. The report may be subject to peer review by the Town Arborist. The cost of the arborist report and/or peer review are born by the applicant.
3. Site Plan showing location, dripline, etc. of tree(s) to be removed.
4. Photo (digital or paper) of the tree to be removed.

Tree Removal Permits shall be exercised within one year from the date of approval or other time limit established through a discretionary permit approval. Time extensions, for up to a total of two additional years, may be granted in compliance with Chapter 27.44 of the Town's Zoning Ordinance. If a Tree Removal Permit is not exercised within the established time frame, and a time extension is not granted, the provisions of Chapter 27.44 shall be initiated to consider the permit expired.

6.15 TREE PRESERVATION AND GENERAL PLAN DENSITYGOALS ANDPOLICIES

The Town Council and/or Planning Commission may direct removal of protected and designated trees for development purposes. Removal at the direction of the Council and/or Commission may be allowed in order to meet density and housing goals and policies of the General Plan. Removal and/or partial removal is at the sole discretion of the Town Council and/or Planning Commission based on the proposed project and will be on a case-by-case basis. The following criteria may be required to determine the level of removal that may be allowed for any given project:

- Preparation of a Tree Preservation and Protection Plan and review and recommendation by a Town Arborist (expense to be covered by applicant). This plan will be used in determining which trees due to health and other factors may be more appropriate to preserve and/or remove.
- Submittal of at least one project site plan. Alternate site plans may be required in an effort to preserve a specific tree or grove/stand of trees.
- Alternate building types including multiple-stories may be requested to address tree preservation.
- The following mitigation for tree removal may be considered by the Council and/or Commission in determining actual tree removal for a project:
    1. On-site mitigation may include planting of trees of the species to be removed in open spaces, as street trees, parkway strips or in public rights-of-way.
    2. Payment and/or waiver of in-lieu fee, based on appraised values and direction by the Council and/or Commission.
    3. Off-site mitigation may include planting of trees of the species to be removed or alternate species on Town owned properties including but not limited to parks, trails, public rights-of-way, etc.

Removal of protected or designated trees requires a thorough analysis to determine that all avenues have been explored for site development. Sites that may be otherwise underdeveloped, or severely limit the ability to meet the goals and policies of the General Plan may be authorized by the Council and/or Commission for tree removal. The applicant must demonstrate that all reasonable alternate site plans have been explored. A written feasibility analysis of alternate site plans may be required by the Council and/or Commission in making the final determination of a projects tree removal.

6.20 WHEN TREE REPLACEMENT IS REQUIRED

Certain conditions determine whether or not a protected or designated trees must be replaced. In summary, they are:

Protected Trees

In the event that the Town authorizes removal of a protected tree because it is dead, dangerous, or a nuisance and the area will not support replacement, no tree replacement is required. In all other cases, the tree must be replaced.

Designated Trees

When authorizing removal of a Designated Tree, the Director or the Director's designee shall require tree replacement if it is necessary or desirable to implement the intent of the original site design. The number and nature of the replacement trees shall be determined by the Director or designee, taking into consideration the value of the tree removed and the site design.

Street Trees

If the Town authorizes removal of a street tree in connection with a development project, it shall specify the replacement requirements in the permit authorizing removal.

6.30 ALTERNATIVES WHEN TREES CANNOT BE REPLACED ON SITE

In some circumstances, crowding or other physical constraints make it impossible or undesirable to replace a tree in the same place. In that case, the value of the tree shall be determined as outlined within this manual and the Zoning Ordinance. 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 Town property.

6.40 TREE CANOPY REPLACEMENT STANDARD FOR ONSITE TREE REPLACEMENT

When a Protected or Designated Tree is to be replaced on site, the following standards apply.

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.

Location

The Director shall approve the location of replacement trees on site. If it is not possible or desirable to replace the tree on site, A sum of money equal to the value of the tree may be deposited with the Town to be used for future replacement or installation of trees within public landscape areas or other Town property.

Size and Number

Occasionally, 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:

Dripline Canopy Diameter Of Tree Removed	Required Replacement Trees	Alternative Replacement Trees
4 – 9 feet	2 x 24" boxes	1 x 36" box
10 – 27 feet	3 x 24" boxes	2 x 36" boxes
28 – 40 feet	4 x 24" boxes	2 x 48" boxes
40 – 56 feet	6 x 24" boxes	2 x 48" + 2 x 36" boxes
56 feet or more	2 x 48" + 2 x 24" + 2 x 36"	----------

6.50 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.

6.60 SECURITY DEPOSITS

A security deposit shall be posted to cover the value of protected trees designated for preservation. Value of trees is established in the Tree Protection and Preservation Plan. The security deposit(s) shall be posted and approved before building or grading permits are issued.

The security deposit, time frame, and type are specified in the Zoning Ordinance. The guarantee period shall be specified within the agreement between the Town and the Developer at the time the security is posted.

If any tree fails to survive, or declines to a point where it is deemed to not be expected to survive, the Town may use the security value of the dead or declining tree(s) to purchase new trees for on or off-site use. In the event that replacement cannot be accomplished on-site the security will be placed in a fund with the Town of Windsor for use in planting trees within public right-of-way, parks, public landscape areas, or other areas as deemed appropriate by the Town of Windsor.

If a tree(s) that has been designated for preservation and protection is determined to have failed or died on its own and not through impacts from development, the security deposit shall not be used for replacement. This determination of failure/death shall be conducted by the Town arborist and will require a written report.

NOTE:

1 Single developed lot property owners that are proposing remodels, additions, pools, etc. are exempt from security deposits.

