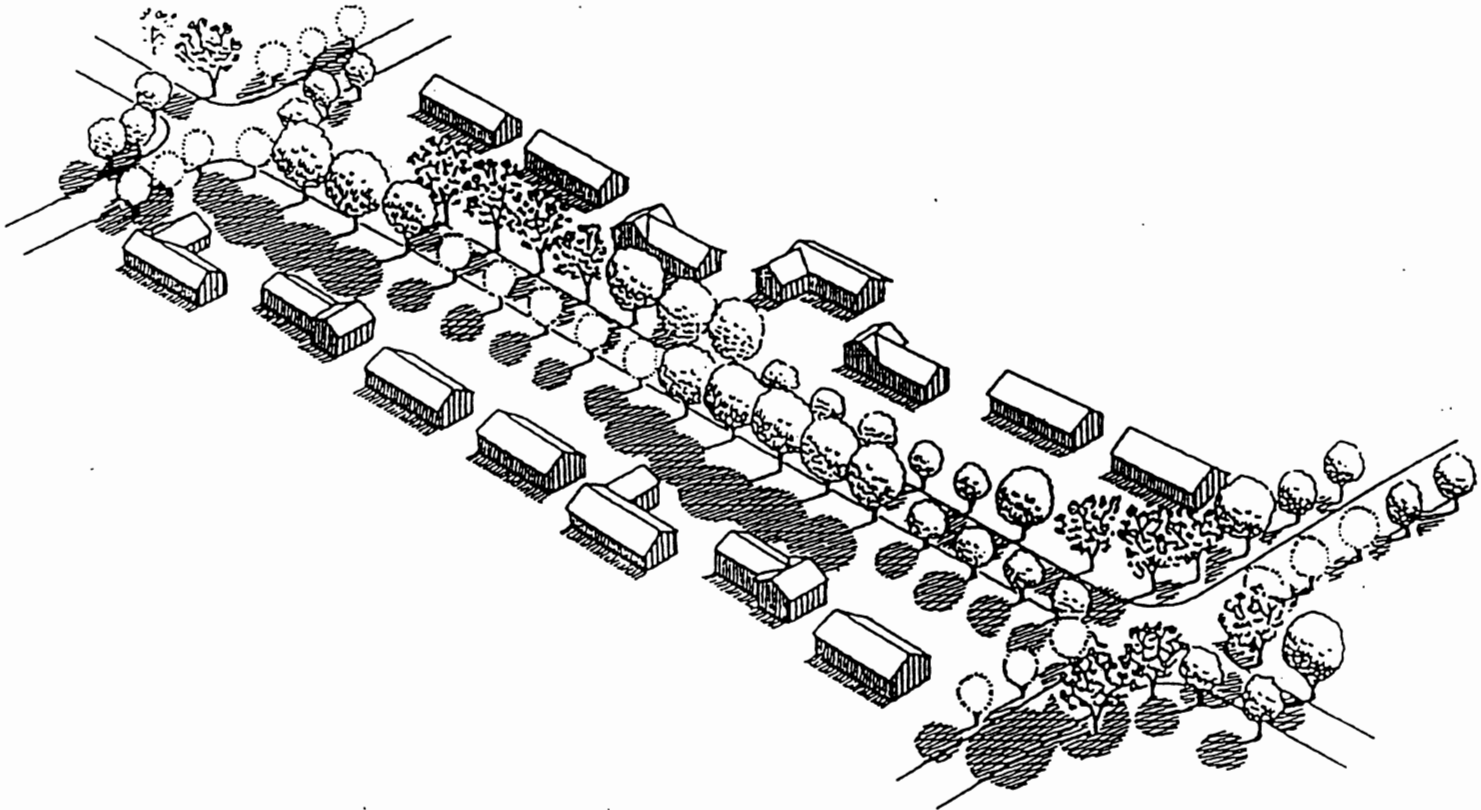
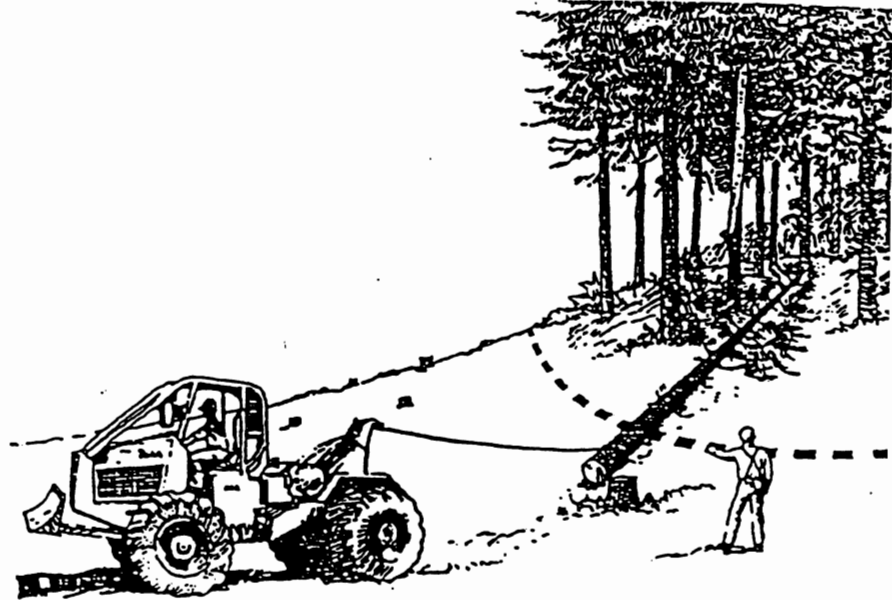