2. Creeks, riparian corridors and significant groves or stands of trees are exempted from security deposit requirements.

6.70 PLANTING STOCK AND MATERIALS

Quality

It is the contractor's responsibility to supply stock that meets ANSI 760.1-1996.

1. All plants and trees installed within the Town of Windsor shall conform with the American Association of Standards, ANSI Z60.1, Specifications for Acceptance of Nursery Trees at the Time of Delivery, in all ways.
2. Plants shall be sound, healthy, vigorous, and free of plant disease and insect pests and their eggs.
3. Container stock shall be grown for at least 8-months in containers in which delivered and shall not be root bound or have girdling roots.
4. Trees shall not have been topped or headed.
5. 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. The written verification shall be forwarded to the Planning Department within one week of acceptance.
6. Inspection shall occur after delivery of stock to the project site. Plants and trees with broken tops, branches or injured trunks shall be rejected.

Miscellaneous Materials

The following materials shall be used unless otherwise specified:

1. Tree stakes. Support stakes shall be treated 2-inch diameter Lodgepole Pine, two stakes per tree or approved equivalent. No cross brace shall be used. After installation, stakes shall be trimmed so that the branches clear the top of the stake.
2. Tree Ties. 'V.I.T' Tree Supports (recommended) or equivalent, twist brace, fabric-reinforced rubber (3/8-inch minimum), or equivalent approved by the Town of Windsor shall be used and installed in a figure eight fashion to support the tree to the stakes.
3. Mulch. Unscreened wood mulch which is 0 inch – 2 inch in diameter, 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 (see Mulching, Section 3.45-G).
4. Root Control Barriers. Use along all public sidewalks, and indicate on approved plans and drawings. 18-inch Linear Barrier LB18-2 root control barrier shall be used. Unless specified otherwise, a 10-foot length shall be placed on center with the tree and on the sidewalk side only. Root barrier boxes are not approved.
5. Mower guards. For trees in turf areas requiring regular mowing, the tree stem shall be protected with TreeGuard or equivalent.
6. Tree Grates. Where sidewalk width is less than 8-feet and new trees will be installed in a tree well, metal tree grates shall be used and approved by Engineering. Minimum size grates shall be 4' x 4' unless specified otherwise. All tree grates shall be mounted in frames inset into a concrete foundation within the sidewalk or surface material and shall be flush with the surrounding surface.

SECTION 7.00 CRITERIA USED BY THE TOWN TO DETERMINE IF A TREE IS HAZARDOUS

Evaluation Form

The Town 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. The Town Arborist retains discretionary right to approve, request in writing a second opinion of a rating, in writing, or recommend action that may reduce the condition to a less-than significant level of hazard.

Authorization

If the hazardous condition or target cannot be mitigated or reduced to a less than significant level (see Hazard Reduction Section) then the tree shall be authorized by the Town and removed by the property owner to abate the condition.

7.10 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 Town of Windsor.

ISA – Hazard Rating Formula

International Society of Arboriculture

Failure Potential	**+ Target**	**+Additional Factors/Size of Part**	**= Hazard Rating**
	+	+	+
1= low **4= severe**	**1= low** **4= severe**	**1= low** **4= severe**	**3= low** **12= severe**

*Note: The above factors are combined to quantify a hazard rating. For example, a minimum rating of 3 is the safest (a low predicable hazard), and the maximum rating of 12 is an imminent hazard (a high predictable hazard). Further details regarding this formula can be found in the ISA- HAZARD EVALUATION FORM and the ISA publication * Evaluation of Hazard Trees in Urban Areas, most current edition.*

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.

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, hardscape, 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.

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.

7.20 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.

Hazard Evaluation Questionnaire

1. Target: If the tree or branch falls will it hit cars, houses, structures, power lines or people? If so, immediate action may be necessary.
2. Dead Branches: Are there dead tops or branches? Is the tree dead?
3. Cracks: Are there deep, open cracks in the trunk or branches? These are major starting points for trunk and branch failure.
4. Crotch Cracks: Are there deep, open cracks below joining trunks or stems?
5. Tree Architecture: Has the tree grown beyond its species-specific shape into hazardous form? Is the tree leaning?
6. History: Has the tree recently lost large branches?
7. 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?
8. 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.
9. 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?

10. Storm injury: Are there broken branches, split trunks, or injured roots? Are branches close to power lines?
11. Root Rot: Are there fungus fruit bodies (mushrooms) on roots or near the trunk? Were roots injured by construction?
12. Rots and Cankers: Are there hollows or cankers (dead spots) in the trunk or major branches, some with fungus fruit bodies?
13. Construction injury: Have roots, trunk, or branches been injured?
14. 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.
15. 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.

7.30 HAZARD REDUCTION AND PREVENTION

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 may be reduced by removing dead and broken branches and by reducing branch end weights, by mechanically supporting weak branches from below, or by cabling and bracing.

If there are no other options to abate the hazard, the tree may need to be removed entirely (see Removing a Hazardous Tree).

The following checklist will help property owners avoid future problems:

1. 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.
2. Avoid planting brittle species where falling limbs could injure people or property
3. Prune trees when they are young and regularly thereafter.
4. Use correct pruning methods, always making the pruning cut outside the branch collar. This will allow only the minimum of decay infection.
5. Do not allow topping.
6. 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. For example, avoid planting tall-growing trees such as redwoods near power lines or too close to your house.
7. Water thoroughly (generally, until saturation is reached) during dry periods, slowly applying at least 2-inches of water.
8. 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.
9. Consider cabling or bracing weak forks of branches in larger trees of high value.

10. Do not plant trees with a narrowly-forked stem v-crotch, imbedded bark or girdling root ball.
11. Where a valuable specimen tree may be suspected of developing into a hazardous tree, use landscaping to keep people at a safe distance. This may require techniques such as rerouting walks, moving patio furniture, or planting shrubs and hedges to function as barriers to keep foot traffic at a safe distance.

SECTION 8.00 GENERAL

8.10 MAINTENANCE, CARE AND PRUNING

Various trees may require that branches be pruned clear from structures, activities, building encroachment or may need to be strengthened by means of mechanical support or surgery. The most compelling reason to prune is to develop a strong, safe framework and tree structure. Tree pruning standards should be consistent with the "Tree–Pruning Guidelines" of the International Society of Arboriculture.

8.20 HOMEOWNER DISCLOSURE

A great deal of time and effort is put into preserving and protecting trees within Windsor. Measures are taken to protect the trees before and during construction. Then the property is sold and a new homeowner becomes responsible for the maintenance and care of these trees. Often times the homeowner is not aware of proper maintenance and care of trees. Projects shall be conditioned to provide a disclosure to new homeowners that would include information regarding maintenance, care, regulations, permitting, and protection of trees on-site. The Town has developed a homeowners brochure entitled *"Native Oak Tree Care"* that is available through the Planning Department or on the Town's website.

8.30 ENFORCEMENT

STOP WORK – TEMPORARY RESTRAINT

If a violation of the Town's ordinance, or of the recommendations contained in the Tree Protection & Preservation Plan occurs during development, the Town may immediately issue a stop work order prohibiting further activity on the project site, and/or a citation. A mitigation plan must then be filed with the Planning Director by the project arborist, which includes the specific measures that must be implemented for protection of the remaining trees on the property, specific mitigation or remediation measures necessary to compensate for tree damage which has occurred, or monetary compensation per the appraisal process for trees illegally removed.

If a violation occurs while a building permit application or development approval is pending, the Planning Director may issue a temporary moratorium on the proposed development. This moratorium may not exceed eighteen months. The moratorium time period is intended to provide the Town an opportunity to assess the violation(s) and to determine suitable mitigation measures for the future development. These mitigation measures shall be placed as a condition of any future permits for development on the property.

CIVIL PENALTIES

Where a tree is illegally removed, or damaged to a degree that survival is not expected, civil action may be brought by the Town. Refer to the Zoning Ordinance for additional information on enforcement

A civil action may be implemented to provide injunctive relief to abate, enjoin, or otherwise compel the cessation of such violation.

If civil action is brought by the Town, and the Town prevails, the court shall award all costs associated with investigation, preparation for trial, costs of the trial, reasonable expenses including overhead and administration costs incurred when prosecuting the action, and reasonable attorney fees, to the Town.

SECTION 9.00 DEFINITIONS AND TERMINOLOGY

Building Footprint - the two-dimensional plan of a building's perimeter boundaries measured at grade level.

Certified Arborist - a person who is certified with the International Society of Arboriculture, thereby demonstrating knowledge and competency in the field of arboriculture, and is a member of the American Society of Consulting Arborists.

Compaction - compression of the soil structure within a TPZ by any means (e.g. traffic, heavy equipment, storage of construction materials, etc.) that creates an upper layer that is dense and impenetrable. Compaction injures the roots of trees, and leads to poor health and decline. Symptoms of soil compaction often take 3 to 10 years to manifest themselves.

Dead Tree - either a tree that is dead, or one that has been so irreparably damaged, or is in such an advanced state of decline that not enough live tissue exists to sustain life. Such a determination must be made by a certified arborist. Once a tree has been determined to be dead then removal is permitted.

Designated Tree – native trees and trees of historical/cultural significance that are associated with an event or person significant to the community. These trees may also be known as Heritage Trees.

Diameter at Breast Height (DBH) - the diameter of the tree trunk at four and one-half feet (54") above the natural grade level. The diameter can be calculated using the formula: DBH = circumference at 4.5 feet ÷3.142. To determine the DBH of multi-trunk trees, or measuring trees on slopes, consult the current *Guide for Plant Appraisal*, published by the Council of Tree and Landscape Appraisers.

Dripline Area - the area represented by the actual size and shape of the tree canopy, as shown on an aerial photograph. Dripline does not represent the size or area of the root zone, and is not the same as the Tree Protection Zone (TPZ), which represents the area required for preservation by fencing.

Excessive Pruning – 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. Also, includes removal of the leaf or steam area predominantly on one side, topping or excessive tree canopy or crown raising.
Exception: when clearance from overhead utilities or public improvements is required or to abate a hazardous condition or public nuisance.

Hand Digging - performing underground trenching without traditional trenching equipment such as backhoes, excavators, or trenchers. Alternate trenching techniques, as specified by the project arborist, might include using horizontal boring technology, high pressure air, high pressure water, and in limited locations manual removal of soil from a trench area with a shovel.

Hazardous Tree - a tree that possesses a significant structural defect that poses an unacceptable risk should the tree, or any part of it, fall on a target.

A structural defect is defined as any structural weakness, whether caused by disease or any other means, which results in the deformity or weakness of a tree. Such a condition can be verified by a certified arborist. The Town retains the 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.

A tree with a structural defect may not be a hazard if a 'target' is absent within the falling distance of the tree or its parts (e.g., a substandard tree in a non-populated area away from pedestrian pathways may not be considered a hazard).