# URBAN FORESTRY MANUAL



# URBAN FORESTRY MANUAL

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## Chapter 1 - Tree Plan Standards

**A. General Plan Requirements.** The Urban Forester may waive detailed plan requirements if the information submitted is sufficient to determine compliance with the Tree Protection and Replacement Ordinance. Additionally the Urban Forester may require additional or more detailed information as deemed necessary to ensure compliance with the Tree Protection and Replacement Ordinance.

**B. Level I Tree Plan.** A level I tree plan is an abbreviated tree plan. It is required for developing residential properties (1-4 units). It can be developed by the applicant. It shall include the following information:

1. The footprint of the house(s), driveway(s), streets and any other improvements, approximate location of trees to be planted and any trees to be saved.
2. A minimum of 30 tree units per acre shall be preserved and/or planted to trees. The site plan should include tree density calculations that show the required tree density and the tree density of existing trees to be retained and trees to be planted.
3. If existing trees are to be counted, the Urban Forester must inspect the trees prior to construction, the trees must be protected during construction and then reinspected by the Urban Forester prior to final building inspection.
4. Location and species of trees proposed for planting shall be at the approval of the Urban Forester.

## Chapter 1 - Tree Plan Standards

C. Level II Tree Plan. A level II tree plan is required for developed commercial, industrial and multi-family (more than four units) sites proposing an addition or site disturbance. It can be developed by the applicant but may require the assistance of a qualified professional forester. A level II Tree Plan should include the following information:

1. **Site Plan.** The site plan shall show the existing improvements and any new additions or site disturbances, as typically required for site plan review.
2. **Tree Protection.** If the proposed changes to the site will be within the critical root zone of any existing tree on site a Tree Protection plan will be required. This plan shall be included on the grading plan, and should include the following information:
  - a. Locations of existing tree(s) potentially impacted by the proposed site changes;
  - b. Assessment of the potential damage to the tree(s), by a qualified professional forester;
  - c. Any required measures to ensure protection of trees to be preserved.
3. **Tree Density Calculations.** The site plan should include tree density calculations including:
  - a. Buildable area of the site in square feet and the proposed site area to be disturbed in square feet;
  - b. Number and size of trees proposed for removal;
  - c. Replacement tree density required based on area of site to be disturbed and tree density proposed for removal.

## Chapter 1 - Tree Plan Standards

4. **Planting Plan:** Drawn to scale on the site plan. It shall include the following information:
  - a. Location, size, species and numbers of trees to be planted.
  - b. Narrative description and detail showing any site preparation, installation and maintenance measures, necessary for the long-term survival and health of the trees.
  - c. Timeline for site preparation, installation and maintenance of plant materials.
  - d. Cost estimate for the purchase, installation and 3-years maintenance of trees.
  - e. **Tree Density calculation:** The following information should be included on the site plan: Site area, tree density calculation for the existing trees to be preserved, tree density calculation for trees proposed for planting

## Chapter 1 - Tree Plan Standards

**D. Level III Tree Plan.** A level III tree plan is required for the removal of any nuisance tree. It can be developed by the applicant but may require the assistance of a qualified professional forester. It shall include the following information:

1. **Site Plan.** The site plan should show the approximate location of the tree(s) buildings, and any other pertinent site improvements. It shall also list species and approximate size and condition of the tree.
2. **Narrative Report:**
  - a. The species, size, and condition of the tree(s) in question.
  - b. Description of the problems associated with the tree including past history of problem, and methods attempted to alleviate the problems.
  - c. Tree density calculations, including the tree density of the tree proposed for removal and the size and number of replacement trees proposed for planting.
3. **Tree Replacement plan.** Location and species of trees proposed for replacement planting. This should include a timeline for installation of the required trees, and a cost estimate for the purchase, installation and 3-years maintenance of the trees.