Injury - a wound resulting from any activity, including but not limited to, excessive pruning, cutting, bruising, scarring, tearing or breaking of roots, bark, trunk, branches or foliage. It also includes damage inflicted on a tree through activities in the tree protection zone such as trenching, excavating, altering grade, paving or compaction. It also includes the application of herbicides or poisons, or any other action that ordinarily would result in damage to a tree.

Inspection Report - a written report prepared by the project arborist to document that the specified tree inspection, or any other required procedure, has been accomplished. All necessary mitigation or action items that are required based on conditions existing at the time of inspection shall be noted, as well as any violations of the Tree Preservation Policy or Tree Protection and Preservation Plan.

Inventory – a site plan that illustrates the location and driplines of all trees on a proposed project site. An inventory is a recommended submittal in the pre-application stage of development.

Native Tree – any tree which has its natural origin at the project site. Does not include trees that originate in other parts of the world that have naturalized in Windsor. Does not include trees that are native to other parts of California that have been planted in Windsor.

Non-native Tree – any tree which has its natural origin outside the Town of Windsor. Includes ornamental trees, trees that have naturalized from other areas, and natives from other areas of the state.

Project Arborist - a certified arborist retained by the Town for the purpose of overseeing on-site activity involving the welfare of the trees to be preserved. The project arborist shall be responsible for all reports, appraisals, tree preservation plans, and/or inspections as required for the duration of the project.

Protected Tree – Actual species of protected trees and sizes are specified within the Town's Zoning Ordinance. Size is trunk diameter measured at a height of 4.5 feet from surrounding grade. Multiple trunk trees must possess at least one trunk with the stated diameter (based on species) to be considered protected.

Protective Tree Fencing - a temporary enclosure erected around a tree to be protected at the boundary of the tree protection zone. The fence serves three primary functions:

- To keep the crown, branch structure and trunk clear from direct contact with, and damage by, equipment, materials or other disturbances;
- To preserve roots and soil in a natural, intact and non-compacted state;
- To identify the tree protection zone in which no soil disturbance is permitted and in which activities are restricted.

Removal - complete tree removal either by cutting to the ground, or extraction, and then grinding or pushing over the stump of the tree, and disposing of the remains as directed by the Project Arborist.

Root Pruning - the deliberate and intended cutting of any root over 1 inch in diameter using a clean saw or other cutting instrument. Roots must never be torn from the ground, but must always be cleanly severed when encountered.

Significant Tree – as determined by the arborist, a significant tree can be identified by size, age, species, unusual character, historical significance, or a combination of these features. When identified by the arborist as significant, exceptional measures to preserve and protect may be required.

Site Plan - either a Pre-application Plan, Improvement Plan, or Tentative Map. The Pre-application Plan need only show the surveyed tree locations and the tree driplines (including trees located on neighboring property that overhang the project site).

The Improvement Plan or Tentative Map must show the surveyed tree locations, tree protection zones (TPZ), and tree numbers that correspond to the tree information contained the Tree

Protection and Preservation Plan. Additionally the Improvement Plan or Tentative Map shall show existing site conditions and proposed improvements.

Street Tree - any publicly owned tree growing within the Town's right-of-way or an area within a public easement. A permit from the Town is required prior to any work on or around these trees.

Target - people, vehicles, structures, other trees or landscape improvements subject to damage by a falling tree.

A tree with a hazardous structure may not be a hazard if a 'target' is absent within the falling distance of the tree or its parts, for example a small tree in a non-populated area, away from pedestrian pathways, might possibly not be considered a hazard.

Topping - the practice of cutting back large diameter branches to a stub, or truncating the main stem.

Tree Appraisal - a method of determining the monetary value of a tree as it relates to the real estate value of a property, neighborhood or community. When required, a certified arborist determines the tree's value by adjusting its 'basic value' by condition, location and species, using the most recent edition of the *Guide for Plant Appraisal*, published by the Council of Tree and Landscape Appraisers.

Tree Protection and Preservation Plan - a plan prepared by a certified arborist that outlines measures to protect and preserve trees on a project. This plan shall include requirements for preservation, establish a tree protection zone (TPZ), specify tree protection during demolition and/or construction, and specify mitigation measures and appraisal values for each tree.

Tree Protection Signage - signs measuring a minimum size of 12" x 18" designating the tree protection zone, which is a protected area. Tree protection signs must be attached to the tree protection fencing at maximum intervals of 12 feet apart on all fenced areas.

Tree Protection Zone or (TPZ)) the area of temporary fenced tree enclosure. The roots that are critical for tree survival are typically found in the upper three feet of soil and may extend beyond the dripline area. Protecting the roots in the TPZ is necessary to ensure the tree's survival. The TPZ is a restricted activity zone where no access or soil disturbance is permitted, unless approved, in writing, and supervised by the Project Arborist. A TPZ must be identified for each tree and shown on all applicable Improvement plans.