## Chapter 1 - Tree Plan Standards

**E. Level IV Tree Plan.** A level IV tree plan is required for developing sites that do not have any existing trees or which trees will not be impacted nor pose a hazard to the proposed project. It can be developed by the applicant, but does require an individual knowledgeable in landscape design, soils and tree species selection. It should include the following information:

1. **Tree Inventory:** Drawn to scale on the site plan; showing the following information:
  - a. Approximate locations of any existing trees on site.
  - b. Species, size and condition of trees to be retained.
  
2. **Planting Plan:** Drawn to scale on the site plan. It should include the following information:
  - a. Location, size, species and numbers of trees to be planted.
  - b. Narrative description and detail showing any site preparation, installation and maintenance measures, necessary for the long-term survival and health of the trees.
  - c. Timeline for site preparation, installation and maintenance of trees.
  - d. Cost estimate for the purchase, installation and 3-years maintenance of trees.
  - e. **Tree Density calculation:** The following information should be included on the site plan: Buildable area of site, tree density calculation for the existing trees to be preserved, tree density calculation for trees proposed for planting

## Chapter 1 - Tree Plan Standards

F. Level V Tree Plan. A level V tree plan is required for developing residential subdivisions (more than four units), commercial, industrial, multi-family (more than four units), in which existing trees are proposed for removal; could be damaged by construction activities; and/or could become hazardous. This plan must be developed by a qualified professional forester. It shall include the following information:

1. Tree Inventory: Drawn to scale on the site plan; a map delineating vegetation types. Each type should include the following information.
  - a. Average trees and basal area per acre, by species and 6" diameter class. For non-forested areas, a general description of the vegetation present.
  - b. Narrative description of the potential for tree preservation for each vegetation type. This should include soils, wind throw potential, insect and disease problems, and approximate distance to existing and proposed targets.
  - c. Description of any off-site tree or trees which could be adversely affected by the proposed activity
2. Tree Protection Plan: Drawn to scale on the grading and erosion control plans; designating trees to be preserved. It should include the following information:
  - a. Surveyed locations of perimeters of groves of trees and individual trees to be preserved, adjacent to the proposed limits of construction. General locations of trees proposed for removal. The critical root zones of trees to be preserved shall be shown on the plan.
  - b. Limits of construction and existing and proposed grade changes on site.
  - c. Narrative description, and graphic detail of tree protection, and tree maintenance measures required for the preservation of existing trees to be preserved.
  - d. Timeline for clearing, grading and installation of tree protection measures.



## Chapter 1 - Tree Plan Standards

3. **Planting Plan:** Drawn to scale on the site plan. It should include the following information:
  - a. Location, size, species and numbers of trees to be planted.
  - b. Narrative description and detail showing any site preparation, installation and maintenance measures, necessary for the long-term survival and health of the trees.
  - c. Timeline for site preparation, installation and maintenance of trees.
  - d. Cost estimate for the purchase, installation and 3-years maintenance of trees.
  - e. **Tree Density calculation:** The following information should be included on the site plan: Buildable area of site, tree density calculation for the existing trees proposed for preservation, tree density calculation for trees proposed for planting

## Chapter 1 - Tree Plan Standards

H. Level VI Tree Plan. A level VI tree plan is required for a Conversion Option Harvest Permit. It is required for any property proposing a conversion option harvest. It shall be developed by a qualified professional forester. It shall include the following information:

1. Forest Inventory including:
  - a. A statistically accurate inventory and a stand stocking table showing the number of trees per acre, basal area per acre, and volume per acre by species and 6 inch diameter class.
  - b. A map showing the locations of existing vegetation types delineated by forest type.
  - c. A map showing the location and a description of trees growing on adjacent property which may be jeopardized by the proposed activity.
  - d. A map showing any critical areas and the required critical area buffers, as defined in chapter 14.10 of the Olympia Municipal Code.
  - e. A map showing the location and a description of any Landmark trees as defined in chapter 16.56 of the Olympia Municipal Code.
2. A harvest plan containing:
  - a. A description of the harvesting method.
  - b. A map showing the locations of trees proposed for removal, skid roads and landings.
  - c. A stand stocking table showing the volume, number, basal area, and species of trees proposed for removal.
  - d. A slash abatement plan, pursuant to Olympia Fire Department standards.
  - e. An erosion control plan, pursuant to the Drainage Design and Erosion Control Manual for Olympia.