The TPZ is measured from the dripline of the furthest most tree limb plus a minimum of one inch for every inch of the diameter of the tree or a minimum of 3' beyond the dripline, whichever is greater to provide a protected zone outside the furthest dripline of the tree. (DBH - the diameter of the tree trunk at four and one-half feet (54") above the natural grade level)

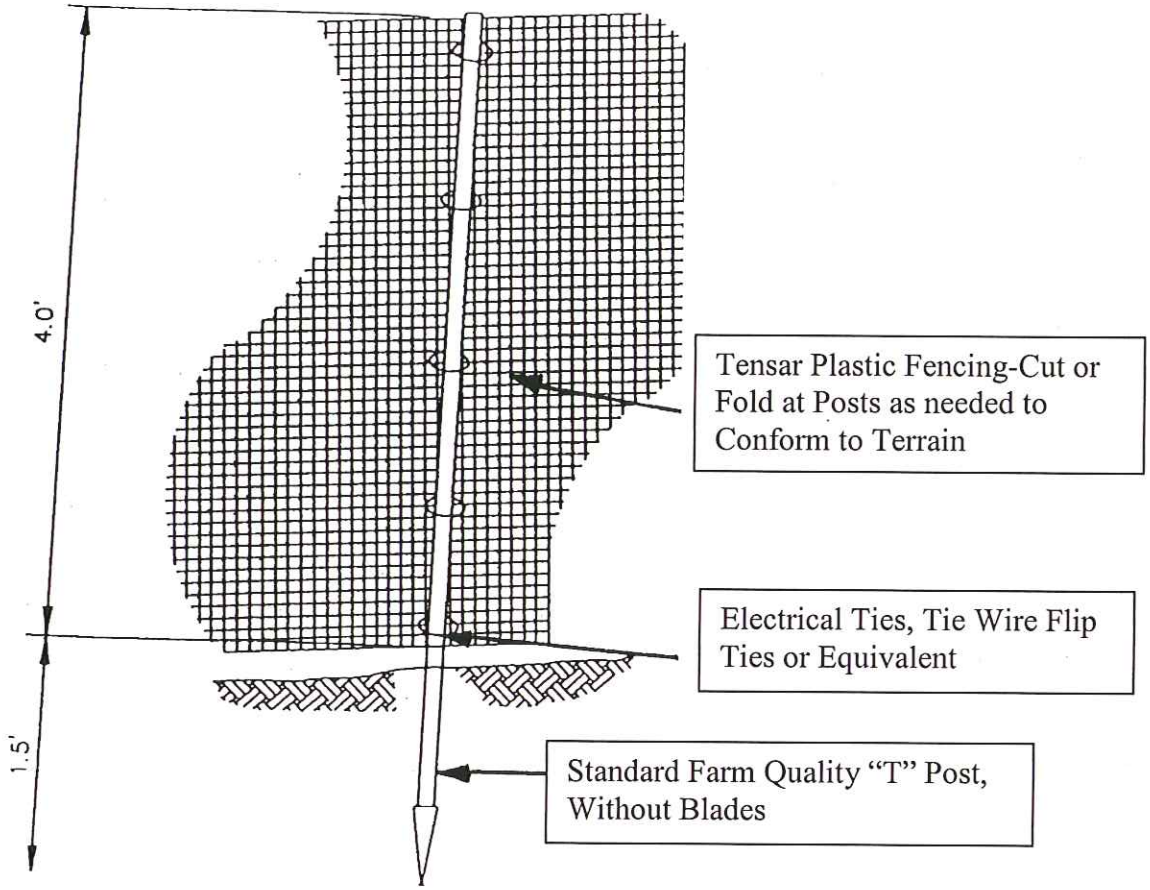
The Project Arborist retains the discretionary right to decrease or increase the size of the TPZ.

Trenching - any excavation, whether to provide irrigation, install foundations, lay utility lines, pipe, drainage or other property improvements below grade. Trenching within the TPZ is injurious to roots and tree health and is prohibited, unless approved in writing by the project arborist.

SECTION 10.00 STANDARDS AND DETAILS

Dwg 001 - Residential Single Lot/Unit Plastic Tree Fencing During Construction Detail
Dwg 002 - Tree Protection During Construction Detail
Dwg 003 - Tree Location and Numbering Plan
Dwg 004 - Multi-Lot/Unit Residential and Non-Residential Chain Link Tree Fencing During Construction Detail
Hazard Evaluation Form (applicant should use ISA most current form)
Tree Disclosure Statement (copy)