## Chapter 1 - Tree Plan Standards

3. Reforestation/Tree Planting Plan: Drawn to scale on the site plan. It should include the following information:
  - a. Location, size, species and numbers of trees to be planted.
  - b. Narrative description and detail showing site preparation, installation and maintenance measures necessary for the long-term survival and health of the trees.
  - c. Timeline for site preparation, installation and maintenance of trees.
  - d. Cost estimate for the purchase, installation and 3-years maintenance of trees.
  - e. Tree Density calculation: The following information should be included on the plan: Buildable area of the site, tree density calculation for the existing trees proposed for retention, tree density calculation for trees proposed for planting.

## Chapter 2 - Tree Protection Standards

- A. **Placing Materials Near Trees.** No person may conduct any activity within the protected area of any tree designated to remain, including, but not limited to, parking equipment, placing solvents, storing building material and soil deposits, dumping concrete washout and locating burn holes.
- B. **Attachments to Trees.** During construction, no person shall attach any object to any tree designated for protection.
- C. **Protective Barrier.** Before development, land clearing, filling or any land alteration for which a Tree Removal Permit is required, the applicant:
  - 1. Shall erect and maintain readily visible protective tree fencing along the outer edge and completely surrounding the protected area of all protected trees or groups of trees. Fences shall be constructed of chain link and at least four feet high, unless other type of fencing is authorized by the Urban Forester.
  - 2. May be required to cover with mulch to a depth of at least six (6) inches or with plywood or similar material the areas adjoining the critical root zone of a tree in order to protect roots from damage caused by heavy equipment.
  - 3. Shall prohibit excavation or compaction of earth or other potentially damaging activities within the barriers.
  - 4. May be required to minimize root damage by excavating a two (2) foot deep trench to cleanly sever the roots of trees to be retained.
  - 5. Shall maintain the protective barriers in place until the Urban Forester authorizes their removal or a final certificate of occupancy is issued, whichever occurs first.
  - 6. Shall ensure that any landscaping done in the protected zone subsequent to the removal of the barriers shall be accomplished with light machinery or hand labor.

## Chapter 2 - Tree Protection Standards

### D. Grade.

1. The grade shall not be elevated or reduced within the critical root zone of trees to be preserved without the Urban Forester's authorization. The Urban Forester may allow coverage of up to one half of the area of the tree's critical root zone with light soils (no clay) to the minimum depth necessary to carry out grading or landscaping plans, if it will not imperil the survival of the tree. Aeration devices may be required to ensure the tree's survival.
2. If the grade adjacent to a preserved tree is raised such that it could slough or erode into the tree's critical root zone, it shall be permanently stabilized to prevent suffocation of the roots.
3. The applicant shall not install an impervious surface within the critical root zone of any tree to be retained without the authorization of the Urban Forester. The Urban Forester may require specific construction methods and/or use of aeration devices to ensure the tree's survival and to minimize the potential for root induced damage to the impervious surface.
4. To the greatest extent practical, utility trenches shall be located outside of the critical root zone of trees to be retained. The Urban Forester may require that utilities be tunneled under the roots of trees to be retained if the Urban Forester determines that trenching would significantly reduce the chances of the trees survival.
5. Trees and other vegetation to be retained shall be protected from erosion and sedimentation.

E. Directional felling. Directional felling of trees shall be used to avoid damage to trees designated for retention.

F. Additional Requirements. The Urban Forester may require additional tree protection measures which are consistent with accepted urban forestry practices.