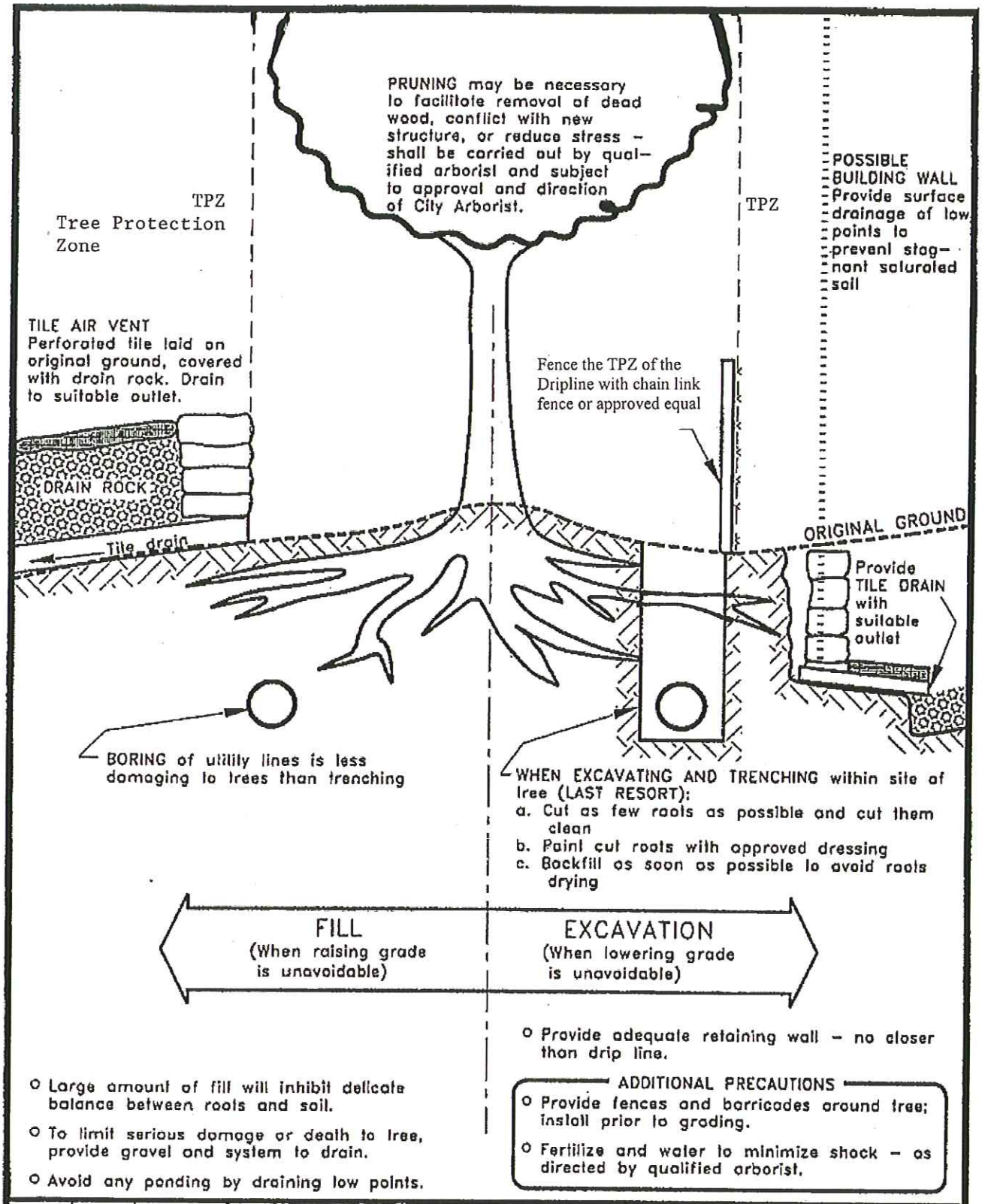
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Tree protection fencing shall be a minimum of 4' in height at all locations, and shall form a continuous barrier without entry points around all individual trees, or groups of trees. Fencing shall serve as a barrier to prevent encroachment of any type of construction activities, equipment, materials storage, or personnel.

Scale: NTS

Rev	By	Date		
			RESIDENTIAL SINGLE LOT/UNIT PLASTIC TREE FENCING DURING CONSTRUCTION	**Date** 07/23/03
			TOWN OF WINDSOR STANDARD	**DWG NO. 001**



Rev	By	Date

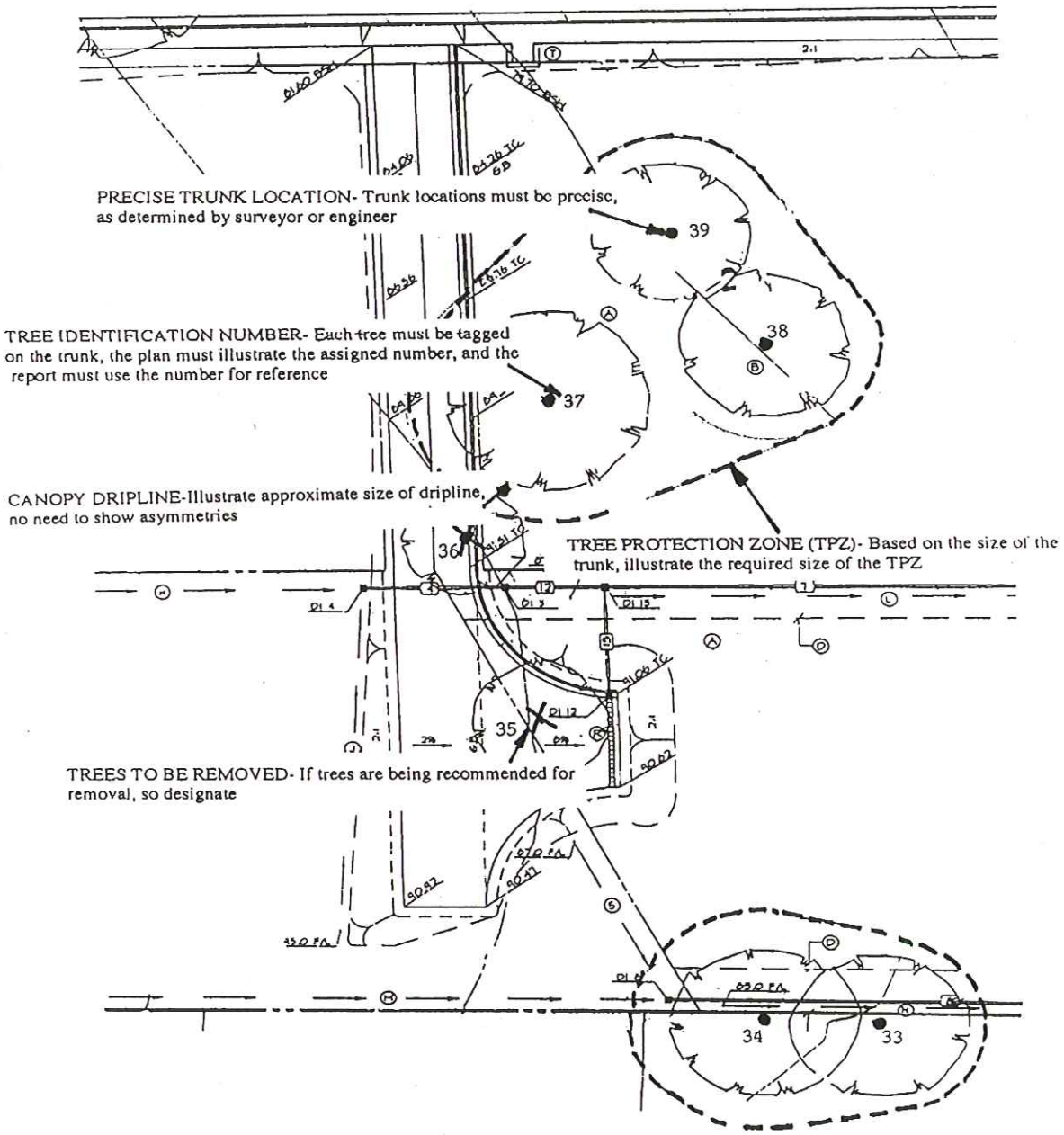
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Tree Protection During Construction