## Chapter 3 - Tree Planting and Maintenance Standards

### A. All Projects Except Conversion Option Harvest

1. **Minimum Size and Tree Density Value for Replacement Trees.** The required minimum size of the replacement trees shall be pursuant to Table B. Each planted tree will be equivalent to one (1) tree unit.
2. **Replacement Tree Quality.** Replacement trees shall be American Standard for Nursery Stock Grade No. 1 or better and must be approved by the Urban Forester prior to planting.
3. **Replacement Trees - Species and Spacing.** The species selection and spacing of trees to be planted shall be such that it provides for the eventual mature size of the trees. Soil type, soil conditions and other site constraints shall be considered when selecting species for planting.
4. **Required cultural practices.** Trees shall be watered as necessary to ensure establishment, survival and growth, during the first two growing seasons after planting. They shall be mulched with 4 inches deep of composted mulch. Staking and fertilizer shall only be required where deemed necessary by the Urban Forester.
5. **Required Pruning (Deciduous Trees).** Pruning shall be performed on newly planted deciduous trees pursuant to the following schedule and standards.
  - a. Year 1 - Only dead, broken or crossing branches shall be pruned when the tree is planted.
  - b. Year 2 - A Class I prune, pursuant to National Arborist Association standards, shall be performed during Year 2. The purpose of this pruning is to establish proper scaffold branching, raise the crown for road/sidewalk clearance, and remove any dead, dying or crossing branches.
  - c. Year 3 - A Class I prune, pursuant to National Arborist Association standards, shall be performed during Year 3. The purpose of this pruning is to continue to establish the proper scaffold branching, continue to raise the crown for road and sidewalk clearance, and to remove any dead, dying or crossing branches.

### Chapter 3 - Tree Planting and Maintenance Standards

5. Required Pruning (Conifer Trees). Pruning/Shearing shall be performed on newly planted conifer trees according to the following schedule and standards.
  - a. Year 1 - Only dead and broken branches and/or double leaders shall be pruned when the tree is planted.
  - b. Year 2 - Depending on species, the tree shall be pruned/sheared to encourage one central leader. Lower branches shall be pruned as needed to provide clearance.
  - c. Year 3 - Depending on species, the tree shall be pruned/sheared to encourage one central leader. Lower branches shall be pruned as needed to provide clearance.

### Chapter 3 - Tree Planting and Maintenance Standards

#### B. Properties proposing a Conversion Option Harvest.

1. **Tree Size.** Planting stock shall be a minimum 2-0 bareroot seedlings. Each planted tree shall be equivalent to one (1) a tree unit.
2. **Acceptable Stocking.** Stocking levels are acceptable if a minimum of 200 tree units per acre of well distributed, vigorous, undamaged trees per acre of the site are established. This includes both the existing trees and the newly planted trees.
3. **Species suitability.** Species chosen for planting should be suited to the constraints of the site including, but not limited to: soils, available moisture, topography, light conditions, existing and potential disease problems.
4. **Timing of planting.** The trees shall be planted during the next planting season (October - March) after the harvesting operation is finished.
5. **Competing vegetation.** Competing vegetation shall be controlled to the extent necessary to allow establishment, survival, and growth of the planted trees. To ensure that competing vegetation is properly controlled, the Urban Forester may require the use of mulch, weed control fabric, tree shelters, and/or other measures deemed necessary.
6. **Maintenance Requirements.** Minimum stocking of the site, as established in this chapter, must be maintained. Failure to maintain the minimum stocking as required constitutes of violation of this chapter. Additionally failure to comply with the conditions established in the conversion option harvest plan also authorizes the City of Olympia to reinstate the 6-year moratorium on development as established in Chapter 222-20 WAC.



Chapter 4 - Tree Density Calculations

- A. Tree Density Calculation for individual trees.
1. Measure the stem diameter of each tree to be preserved at 4.5 ft. above the ground line. This is called diameter at breast height (DBH) and is measured in inches.
  2. Go to Table A, and select the tree unit value that corresponds to the DBH for each protected tree.
- B. Tree density calculation for forested stands.
1. Inventory the existing forested stand, using standard forest mensuration techniques. Determine the average basal area per acre of the dominant and co-dominant stems.
  2. Convert the Average Basal Area per acre to tree units per acre by multiplying the Average Basal Area by (2) two.

**TABLE A  
TREE DENSITY FOR EXISTING TREES**

DBH	TREE UNITS	DBH	TREE UNITS	DBH	TREE UNITS
1"-6"	1	24"	7	38"	14
6"-12"	1.5	26"	8	40"	15
14"	2	28"	9	42"	16
16"	3	30"	10	44"	17
18"	4	32"	11	46"	18
20"	5	34"	12	48"	19
22"	6	36"	13	50"	20

56  
57 -      56 21  
                 57 22  
                 56 23  
                 57 24

**TABLE B  
PLANTING STOCK - SIZE REQUIREMENTS**

DEVELOPMENT TYPE	PLANTING LOCATION	TREE TYPE	REQUIRED MINIMUM SIZE	TREE UNIT VALUE
Residential subdivision	Tree Tracts	Deciduous	1" caliper	"1"
Residential subdivision	Tree Tracts	Conifer	3' tall	"1"
Commercial, Industrial, multi-family (4 or more units)	All developed locations	Deciduous	2" caliper	"1"
Commercial, Industrial, Multi-family (4 or more units)	All developed locations	Conifer	6' tall	"1"
Commercial, Industrial, multi-family (4 or more units)	Undeveloped locations (i.e., woodland interplanting, etc.)	Deciduous	1" caliper	"1"
Commercial, Industrial, multi-family (4 or more units)	Undeveloped locations (i.e., woodland interplanting, etc.)	Conifer	3' tall	"1"
Single family and multi-family (up to 4 units)	All locations	Conifer	4' tall	"1"
Single family and multi-family (up to 4 units)	All locations	Deciduous	1.25" caliper, branched.	"1"
Undeveloped property (Conversion Option Harvest)	All locations	Conifer/ Deciduous	2-0 Bareroot Seedlings.	"1"

A. Specimen Tree Evaluation

1. Size. Size shall be determined using the methodology developed by the American Forestry Association for measuring champion trees. This methodology as adopted by the Washington Big Tree Program is described in detail in the publication: "Washington Big Tree Program, 1994" by Robert Van Pelt, College of Forest Resources, University of Washington, AR-10 Seattle, Washington, 98195.
  - a. Circumference of the trunk. The circumference of the trunk in inches shall be measured at Breast Height (4.5 ft. from the ground). If the circumference at 4.5 ft. is distorted by low branching, etc. then the circumference shall be taken at the smallest reading obtainable below that point.
  - b. Height of the tree. The height in feet shall be measured using standard forestry mensuration equipment. (clinometer, etc.)
  - c. Average Crown Spread. The average crown spread is measured in feet. This shall be the average of the spread of the crown at its widest and narrowest points.

One point shall be assigned for every inch in circumference, every 1 ft. in height and every four feet in crown spread.

The size value for specimen tree evaluation shall be the percentage obtained by dividing the point value of the subject tree by the value of the state champion of the species (listed in the Washington Big Tree Program, 1994 book) then multiplied by 4.

e.g. Subject tree = 200 size points / State Champion (350 points) = 57%

$$57\% \times 4 = 2.85$$

## Chapter 5 - Specimen Tree Evaluation

2. Location. There are four possible location values. They are determined based on the visibility of the tree from the public rights-of-way or other publicly accessible areas of the property. The four locations values are:

- a. 100% visible and prominent in the landscape = 3 points
- b. At least 75% visible = 2 points
- c. Not less than 50% visible = 1 point
- d. Not visible = 0 points

Given these criteria, it would be possible to increase the location value of a tree by incorporating it into the design of the site or plat, making it more visible, or more prominent in the landscape. Examples of this would be to design the tree or group of trees into the entry way of a new subdivision, or to incorporate an existing tree or group of trees into the middle of a parking lot at the front of a commercial building.

3. Condition. There are three condition criteria. The condition class of a tree shall be determined using the methodology developed by the International Society of Arboriculture, Specifically described in Table 6-2, Pages 40-41 of the 8th. edition of International Society of Arboriculture's, "Valuation of Landscape Trees, Shrubs, and Other Plants."

- a. Excellent Condition = 2 points
- b. Good Condition = 1 points
- c. Fair Condition = 0 point

Given these criteria it may be possible for the applicant to increase the Condition Value of a tree by performing necessary cultural practices to the tree. These cultural practices include but are not limited to: Pruning, cabling or bracing as needed, mulching, fertilizing, installing irrigation, etc.

4. Specimen Tree - Tree Density value. The specimen tree value is determined by multiplying the average of the size, location and condition values times the standard tree density of that tree.

e.g. Standard tree density = 7 tree units  
Size value (75% of state champion) = 3.0  
Location (at least 75% visible) = 2  
Condition (Good) = 1

Specimen Tree Value =  $\{(3 + 2 + 1) / 3\} \times 7 \text{ tree units} = 14.0$