TOWN OF WINDSOR STANDARD

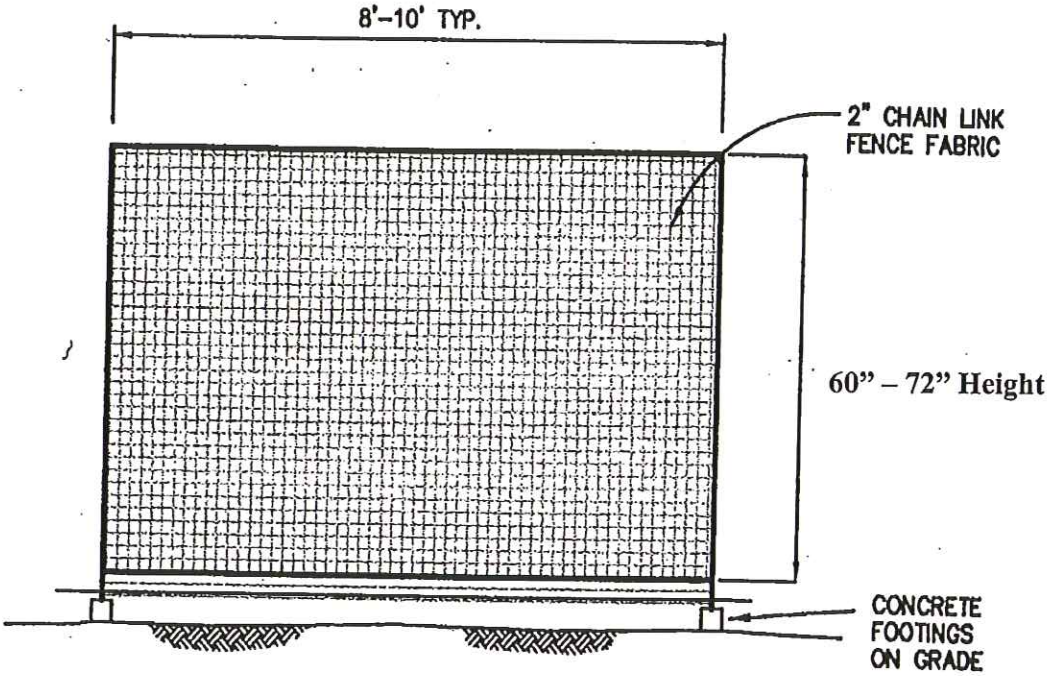
Date 08/26/03

Dwg No. 002



SCALE: NTS

Rev	By	Date	LOCATION AND NUMBERING PLAN	Date: 07/02/01
			TOWN OF WINDSOR STANDARD	DWG NO. 003



INSTALL PORTABLE CHAIN LINK FENCE PANELS AS TEMP. TREE PROTECTION FENCING AT LOCATIONS SHOWN ON PLANS

TEMPORARY TREE PROTECTION FENCE

NOT TO SCALE

Rev	By	Date		
			MULTI-LOT/UNIT RESIDENTIAL AND NON-RESIDENTIAL CHAIN LINK TREE FENCING DURING CONSTRUCTION	**Date** 08/26/03
			TOWN OF WINDSOR STANDARD	**DWG NO. 004**

TREE HAZARD EVALUATION FORM

Hazard Rating:

_____ + _____ + _____ = _____
Failure Potential + Size of part + Target Rating = Hazard Rating

☐ Immediate action needed
☐ Needs further inspection
☐ Dead Tree

Site/Address: _____
Map/Location: _____

Owner: ☐ - Public ☐ - Private ☐ - Unknown ☐ - Other
Date: _____ Inspector: _____
Date of last inspection: _____

TREE CHARACTERISTICS:

Tree #: _____ Species: _____
DBH: _____ # of trunks: _____ Height: _____ Spread: _____

Form: ☐ generally symmetric ☐ minor asymmetry ☐ major asymmetry ☐ stump sprout ☐ stag-headed
Crown class: ☐ dominant ☐ co-dominant ☐ intermediate ☐ suppressed
Live crown ratio: _____% **Age class:** ☐ young ☐ semi-mature ☐ mature ☐ over-mature/senescent
Pruning history: ☐ crown cleaned ☐ excessively thinned ☐ topped ☐ crown raised ☐ pollarded ☐ flush cuts
☐ crown reduced ☐ cabled/braced ☐ none ☐ multiple pruning events Approx. dates: _____
Special Value: ☐ specimen ☐ heritage/historic ☐ wildlife ☐ unusual ☐ street tree ☐ shade ☐ screen
☐ indigenous ☐ protected by government agency

TREE HEALTH:

Foliage color: ☐ normal ☐ chlorotic ☐ necrotic Epicarmics? Y N
Foliage density: ☐ normal ☐ sparse **Leaf size:** ☐ normal ☐ small
Annual shoot growth: ☐ excellent ☐ average ☐ poor
Woundwood development: ☐ excellent ☐ average ☐ poor ☐ none
Vigor class: ☐ excellent ☐ average ☐ Fair ☐ poor
Major pests/disease: _____

Growth obstruction: _____
☐ stakes ☐ wire/ties ☐ signs ☐ cables
☐ other: _____

Twig Dieback? Y N

SITE CONDITIONS:

Site Character: ☐ residence ☐ commercial ☐ industrial ☐ park ☐ open space ☐ natural ☐ woodland forest
Landscape type: ☐ parkway ☐ raised bed ☐ container ☐ mound ☐ lawn ☐ shrub border ☐ wind break
Irrigation: ☐ none ☐ adequate ☐ inadequate ☐ excessive ☐ truck welted
Recent site disturbance? Y N ☐ construction ☐ soil disturbance ☐ grade change ☐ line clearing ☐ site clearing
% dripline paved: ☐ 0% ☐ 10-25% ☐ 25-50% ☐ 50-75% ☐ 75-100% **Pavement lifted? Y N**
% dripline w/ill soil: ☐ 0% ☐ 10-25% ☐ 25-50% ☐ 50-75% ☐ 75-100%
% dripline grade lowered: ☐ 0% ☐ 10-25% ☐ 25-50% ☐ 50-75% ☐ 75-100%
Soil problems: ☐ drainage ☐ shallow ☐ compacted ☐ drought ☐ saline ☐ alkaline ☐ acrid ☐ small volume
☐ disease center ☐ history of fail ☐ clay ☐ expansive ☐ slope ____ ☐ aspect _____
Obstructions: ☐ lights ☐ signage ☐ line-of-site ☐ view ☐ overhead lines ☐ underground utilities ☐ Traffic
☐ Adjacent vegetation ☐ other: _____
Exposure to wind: ☐ single tree ☐ below canopy ☐ above canopy ☐ recently exposed ☐ windward, canopy edge
☐ area prone to windthrow **Prevailing wind direction:** _____
Occurrence of snow/ice storms ☐ never ☐seldom ☐regularly

TARGET:

Use under tree: ☐ building ☐ parking ☐ traffic ☐ pedestrian ☐ recreation ☐ landscape ☐ hardscape
☐ small features ☐ utility lines ☐ other: _____
Can target be moved? Y N **Can use be restricted? Y N**
Occupancy: ☐ occasional use ☐ intermittent use ☐ frequent use ☐ constant use

TREE HAZARD EVALUATION FORM

TREE DEFECTS:

Root Defects:

Suspect root rot? Y N **Mushroom/conk/bracket present:** Y N **ID:** _____

Exposed roots: ☐ severe ☐ moderate ☐ low **Undermined:** ☐ severe ☐ moderate ☐ low

Root Pruned: _____ distance from trunk **Root area affected:** _____% **Buttress wounded:** Y N When:_____

Restricted root area: ☐ severe ☐ moderate ☐ low **Potential for root failure:** ☐ severe ☐ moderate ☐ low

LEAN: _____deg. from vertical ☐ natural ☐ unnatural ☐ self-corrected **Soil heaving:** Y N

Decay in plane of lean: Y N **Roots broken:** Y N **Soil cracking:** Y N

Compounding factors: _____. **Lean severity:** ☐ severe ☐ moderate ☐ low

CROWN DEFECTS: Indicate presence of individual defects and rate their severity (S-Severe, M=Moderate, L=Low)

DEFECT	ROOT CROWN	TRUNK	SCAFFOLDS	BRANCHES
Poor taper				
Bow, sweep				
Codominants/forks				
Multiple attachments				
Included bark				
Excessive end weight				
Cracks/splits				
Hangers				
Girdling				
Wounds/seams				
Decay				
Cavity				
Conks/mushroom/bracket				
Bleeding/sap flow				
Loose/cracked bark				
Nesting hole/bee hive				
Deadwood/stubs				
Borers/termites/ants				
Cankers/galls/burls				
Previous failure				

HAZARD RATING:

Tree part most likely to fail: _____

Inspection period: _____ annual _____ biannual _____ other: _____

Failure Potential + Size of Part + Target Rating = Hazard Rating

_____ + _____ + _____ = _____

Failure potential: 1 – low, 2 - medium, 3 – high, 4 – severe

Size of part: 1=<6" (15cm); 2 =6-18" (15-45cm); 3 = 18-30" (45-75cm); 4= >30" (75cm)

Target rating: 1 – occasional use, 2 – intermittent use: 3 – frequent use; 4 – constant use

HAZARD ABATEMENT:

Prune: ☐ remove defective part ☐ reduce end weight ☐ crown clean ☐ thin ☐ raise canopy ☐ crown reduce☐ restructure ☐ shape

Cable/Brace: _____. **Inspect further:** ☐ root crown ☐ decay ☐ aerial ☐ monitor

Remove tree: Y N **Replace:** Y N **Move target:** Y N **Other:** _____

Effect on adjacent trees: ☐ none ☐ evaluate

Notification: ☐ owner ☐ manager ☐ governing agency **Date:** _____.

Comments: