Introduction – Use of the Manual

I. SEATTLE'S REGULATED TREES

A. Seattle Municipal Code

Title 15 protects specific trees on public property or public rights-of-way (ROW) under the jurisdiction of the Seattle Department of Transportation (SDOT). The *Street Tree Manual* establishes procedures and standards for the preservation and planting of trees in the ROW. All trees in the ROW and Heritage trees are considered *"Regulated Trees"* subject to standards for management contained in the *Manual*. A permit from the Department of Transportation is required for the planting, pruning or removal of a 'Regulated Tree'..

Street Trees

- All trees growing within the street right-of-way (including unimproved right-of-way). In some cases, property lines may lie several feet behind the sidewalks. A permit from SDOT is required prior to any work on or within the dripline of any *'street tree'*.

Heritage Trees

- Individual trees of any size or species designated by the Heritage Tree Program, cosponsored by the City of Seattle and Plant Amnesty, for distinctive characteristics based on age, size, unique form or historical significance.

B. Protected Categories

Throughout the *Manual*, the designation of *Protected Trees* shall apply to all trees or groups of trees in the above categories.

II. REQUIRED PRACTICES

Required Practices are to be implemented by the property owner, project applicant, contractor or designee, and are minimum standards for work undertaken on a *Regulated Tree*.

Required Practices are reasonable measures consistent with best management practices (BMP's) in the landscape and tree care industry to protect the public health, safety and welfare and promote the health of trees as an environmental priority of the City of Seattle .

In all cases, the *City Arborist* shall, if justified by field conditions, have the discretion to modify or add to any condition, practice or standard mentioned within the *Manual*.

III. RECOMMENDED PRACTICES

Recommended Practices are not mandatory. They provide guidance to ensure that proactive measures implemented for the care of trees (fertilization, mulching, vertimulching, treatment to discourage pests, etc.) are consistent with current industry standards, and SDOT policies and procedures.

Note: *The SDOT Director through a designee for SDOT Urban Forestry has discretionary authority to require recommended practices as a condition for approval of a project permitted by SDOT or as mitigation for damage to trees in the ROW.*

IV. DEFINITIONS

Terms unique to the construction and/or urban forestry industry are defined to provide a uniform understanding of language in this document. Terms that are defined below are noted in *italics* throughout the document.

V. APPENDICES & REFERENCES

Appendices augment the information and provide sources for the technical requirements and guidance included in this *Manual*..

VI. ASSUMPTIONS AND LIMITING CONDITIONS

- No responsibility is assumed by the City of Seattle for matters legal in character regarding this *Manual*. Any legal description that may be provided is assumed to be correct.
- Care has been taken to obtain reasonable information from reliable sources for this *Manual*.
- Visual aids within this *Manual*, such as sketches, diagrams, graphs, and photos, are not necessarily to scale and should not be construed as engineered data for construction.

This *Manual* conforms with current standards for tree care and application of best management practices, evaluation and appraisal procedures, diagnostic and reporting techniques and sound urban forestry practices as recommended by the sources listed in the References section.

SDOT Urban Forestry has 2 sections. The City Arborist's Office, which is responsible for the issuance of permits to plant, prune or remove street trees, and the Landscape Architect's Office which reviews tree issues relating to Capital Improvement Projects and Multi Family and Commercial Development.

SECTION 1.00 - DEFINITIONS

For the purposes of this Manual and interpretation of regulations, the following definitions apply:

1. ***Appraisal*** (*see Tree Appraisal, Section 1.34*).

2. ***Certified Arborist*** is an individual who with current International Society of Arboriculture arborist certification,

3. ***City Arborist*** – SDOT Urban Forestry representative designated this title by the Director of Transportation.

4. ***Compaction*** - compression of the soil structure or texture by any means that impacts permeability within the upper foot of the surface.. *Compaction* occurs when protection measures are not in place prior to construction activity (operation of equipment, storage of materials, etc) and is injurious to roots and the health of a tree (*see Compaction, Section 2.20; and Aeration, Section 5.50 A*).

5. ***Critical Root Zone*** – Area of tree protection as defined by Standard Plan No. 133 and Section 8-01.3(2)B TREE, VEGETATION AND SOIL PROTECTION PLAN (TVSPP) in the City Of Seattle Standard Specifications For Road, Bridge, And Municipal Construction.

6. ***Dangerous*** see Hazardous.

7. ***Dead Tree*** - Term applied to trees which are dead or in an advanced state of decline (an insufficient amount of live tissue, green leaves, limbs or branches, exists to sustain life) as determined or confirmed by SDOT Urban Forestry. A tree confirmed dead by SDOT will be permitted for removal under Section 15.43.030 of the Seattle Municipal Code.

8. ***Diameter at Breast Height (DBH) or Diameter at Standard Height (DSH)*** - the diameter of the tree trunk at four and one-half feet (or 54 inches) above natural grade level. The diameter may be calculated by using the following formula: DBH= circumference at 4.5-feet / 3.142 (D=C / Þ). 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.

9. ***Director*** - the Seattle Department of Transportation Director

10. ***Disturbance*** – any action with the potential to impact a tree including but not limited to change in soil or drainage conditions in area supporting roots.

11. ***Dripline Area*** - the area within X distance from the trunk of a tree, measured from the perimeter of the trunk of the tree at 54-inches above natural grade, where X equals a distance ten times the diameter of the trunk at 54-inches above natural grade.

12. ***Excessive Pruning*** -: removing more than one-fourth (25 percent) of the functioning leaf, stem or root area. Pruning in excess of 25 percent is injurious to the tree and is a prohibited act (*see 'Standards for Pruning Regulated Trees*', *Section 5.15*).

Excessive pruning (including pruning and removal of roots, removal of the leaf or stem area predominantly on one side, topping, or excessive tree canopy or crown raising) deemed necessary to meet mandated standards for public safety may be permitted (as an exception with conditions to ensure tree health) by SDOT Urban Forestry based on tree species, age, and/or site conditions.

13. ***Hazardous Tree*** refers to a tree with a structural defect which poses an imminent risk. Risk assessment by a qualified *Tree Risk Assessor* determines mitigation (pruning, removal, relocation of target) necessary for public safety and protection of property (*see Determining if a tree is Hazardous, Section 4.00*).**Structural defect** – condition within a tree due to natural deformity, damage, or mismanagement deemed by a Tree Risk Assessment as indicative of a structural weakness.

14. ***Injury*** - a wound resulting from any activity, including but not limited to *'excessive pruning'*, improper pruning cuts, cutting, *trenching*, excavating, altering the grade, paving or *compaction* within the *tree protection zone* of a tree. *Injury* shall include bruising, scarring, tearing or breaking of roots, bark, trunk, branches or foliage, herbicide or poisoning, or any other action predictably leading to the death or permanent damage to tree health.

15. ***Protected Tree*** - Heritage trees, individual trees of any size or species designated by the Heritage Tree Program cosponsored by the City of Seattle and Plant Amnesty, as having distinctive characteristics (age, size, unique form or historical significance). (*see Introduction - Use of The Manual, Regulated Trees*).

16. ***Qualified Tree Care Professional*** - an individual with a combination of education, training and experience necessary to meet standards for protection of the public and protection of the tree or trees as a public resource.

17. ***Recommended Practice*** - an action, treatment, technique or procedure recommended for optimum tree health and growth to maturity. Recommended practices may be required under specific conditions of approval for *discretionary development* projects or *injury* mitigation.

18. ***Regulated Tree*** – any tree in the ROW. Regulatory authority extends to include Heritage trees identified by the City as such.

19. ***Removal*** - any of the following:

Complete tree *removal* such as cutting to the ground or extraction of the tree.

Term also applies to action that necessitates the removal of a tree based on extent of permanent damage to its health or structural integrity, including but not limited to *excessive pruning*, cutting, girdling, poisoning, grading, or other impacts to tree canopy or roots within the *dripline* of the tree.

20. ***Required Practice*** - a mandatory standard of care required by SDOT Urban Forestry under the authority of the SDOT Director to be implemented by the property owner, developer, contractor or designee for the preservation of trees

21. ***Root Buffer*** - a temporary layer of material to protect the soil texture and roots. Buffer requirements as a tree protection measure are defined by SDOT Urban Forestry based on a field inspection of the tree, site, and related conditions. (*see Buffers, Section 2.15.5 B*).

22. ***Street Tree*** - any tree growing within the street right-of-way. **NOTE:** In some cases, property lines lie several feet behind the sidewalks. A permit from The Seattle Department of Transportation (SDOT) is required prior to any work on or around these trees. (*see Introduction - Use of The Manual, Regulated Trees*).

23. ***Target*** is a term used to include people, vehicles, structures or something subject to damage by a tree that cannot be moved to mitigate risk.

Note: *A tree may not be a hazard if a "target" is absent within the falling distance of a tree or its parts (e.g., a defective tree in a non-populated area away from pathways may not be considered a hazard (see Hazardous Tree, Section 1.15).*

24. ***Topping*** – inappropriate pruning technique used to reduce tree size that cuts through a stem more than 2 years old at an indiscriminate location in a manner that promotes decay, impacting tree health and longevity.. Also known as stubbing, tipping, heading, hatracking, dehorning or excessive canopy reduction.

25. ***Tree Appraisal*** - a method of determining the monetary value of a tree as it relates to the real estate value of the property, neighborhood or community. When required, a *Certified Arborist or Qualified Tree Care Professional* determines the appraisal by adjusting a tree's basic value by its condition, location and species using the most recent edition of the *Guide for Plant Appraisal*, published by the Council of Tree and Landscape Appraisers (*see Tree Reports, Section 6.00*).

26. ***Tree Protection Fencing*** - a temporary enclosure erected around a tree to be protected subject to field approval by SDOT Urban Forestry . Fencing, as a measure for tree protection provides: 1) Protection of unpaved areas within the Tree Protection Zone. 2) identification of the tree for protection from construction impacts to trunk and canopy. (*See City of Seattle Standard Plans and Specifications for Municipal Construction : Specifications 1-07.16(2), 8-01.3(2) A and B* ; Plans 132 a, 132 b, & 133)

27. ***Tree Protection and Preservation Plan*** - a component of a comprehensive Tree, Soil, and Vegetation Protection Plan required as a condition of the current City of Seattle Drainage Code for projects permitted by the City of Seattle. Tree protection reviewed and approved by SDOT Urban Forestry. (*see Tree Protection and Preservation Plan, Section 2.10 and Reports, Section 6.30*). Plan requirements typically include measures for preconstruction, demolition and/or construction to establish a *critical root zone (CRZ)* for each tree. Plan components may include a tree monitoring and inspection schedule and conditions for continued maintenance of trees after construction according to the requirements in this *Manual*.

28. ***Tree Report*** - a report prepared by a *Certified Arborist or Qualified Tree Care Professional* retained by the property owner or agent for review by SDOT Urban Forestry.

Letter Report. A 'letter report' shall provide a brief description of the tree information to determine whether or not a tree is dead, hazardous or constitutes a public nuisance as defined in Seattle Municipal Code, Chapter 15 (*see Tree Reports; Tree Protection and Preservation Plan and Tree Appraisal, Section 6.00*).

29. **Tree Risk Assessor (Certified)** – Individual who has completed all requirements of the PNW-ISA Tree Risk Assessor Certification Exam (TRACE) course or has equivalent experience and training.

30. ***Street Tree Manual*** is this document.

31. ***Trenching*** - any excavation to provide irrigation, install foundations, utility lines, services, pipe, drainage or other property improvements below grade. *Trenching* within the CRZ is injurious to roots and tree health and is prohibited, unless approved. If *trenching* is approved within the CRZ, it must be in accordance with instructions and table outlined in this *Manual* (*see Trenching, Section 2.20.C, and Existing Paving and Hardscape Conflicts with Tree Roots, Section 2.40*).

32. ***Verification of Tree Protection*** - the *project arborist or contractor* shall verify, in writing, that all pre-construction conditions have been met (tree fencing, erosion control, pruning, etc.) and are in place. An initial inspection of protective fencing and written verification must be submitted to the *City Arborist* prior to demolition, grading or building permit issuance (*see Inspections, Section 2.30*).

SECTION 2.00 - PROTECTION OF TREES DURING CONSTRUCTION

There is wide variety for trees and the measures appropriate for their protection and tolerance for altered growing conditions. Mature trees have established stable biological systems necessary to support health and growth in response to site conditions (soil, drainage, sun exposure, etc). Disruption of this environment by construction activities undertaken without protective measures in place interrupts the tree's physiological processes causing depletion of energy reserves and a decline in vigor, often resulting in the tree's death. This reaction may occur within the first year or may develop over the course of 5-10 years after disruption. Standards for tree protection must be implemented, and fully enforced to minimize construction impact on trees to be retained

Negative impacts to guard against during construction may include, but are not limited to:

- mechanical *injury* to roots, trunk or branches
- *compaction* of soil degrades functioning roots, inhibits the development of new roots restricts drainage and promotes root loss through desiccation and decay.
- changes in existing grade, severing or suffocating 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.

Construction projects are required to comply with Standards in place for a Tree, Vegetation, and Soil Protection Plan to ensure that measures are in place for the protection of Trees and the related resources necessary to support them.

(see Standard Specifications 1-07.16(2) and 8-01.3(2)B and Standard Plans 132a, 132b, and 133)

Protective Tree Fencing for Protected Trees or Street Trees.

Fenced enclosures shall be erected around trees to be protected to achieve three primary goals, (1) to keep the foliage crowns and branching structure clear from contact by equipment, materials and activities; (2) to preserve roots and soil conditions in an intact and non-compacted state and; (3) to identify the *Critical Root Zone* (CRZ) in which no soil *disturbance* is permitted and activities are restricted, unless otherwise approved (*see Critical Root Zone, Section 1.00 and 2.15.E*).

Tree Protection Fencing - a temporary enclosure erected around a tree to be protected subject to field approval by SDOT Urban Forestry . Fencing, as a measure for tree protection provides: 1) Protection of unpaved areas within the Critical Root Zone. 2) identification of the tree for protection from construction impacts to trunk and canopy. (*See City of Seattle Standard Plans and Specifications for Municipal Construction : Specifications 1-07.16(2), 8-01.3(2) A and B* ; Plans 132 a, 132 b, & 133)

Type I Tree Protection

The fences shall enclose the entire area under the **canopy dripline** (see Standard Plan 133—Zone B) of the tree(s) to be saved. Fence must be maintained in place for the entire construction project unless otherwise approved by SDOT Urban Forestry

2.15-1

2.15-2

Type II Tree Protection (see Standard Plan 132a)
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. See image 2.15-3

2.15-3

Type III Tree Protection
Trees situated in isolated tree pits shall be protected by the construction of a chain link (or plywood where site distance is not impeded) tree protection enclosure, (see image 2.15-3). For projects where tree protection is only necessary for short durations, a reuseable tree protection fence is applicable
(see Standard Plans 132a & 132b)

Duration

Tree fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project permit, unless otherwise approved by SDOT Urban Forestry

Tree Protection Sign

A “Protect Tree” sign shall be prominently displayed on each fence or tree. The sign shall be provided by an SDOT representative. – Removal of the sign or the fence is subject to a penalty according to SMC Section 15.

See Standard Specification 2-02.3(3)I

Required Practices

E. Critical Root Zone or (CRZ)

Each tree to be retained shall have a designated CRZ identifying the area sufficiently large enough to protect the tree and roots from *disturbance*. The recommended CRZ area can be set as the dripline, the Critical Root Zone, or be determined by the formula outlined in the Street Tree Manual, at the discretion of SDOT Urban Forestry.(*see Definitions, Critical Root Zone, Section 1.36*). The CRZ shall be shown on all site plans (*see Definitions, Site Plan, Section 1.28*) for the project. Improvements or activities such as paving, utility and irrigation *trenching* and other ancillary activities shall occur outside the CRZ, unless authorized by SDOT Urban Forestry, or by project approval. Unless otherwise specified, the protective fencing shall serve as the CRZ.

1. Activities **prohibited** within the CRZ include:

- Storage or parking vehicles, building materials, refuse, excavated spoils or dumping of poisonous materials on or around trees and roots. Poisonous materials include, but are not limited to, paint, petroleum products, concrete or stucco mix, dirty water or any other material which may be deleterious to tree health.
- The use of tree trunks as a winch support, anchorage, as a temporary power pole, sign posts or other similar function.
- Cutting of tree roots by utility *trenching*, foundation digging, placement of curbs and trenches and other miscellaneous excavation without prior approval of the *City Arborist.*
- Soil *disturbance* or grade change (*see Grade Changes and Trenching, Section 2.20*).
- Drainage changes.

2. Activities permitted or required within the CRZ include:

Mulching. During construction, arborist chips may be spread within the CRZ to a 4-to 6-inch depth, leaving the trunk clear of mulch to help inadvertent *compaction* and moisture loss from occurring.

The mulch may be removed if improvements or other landscaping is required. Mulch material shall be 2-inch unpainted, untreated wood chip mulch or approved equal.

Root Buffer. When areas under the tree canopy cannot be fenced, a temporary buffer is required and shall cover the root zone and remain in place at the specified thickness until final grading stage (*see Definitions, Section 1.27, and Heavy Equipment,Section 2.20 C*).

Irrigation, aeration, fertilizing or other beneficial practices that have been specifically approved for use within the dripline

3. 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 dripline to prevent siltation and/or erosion within the dripline

B. Tree Pruning, 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. The most compelling reason to prune is to develop a strong, safe framework and tree structure. Such pruning, or the *removal* of trees shall adhere to the following standards:

1. Pruning limitations:

- Minimum Pruning: Standard pruning required by SDOT Urban Forestry shall consist of 'crown cleaning' as defined by ISA Pruning Guidelines (*see Pruning, Section 5.15, and Appendix E*). 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 on a tree by tree basis by SDOT Urban Forestry. No more than one fourth (25 percent) of the functioning leaf and stem area may be removed within one calendar year of any *protected tree*. Foliage may not be removed to a degree, 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* (*see Excessive Pruning, Section 1.15*).
- Tree Workers. Pruning must be performed by a qualified tree care specialist or certified tree worker, according to specifications contained within this *Manual* (*see Pruning Mature Trees, Section 5.20*).

Tree Removal

Removal of trees within fall distance of trees to be preserved shall be done by methods approved by SDOT Urban Forestry to ensure protection of trees to be retained.

Stump Removal

Stump removal within the dripline of trees to be preserved shall be done by methods approved by SDOT Urban Forestry to ensure protection of trees to be retained. *Removal* shall include the grinding of stump and roots to a minimum depth of 18 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 18 - inches. If dug below 18-inches, compact the backfill to prevent settling. Large surface roots three feet from the outside circumference shall be removed, including the spoils and backfilled with City approved topsoil to grade, and the area tamped to settle the soil.

(see Standard Specification 2-02.3(3)I)

2.20 ACTIVITIES DURING CONSTRUCTION & DEMOLITION NEAR TREES

Soil *disturbance* or other injurious and detrimental activity within the *Critical Root Zone* (CRZ) is prohibited unless approved by SDOT Urban Forestry based on a *tree report*. If an injurious event inadvertently occurs, or soil *disturbance* has been specifically conditioned for project approval, then the following mitigation is required:

A. Soil Compaction

If *compaction* of the soil occurs, it shall be mitigated as directed by SDOT Urban Forestry for optimum compatibility with the tree species, soil and site conditions.

B. Grading Limitations within the Critical Root Zone

Grade changes outside of the CRZ shall not significantly alter drainage to the tree.

Grade changes within the CRZ are not permitted.

Grade changes under specifically approved circumstances shall be limited to 6-inches of fill or 4-inches excavation and limited to area between the Critical Root Zone and Dripline

Grade fills over 6-inches or impervious overlay within the dripline shall not be allowed without site specific conditions to mitigate the impact to trees to be protected.

C. Trenching, Excavation and Equipment Use

Trenching, excavation or boring activity within the CRZ is restricted to the following activities, conditions and requirements if approved by SDOT Urban Forestry

(see Standard Plan 133)

2.20-3

Mitigating measures shall include prior notification to and direct supervision by SDOT Urban Forestry.

1. Work within the Dripline of trees to be protected must be scheduled a minimum of 2 working days after notification to SDOT Urban Forestry to coordinate inspection.

2. Root Severance. Roots that are encountered shall be cut to sound wood and repaired (*see Root Injury, Section 2.25 A-1*). Roots 2- inches and greater must remain injury free.

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

If excavation or *trenching* for drainage, utilities, irrigation lines, etc.,the contractor shall tunnel under any roots 2-inches in diameter and greater.

Prior to excavation for foundation/footings/walls, grading or *trenching* within the CRZ, roots shall first be severed cleanly at the edge of the excavation. Trenching must be done by approved methods and roots pruned with a saw, sabre saw [Registered Trademark name 'sawzall], narrow trencher with sharp blades or other approved root pruning equipment.

4. Heavy Equipment. Use of backhoes, steel tread tractors or any heavy vehicles within the is prohibited unless approved by SDOT Urban Forestry. the *City Arborist*. If allowed, a protective *root buffer* (*see Root Buffer and Damage to Trees, Section 2.25.A-1*) 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 to stabilize 3/4-inch plywood on top. This buffer within the CRZ shall be maintained throughout the entire construction process.

D. Tunneling & Directional Drilling

If *trenching* or pipe installation has been approved within the CRZ, trenching shall be done by hand, air-spade, boring under the roots with a horizontal directional drill or alternate approved method . 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 per *Trenching Tunneling & Distance Matrix* in Table 2-1.

TABLE 2-1

TRENCHING DISTANCE	
When the Tree Diameter At 4.5 Ft Is:	Trenching will be Replaced with Boring at this Minimum Distance (10x tree dia.) from the Face of the Tree in any Direction:
6-9" Measured At 6"	6-9'
10-14" Measured At 54"	10-14'
15-19" Measured At 54"	15-19'
Over 19" Measured At 54"	20' +

DEPTH OF TUNNELING	
Tree Diameter	Depth of Tunneling
9" Or Less Measured At 6"	2.5'
10-14" Measured At 54"	3.0'
15-19" Measured At 54"	3.5'
More Than 19" Measured At 54" Depth of Tunnel	4.0'

1. Public Utilities

Underground public utility improvements or repairs shall be performed with SDOT Urban Forestry inspection if they enter *Restriction Zones Near Regulated Trees*.

2. Street Trees

Exclusions for *street trees* in the public right-of-way (ROW). *Street Trees* that are in conflict with utility infrastructure where the conflict cannot be resolved may be removed if approved SDOT Urban Forestry (e.g., a tree planted directly on top of a damaged sewer mainline.)

Practices

Emergency utility repairs shall be exempt from the above restriction zones within the CRZ. SDOT Urban Forestry shall be contacted after any such repairs that may result in significant *tree damage* or *removal*.

E. 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:

1. Irrigation Program. Irrigate to wet the soil within the CRZ 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 CRZ. 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*.

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

3. Soil Compaction Damage. *Compaction* of the soil is the most frequent killer of trees on construction sites due to suffocation of roots and the ensuing decline of tree health. If soil compaction in the upper 12-inch soil horizon of the CRZ has or will occur by any means, then one or more of the of the following mitigation measures shall be implemented (*see Compaction and Grade Change, Section 2.20 A&B and Soil Improvement, Section 5.50*).

Type I Mitigation. If an approved paving, hardscape or other compromising material encroaches within the CRZ, an aeration system shall be designed by the *project arborist* and used within this area (subject to approval by SDOT Urban Forestry).

Type II Mitigation. If inadvertent *compaction* of the soil has occurred within the CRZ, the soil shall be loosened by one or more of the following methods to promote favorable root conditions: *soil fracturing*, core-venting, radial trenching or other method approved by SDOT Urban Forestry (*see Soil Improvement, Section 5.50*).

2.25 DAMAGE TO TREES

A. Reporting

Any damage or injury to trees shall be reported within 6-hours to the job superintendent, *project arborist*, or SDOT Urban Forestry to ensure timely application of mitigation measures. All mechanical or chemical *injury* to branches, trunk or roots over 2-inches in diameter shall be reported. 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 lateral root of sound wood. All exposed root areas within the CRZ 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 the trench is 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 SDOT Urban Forestry.

B. Penalty for damage to street trees

In the event that *street trees* or their roots have been damaged, the contractor or property owner shall be subject to a penalty rate of $100.00 per diameter inch of damage (or linear inch in the case of trunk damage), or the percentage of appraised value of the tree as calculated by the current edition of the Council of Tree and Landscape Appraisers 'Guide for Plant Appraisal'. Measurement of the damage shall be the width of the wound measured across the grain at the widest point. Penalty fee shall be paid to SDOT Urban Forestry Tree Replacement Fund.

A. Removal and Replacement of Pavement or Sidewalk:

Removal of existing pavement over tree roots shall include the following precautions: Break pavement into manageable pieces with a jackhammer or pick and hand load the pieces onto a loader. The loader must remain on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within one hour, then wet the chips and base rock and keep moist until overlay surface is applied.

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 SDOT Urban Forestry and replace sidewalk.

Note: Any work in the right-of-way requires a separate Street Use work permit from SDOT Street Use Division.

B. Alternative methods to prevent root cutting:

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

Grinding a raised sidewalk edge.

Ramping the walking surface over the roots or lifted slab with pliable paving.

Routing the sidewalk around the tree roots.

Install flexible paving or rubberized sections.

On private property, new sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are: permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, porches elevated on posts and brick or flagstone walkways on sand foundations.

C. Avoiding Conflict

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

Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.

Follow soil loosening planting techniques to promote deep rooting.

Install root barrier only along the hardscape side of a tree at the time of installation, allow roots to use open lawn or planter strip areas.

Dedicate at least 10-linear feet of planting space for the growth of each tree.

SECTION 3.00 – REMOVAL, REPLACEMENT AND PLANTING OF TREES

INTRODUCTION

A *Regulated Tree* must be protected and preserved unless otherwise approved and permitted in advance. Exceptions to this requirement are made for emergency removal necessary for public safety. In instances where City of Seattle policy requiring 2 replacement trees for every tree permitted for removal applies, this requirement is commonly a condition of the permit for removal.

This section describes conditions warranting permit approval for tree removal, replacement standards and related planting and establishment requirements..

3.05 TREE REMOVAL

A. Allowable Removal

A permit is required to remove a *Regulated Tree.* In the case of an emergency tree removal – the permit must be obtained within 24 hours after removal, Emergency situations are described in Hazardous Trees, Section 4.00.

Removal of *Regulated Trees* is allowed based on risk assessment and determination by SDOT Urban Forestry that mitigation required is tree removal. Additionally, removal may be allowed for the following:

- A *Protected Tree* is determined to be dead or hazardous (*see Hazardous trees, Section 4.0*).
- The trunk of a *protected tree* is touching or the basal flare is under the building footprint of an existing building.(see Section 8.10.050, Appendix A.

B. Permit Application

Tree Removal Applications are available from the City of Seattle, Seattle Municipal Tower, 700 Fifth Avenue, Suite 2300 (Street Use Counter) Seattle, WA 98104, 206-684-TREE. The following is a checklist of items necessary for City review for tree removal. Additional information may be required by the reviewing staff. The removal permit must be on site during the *removal*.

- Completed City of Seattle Tree Removal Application
- Payment of current fee per Street Use Fee Schedule. Fee may be waived in some instances.
- Verification of neighborhood notification or tree posting (when required).
- Arborist letter report, describing the tree species, condition (foliage, vigor, structural integrity), location, size and prognosis. (Report may be waived in some instances).

C. Hazard Trees

To remove a *protected* tree that has been verified as *hazardous*, as defined within Chapter 15 of the Seattle Municipal Code and the *Street Tree Manual*, a tree removal permit from SDOT Urban Forestry is required and must be available on site when the tree

is being removed (*for exceptions see Emergency Removal Conditions, Section 4.00*).

3.10 TREE REPLACEMENT IS REQUIRED

SDOT Urban Forestry requires replacement as a standard condition for issuance of a permit for removal of a tree identified as regulated or protected.

Authorization for removal of street trees for development projects is:

- administered as a component of the SDOT Street Use and Urban Forestry Street Improvement Permit process

Or

- administered in coordination with the Department of Planning and Development (DPD) Building Permit process

3.15 ALTERNATIVES WHEN TREES CANNOT BE REPLACED ON SITE

Where space is not adequate to support replacement planting on site, alternative conditions may apply to achieve an appropriate balance for the loss of public investment and/or benefit. Conditions for permitting are based on assessment of trees and sites on a case by case basis.

3.20 TREE CANOPY REPLACEMENT STANDARD FOR ONSITE TREE REPLACEMENT

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

A. Species

Replacement shall be the same species unless otherwise determined based on review and recommendation of an alternate selection with approval by SDOT Urban Forestry

B. Location

Replacement tree shall be planted in the same location as the tree removed unless otherwise determined based on review, recommendation and approval by SDOT Urban Forestry

3.25 TREE VALUE REPLACEMENT STANDARD

Tree value is determined by using The Guide for Plant Appraisal published by the Council of Tree and Landscape Appraisers, current edition.

(see Standard Specification 1-07.16(2).

3.30 TREE AND SHRUB PLANTING SPECIFICATIONS

Clearances

Standard Clearances for Street Trees are as defined in City of Seattle Standard Plans and Specifications with limited exceptions allowed based on site specific review and approval by SDOT Urban Forestry.

(see Standard Plan 030 / Chapter 4.14.2 ROW Manual)

The City of Seattle Recommended Street Tree List categorizes trees by size for compatibility with site conditions (i.e. planting strip width and/ or tree pit size, overhead transmission lines, etc). Recommended planting clearances for certain site conditions are:

- 3 ½ feet back from the face of the curb
- 5 feet from underground utility lines
- 5 feet from fire hydrants (10 feet recommended)
- 10 feet from power poles
- 7 ½ feet from driveways (10 feet recommended)
- 20 feet from street lights or other existing trees
- 30 feet from street intersections

Only small scale trees shall be selected for planting underneath primary voltage power lines.

Recommended spacing is a function of crown spread with the following as general guidance:,

- Small Trees – 20 to 25 feet on center
- Small/Medium Trees – 25 to 30 feet on center
- Medium/Large Trees – 30 to 35 feet on center
- Large Scale Trees – 35 to 40+ feet on center

3.35 PLANTING STOCK AND MATERIALS

A. Quality

Street tree quality is required to meet industry standards established by the American Standard for Nursery Stock.

(see Standard Specification 9-14.6(2))

Trees shall be sound, healthy, vigorous, and free of disease and/or pests.

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.

Trees shall not have been topped or headed.

Inspection shall occur after delivery of stock to the project site.

Trees with broken tops, injured trunks, or branch damage that cannot be corrected by minor pruning shall be rejected.

B. Materials

Tree stakes and ties

Stakes shall be treated 2-inch diameter Lodgepole Pine, two stakes per tree or approved equivalent,

Ties shall be "Chainlock" tree tie (or approved equivalent such as 'V.I.T' Tree Supports , twist brace, fabric-reinforced rubber 3/8 inch minimum).

(see Standard Specification 8-02.3(7)B , 9-14.7& Standard Plan 100A.)

Root Barrier

Root barrier (18" depth x 10' length) adjacent to the sidewalk is required for trees in 4 x 6 tree pits and trees in standard 5' planting strips with minimum clearance from the sidewalk edge.

Arborist Wood Chip Mulch. Coarse untreated wood chips 1/2- to 6-inch in size, free of weeds, weed seed and invasive plant parts Mulch shall be installed to provide a 2-3 inch depth over a minimum area 2x the diameter of the root ball

(see Standard Specification 9-14.4(5) & Standard Plans 100a,, 100b, and 101) The mulch should be kept at least two inches away from the trunk.

Rock Mulch. ¼ minus crushed rock mixed with stabilizer (200 pounds of rock to 1 pound of stabilizer) placed as directed to meet site conditions.

Tree Grates. Tree grates are allowed but not recommended by SDOT Urban Forestry as a tree pit treatment based on the standards for maintenance to ensure a surface flush with adjacent sidewalk for public safety and routine expansion for clearance from the trunk of a tree as it grows.

3.40 PLANTING

Planting strips

Tree holes shall be dug to provide a minimum surface area 12" beyond the rootball and to a depth equal to the depth of the root ball. Excavated native soil shall to be used as backfill shall be free of debris of any kind and rocks larger than 2".

Tree Pits

Tree planting holes in tree pits shall be dug to provide surface area equivalent to the size of the pit, allowing 3" setback from curb and sidewalk edges and a depth equal to the depth of the root ball. Scarify the sides of the pit. Soil beneath the root ball shall be compacted to prevent settling.

Drainage

Tree holes with standing water must be inspected, fully drained, and field reviewed by SDOT Urban Forestry to determine provisions appropriate to support tree health including but not limited to 1) adjustment in tree location 2) adjustment in height of the root ball to ensure surface drainage, 3) change to alternate tree to ensure species selection compatible with site conditions.

Root ball Handling & Placement

Trees shall be handled to ensure protection and full support under the root ball, placed with the root crown 2" above adjacent curb and sidewalk surfaces, and oriented to align structural branches for optimum compatibility with buildings and adjacent street /sidewalk clearances.

Twine, burlap and wire baskets shall be removed to expose the top 2/3 of the root ball (minimum). All containers, Grow Bags ™ or Root Control Bags ™ must be removed entirely and roots pruned, loosened and/or straightened to ensure proper growth and establishment.

Backfill

Soil Amendment

Unless otherwise approved by SDOT Urban Forestry, Standard Specification 8-02.3(6)B requires 2/3 native soil mixed with 1/3 Decomposed Organic Mulch as backfill to amend soil low in organic matter and/or high in clay content.

Place backfill soil in 6" lifts around root ball, compacted between lifts (with pole or shovel handle).

Watering Ring/Berm, Mulch, Stake & Water

A Watering ring (soil berm 4' in diameter and 3-4" in height) shall be constructed with arborist wood chip mulch topdressing at 2-3" depth tapering to expose the top of the rootball at the rootcrown (see Standard Plans 100a and 100b). Apply water to fill the watering ring, drain and stake.

(see Standard Specification 8-02.3(6)B & Standard Plans 100a, 100b, and 101)

Alternate Specifications

SDOT Urban Forestry reviews and approves alternatives designed to support street tree installations for optimum tree health and longevity and compatibility with other infrastructure in the ROW including engineered or structural soil mixes, structural support systems, etc.

3.55 PLANTING STRIP TREATMENTS

Treatments in planting strips required as a permit condition for new development are otherwise encouraged for ROW frontage to provide important transportation safety, environmental, economic and aesthetic benefits

Green Stormwater Infrastructure (GSI)

The City of Seattle's Stormwater Code contained in Seattle Municipal Code requires all single-family residential projects and all other projects with 7,000 square feet or more of land disturbing activities or 2,000 square feet or more of new plus replaced impervious surfaces to implement green stormwater infrastructure (GSI) to the maximum extent feasible (MEF).

GSI in the ROW includes retained and/or new street trees required as an SDOT permit condition for new development. Planted bioretention swales as GSI are often proposed for planting strip area between trees subject to review and approval by Seattle Public Utilities (SPU) and SDOT as a component of the Street Improvement Permit (SIP) process,

(see SMC 22.800-22.808 & Director's Rules DWW-201.2 (SPU) 16-2011 (DPD

Green Factor

The Green Factor Ordinance applicable to development projects in various zones (Commercial, Neighborhood Commercial, Low Rise Multi Family etc.) requires projects to meet a minimum threshold for sustainability.

The City of Seattle Department of Transportation (SDOT) reviews and approves plans for improvements in the ROW proposed for credits established by the Department of Planning and Development (DPD) to meet Green Factor Ordinance requirements. Review and approval of applications is provided by the SDOT Urban Forestry Office of the Landscape Architect.

Installation of vegetation in planting strip areas between street trees similar to installations required to meet GSI and/or Green Factor credit is encouraged for property owners in general to enhance and soften the streetscape; to provide a buffer between vehicular and pedestrian traffic; and to discourage illegal parking.

Though no permit is required to install vegetation between trees in planting strips, the SDOT ROW Manual Chaper 4.14.2 and DPD Green Factor website are recommended references to ensure planting in compliance with standards applicable to the ROW

Paving & Constructed Improvements in the ROW

A permit is required from SDOT to install paving and other improvements in a planting strip in the public right-of-way.

Paving materials may include grasscrete, brick pavers, or other approved materials, preferably permeable. Gravel, cinders or other loose material will not be permitted unless contained in a tree pit. Bark (mulch) may be used in conjunction with planting material, but may not be installed as a single element.

Raised planter boxes shall be no more than 18" inches in height, and no more than 1' foot in height if within 3' feet of the curb. They may be no longer than 40' feet in length, and must be set back a minimum of 2' feet from the curb. They must be constructed to provide a minimum of 3' feet of unimpeded clearance at each end to provide pedestrian access between the sidewalk and curbside vehicles.

Plant height in a raised planter box shall be measured from the surrounding ground level, rather than the ground level within the planter box.

Line of Sight

For adequate line of sight, setback for street trees is 30' from intersections, pruned to meet clearance requirements (8' over sidewalks, 10' over bike lanes, and 14' over streets per Seattle Municipal Code

Understory plants for planting strips within 30' feet of a street intersection must be selected for compatibility with sight distance requirements, limiting height to 24".

SECTION 4.00 – EVALUATING TREE RISK EXPOSURE

INTRODUCTION

Property owners are responsible for maintaining the trees on their own property, and any trees growing on right of way adjacent to their property that are not listed as being maintained by the City. The City does not require advance permission for removal of Protected Trees in an emergency. However, it does require that you obtain a tree removal permit within 24 hours of the emergency, and that you provide documentation of the problem at the time of permit application.

Removal of sound, Protected Trees where there is no immediate danger to the public or property, or that a danger can be mitigated through corrective measures, is a violation of City ordinance. If the City determines that an emergency removal cannot be justified, the property owner will be penalized for violating City ordinance.

(see also Removal, Replacement and Planting Trees, Section 3.00, and ISA Tree Risk Evaluation Form, Section 4.20 B).

A. Tree Hazard Responsibility

On private property, it is the responsibility of the property owner to mitigate or abate a known hazardous condition of a tree that may be of questionable structure or deemed as hazardous. The property owner is also responsible for abating a hazardous condition on a *protected tree* in the right-of-way adjacent to their property if the tree was not planted by the City. If origin of a tree is in question, contact SDOT Urban Forestry at (206) 684-TREE (8733) or email seattle.trees@seattle.gov.

Most tree hazards can be prevented with regular checkups by a tree care professional and timely maintenance action by the property owner. Street trees on city right-of-way that may be a public safety hazard should be reported to the City of Seattle, SDOT Urban Forestry at (206) 684-TREE (8733) or the 24hr emergency line at (206) 386-1218.

B. Recognizing Tree Hazards

Determining whether or not a tree's defects are a condition that presents an imminent hazard requires a high degree of knowledge and experience. Tree risk assessment of a *protected tree* should only be performed by an arborist who is familiar with tree physiology and can interpret the external signs of weaknesses, who can perform internal checks if necessary and recommend mitigation (*see Hazard Reduction and Prevention, Section 4.40, and Hazard Evaluation Form, Section 4.20 B*).

4.10 EMERGENCY REMOVAL CONDITIONS

A. Abatement

When a tree has partially failed or it is apparent it is about to fail, and persons or property are threatened, the tree may be removed without prior City review or approval. The property owner is required to obtain a tree removal permit within 24 hours of the removal, and provide supporting documentation at that time.

B. Authorization

Such cases must be substantiated after the fact by the property owner and tree professional with photographs, abatement information, insurance claim or other relevant information and

completion of a Tree Removal Application. The information is to be submitted to the City Arborist within 24 hours of emergency *removal*. All other authorizations are subject to the standard procedure outlined in *Removal of Protected Trees, Section 3.05.*

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

A. Definition of Hazardous

Seattle Municipal Code Chapter 15.02.044 defines *'Hazardous Tree'* as: any tree or tree part that poses a high risk of damage to persons or property, as determined by the Director, according to the tree risk evaluation standards established by the International Society of Arboriculture.

B. Evaluation Form

The City uses a standard, ISA - TREE EVALUATION FORM (*see Appendix C*) as a basis to determine the risk rating of a tree (*see Risk Rating, Section 4.25*). This form, or an approved equivalent, must be completed by a C*ertified Tree Risk Assessor or Qualified Tree Care Professional*. The *City 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 risk.

C. Authorization

If the *hazardous* condition or *target* cannot be mitigated (*see Hazard Reduction and Prevention, Section 4.40*) then the tree shall be authorized for removal by the City and removed by the property owner to abate the condition.

4.25 DETERMINING A TREE'S RISK 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 ISA Tree Risk Assessment protocol or other professional methodology acceptable to the City of Seattle (*see Hazard rating formula Table 4-1 and Appendix C*):

A. Failure Potential Rating

Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The scope of the professional evaluation will include structural defects in the tree (including branches, trunk and roots) and if necessary, shall employ the use of the most current methods of internal decay inspection available; soil/slope and/or creek bank stability; individual species susceptibility to failure; pruning; history; decay weaknesses and any other compromising or pertinent factors considered by the consultant.

B. Target Rating

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

Consideration shall be given as to whether the *target* can be reasonably removed or isolated to reduce the hazard rating to a

less than significant level. A target means people or property (public or private).

A tree may be a potential hazard if it is: (a) a tree with the potential to fail; (b) in an environment that increases the likelihood of failure and; (c) a tree that would strike a *target*.

C. Additional Factors

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

4.30 TREE EVALUATION CHECKLIST

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

A. Hazard Evaluation Questionnaire

Target: If the tree or branch falls will it hit cars, houses, structures, power lines or people? If so, immediate action may be necessary.

Dead Branches: Are there dead tops or branches? Is the tree dead?

Cracks: Are there deep, open cracks in the trunk or branches? These are major starting points for trunk and branch failure.

Crotch Cracks: Are there deep, open cracks below joining trunks or stems?

Tree Architecture: Has the tree grown beyond its species specific shape into a hazardous form? Is the tree leaning?

History: Has the tree recently lost large branches or developed a sudden lean?

Edge Tree: Were neighboring trees recently removed, leaving tall trees exposed at the edge that may be subject to unexpected wind dynamics and blow-over?

Living Branches: Do live branches bend abruptly upward or downward where tips of large branches were cut off? These may pull out of trunks that are weakened by rot or cracks. Beware of large branches on rotten or cracked trunks.

Topping: Are large branches growing rapidly from topping cuts? These sprouts have weak attachments and may weaken further as they grow. Is there decay below topping cuts?

Storm *injury*: Are there broken branches, split trunks, or injured roots? Are branches close to power lines?

Root Rot: Are there fungus fruit bodies (mushrooms) on roots or near the trunk? Were roots injured by construction?

Rots and Cankers: Are there hollows or cankers (dead spots) in the trunk or major branches, some with fungus fruit bodies?

Construction *injury*: Have roots, trunk, or branches been injured?

Is there a new lawn or garden over injured roots? The added fertilizer may stimulate the growth of fungi that will rot the supporting roots while the top gets heavier, resulting in a less stable tree.

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, root loss, girdling roots or other factors.

4.40 RISK REDUCTION AND HAZARD PREVENTION

Review the following list for options to manage hazardous conditions.

Reduce the potential for risk by planting trees that are not problematic and that fit the site. SDOT Urban Forestry has developed an approved tree list that is available by request, or on the web at: http://www.seattle.gov/transportation/treeplanting.htm

A healthy, vigorous tree that receives regular care is less likely to develop *hazardous* conditions than one that is ignored. Prevention is the best solution to a tree hazard problem.

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

In some cases, *targets* may be removed such as by moving picnic tables or other items beneath a precarious tree, fencing to prevent access to such trees, or rerouting pedestrian or vehicular traffic.

If there are no other options to abate the hazard, the tree may need to be removed entirely (*see Removing a Hazardous Tree, Section 4.10*). Steps outlined in the Tree Removal Procedure (*see Section 3.05*) should be submitted as soon as possible for review by the City.

SECTION 5.00 – TREE MAINTENANCE GUIDELINES

INTRODUCTION

This chapter establishes the minimum standard of care and maintenance Seattle's Regulated Trees. These standards apply to all persons who own or are engaged in the business of repairing, maintaining, or preserving these trees. The following standards of care are set forth for pruning (including utility and traffic encroachment), planting, watering, soil and nutrient requirements, insect, and disease control. Guidelines for selecting an arborist are also given. These standards and guidelines are based on sound arboricultural principles and are applicable to trees, shrubs and woody plants.

SECTION 5.05 CARE OF REGULATED TREES

All owners of *Regulated Trees* are to follow the required maintenance standards set forth in this *Manual*. If special pruning or situations require a variance from these Standards, it is the responsibility of the project arborist and property owner to clarify why the changes are needed and review them with the *City Arborist*.

SECTION 5.10 PROHIBITED ACTS

Improper maintenance may constitute a prohibited act as defined by the Seattle Municipal Code, Chapter 15 and a violation which may be subject to penalty. The following permitted and prohibited maintenance practices for *protected trees* apply.

A. Excessive Pruning

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

B. Topping

Topping is considered a prohibited act (*see Topping, Section 1.33*). Seek alternatives to topping (*see Crown Reduction, Section 5.20-A*) and possibly subject to fines.

C. Other prohibited actions

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

5.15 STANDARDS FOR PRUNING REGULATED TREES

The most compelling reason to prune trees is to develop a strong, safe framework. All work to be performed on *Regulated Trees* shall be in accordance with the following standards. All trees, both public and private shall be maintained at a minimum clearance of 14' feet over the street surface and 8' feet over the sidewalk surface.

A. Specifications

All specifications for working on *protected trees* shall be written and shall be administered by a qualified arborist, and shall be designed to promote the preservation of tree structure and health.

B. Industry Standards

All work on *Regulated Trees* shall be in accordance with the most current edition of the following industry standards: (*see Performance Standards. Standard Practices for Tree Care Operations - ANSI A300-(Part 1) Appendix G; Safety Standards, ANSI Z133.1-1994, Appendix F; and Tree Pruning Guidelines, Appendix E*).

5.20 PRUNING MATURE TREES

There are six types of pruning that may be required for use on mature *Regulated Trees (see ISA Tree Pruning Guidelines, Appendix E)*. Prior to entering the tree, the tree worker is required to be familiar with these types of pruning as stated in the Performance Standards, ANSI, A300-(Part 1). 'Species-specific' pruning promotes the natural shape of the tree (i.e. excurrent, decurrent, vase-shaped, fast growing, etc.).

A. Types of Pruning

- Crown Cleaning
- Crown Thinning
- Crown Raising
- Crown Restoration
- Crown Reduction
- Utility Pruning

B. Tree Injury

Climbing and pruning practices shall not injure the tree except for the pruning cuts. (Climbing spurs are prohibited for pruning operations).

C. Timing of Pruning

To reduce the probability of insect infestation, disease or infection, the following seasonal restrictions apply, except when public safety is a concern (*see Tree Pruning, Surgery and Removal, Section 2.15-F*):

Pine (*Pinus spp.*) or Elm (*Ulmus spp.*): Do not prune May-October

All species: Avoid pruning during the flush of spring shoot growth and during fall, prior to dormancy

Trees with thin bark: Do not prune in summer when sun scald injury may be a factor

Deciduous trees (leafless in winter): Best pruned November-February

Hazardous trees of any species may be pruned any time of the year for abatement reasons

5.25 PRUNING DISTRESSED TREES

Distressed trees require as much leaf area as possible to overcome stressed conditions.

To avoid additional injury, the following measures shall be followed for these trees.

A. Injury or Disturbance

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

B. Neglect

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

5.30 PRUNING YOUNG TREES

The average life expectancy for trees growing in harsh urban conditions is much shorter than if the tree is in ideal conditions. Pruning trees early will improve life expectancy and is a proven, cost-effective measure. Added benefits are also reflected in safer trees with fewer branch failures. For trees that serve as a replacement for a *protected tree*, they shall be pruned in the following way:

Young trees should be pruned during the second year after planting to improve their structure, and only minor crown cleaning every 3-7 years thereafter. Refer to *ISA Tree Pruning Guidelines* (*see Appendix E*).

Do not top the main leader. Main branches should be spaced at least 18-inches apart to alleviate a tight grouping branches.

Select permanent branching and allow temporary low branching on the lowest part of the trunk to remain.

5.45 WATERING SCHEDULE

Newly planted trees, including drought tolerant species, are dependent upon supplemental irrigation until established, typically for two to three years. Periods of extreme heat, wind or drought may require more or less water than recommended in these specifications. The method and amount that is applied may vary depending upon soil composition, heat, wind, planted in turf or ground cover, periods of abnormal rainfall or in poorly drained soils (*see Drainage, Section 3.40-C*). The watering of *protected trees* or their replacements shall follow these standards:

A. New trees

During the establishment period (1-3 years) trees should be watered thoroughly to their root depth as frequently as needed. A watering schedule is to be submitted at the preconstruction meeting. The schedule is to include watering frequency and quantity. The minimum standards shall be as follows:

1-3 months in the ground: 4 times per month or as necessary – recommended quantity of 5 gallons per caliper inch.

4-6 months in the ground: 3 times per month or as necessary– recommended quantity of 5 gallons per caliper inch.

7-12 months in the ground: 2 times per month or as necessary– recommended quantity of 5 gallons per caliper inch.

B. Mature trees

Most species: 1 time per month during irrigation season (usually July through September)

C. Watering Methods

The following options shall fulfill the watering requirements. One or more of the following may be utilized dependent upon unique circumstances subject to the *City Arborist* determination. The options are as follows:

1. Automated Watering Systems. All new *street trees* planted within the right-of-way shall require supplemental water. All tree irrigation is to be consistent with current *Landscape Water*

Efficiency Standards for the City of Seattle. Other city maintained systems shall be per Parks Department specifications. Bubbler heads (Preferred). One or two bubbler heads mounted on flexible tubing are to be placed adjacent to or on top of the root ball. The placement of bubbler within an aeration tube is not allowed.

Drip Loop system. A continuous loop of drip tubing circling around the trunk at a point two-thirds out from the trunk to the edge of the root ball (for new trees 36-inch box size and greater, a second loop of drip tubing is required at a point just beyond the root ball on native soil).

Hand watering systems. Recommended for trees that are part of a development project that must be watered to insure tree survival during the course of construction until automatic irrigation is installed.

Flood watering. Newly installed trees must be 'flood or basin-watered' on top of the root ball to allow the water to infiltrate through the root zone.

Subsurface injections using a hydraulic spray pump may be used (practical for use in hard, compacted soils or steep hillsides).

Soaker hose. Slow, deep watering using a garden type soaker hose.

Wetting agent. A root ball that has been allowed to dry out beyond the wilting point shall require the addition of a wetting agent to the water (such as Aqua-grow or equivalent).

D. Amount

Unless otherwise specified, the volume of water applied at each irrigation site should be in the range of 5-gallons per inch of trunk diameter when measured at 54-inches above natural grade. The final decision of whether to water or not should be based on accurate soil probe samples that are taken from the root ball.

5.50 SOIL IMPROVEMENT

During development, compaction of the soil is the largest single factor responsible for the decline of oaks and older trees. Ninety percent of the damage to the upper eighteen inches of soil occurs during the first pass of heavy equipment - and cannot be reversed. Every effort to avoid compaction of soil porosity within the tree protection zone shall be taken at all times (*see Soil Compaction, Section 1.29*). When required by the conditions of *Discretionary Development Approval* for a project or as mitigation for injury or a prohibited action, the following performance standards for improvement of compacted or damaged soil shall be implemented:

A. Aeration

Soil that is damaged or compacted within the dripline of *protected trees* shall be loosened or aerated to promote root growth and enhance tree vitality. One of the following aeration methods shall be specified an in effort to correct compacted soil conditions:

Vertical Mulching: auger holes 2 to 4-inch diameter, 2 to 3-feet deep, on 4-foot centers and backfilled with porous material such as perlite, vermiculite or volcanic rock (*see Definitions, Section 1.41*)

Radial Trenching: with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.

Soil-fracturing with a pneumatic air-driven device (*see Definitions, Section 1.30*)

Subsurface injections under moderate hydraulic pressure using a three foot probe and applied on 3-foot centers under the dripline

5.60 INSECT AND DISEASE CONTROL

Generally, insect populations do not threaten tree health to the point of mortality. More often, when their populations become too great they create a nuisance. For example, aphids feeding on linden, birch, oak or maple, produce sticky honeydew that may be a nuisance if dripping on cars or at a storefront entry. If action is warranted, Integrated Pest Management (I.P.M.) suggests that the pest source be identified and targeted with a specific and timely treatment. If insects or disease can lead to the death of a *protected tree*, then it is the responsibility of the property owner to evaluate the condition according to the following guidelines and treat the problem in a timely fashion to prevent further deterioration of the tree

A. Insects

For treatment, consult a pest control operator that is licensed by the Washington Department of Pesticide Regulation. Accurate timing is critical for success. Nontoxic materials should be used whenever possible to control leaf-chewing insects

B. Disease and Decay - above ground

Disease such as heart-rot decay that erodes the health or weakens the structure of a *protected tree* may compromise the safety of people or property (*see Hazardous Tree Determination, Section 4.0*). It is the property owner's responsibility to correct a known hazardous condition in a timely fashion.

Consult with a *certified arborist* for remedy possibilities, for example, pruning out infected branches, thinning, or the spray application of a chemical treatment.

C. Disease - below ground

Soilborne diseases, such as Oak Root Fungus (*Armillaria mellea*) or Root Rot (*Phytophthora sp.*), are present in Seattle soils. Often, a poor landscape design surrounding old trees encourages harmful and often lethal diseases. The following conditions that favor a disease environment must be avoided.

Conditions to avoid: Compacting of the soil within the tree's dripline, adding fill dirt, rototilling, trenching, removing soil from the tree root area, and excessive or regular watering on or near the tree trunk area and planting incompatible water-loving plants within the tree's dripline. Combined with poorly-drained soil, these factors often activate normally dormant fungi to become opportunistic and infect the tree to cause the decline and eventual death of the tree. This decline can be slow and may not be evident for many years.

Landscape Design

When planning landscaping around a *protected tree*, an evaluation of the tree and soil must be performed to determine if there is a disease present. If the tree is diseased and landscaping will contribute to decline, permanent damage or render it hazardous, it is the obligation of the property owner to take reasonable measures to reduce or eliminate the conditions that may cause the decline of the protected tree.

To identify cultural conditions that may lead to diseases such as Oak Root Fungus, Verticillium, Phytophthora or other soilborne fungi, review the *Sunset Western Garden Book* or consult with a *Certified Arborist* or *Qualified Tree Care Professional*.

Plants selected for use under an oak should not need water more than once a month. Use a drip system to irrigate around an oak so that runoff does not flood the area.

D. Foliar disease

Leaf spot or galls may be chronic or reoccur with specific seasons. Though many of these diseases destroy leaf tissue and become unsightly, they may not significantly reduce the trees health and therefore need not be treated.

5.95 TIPS FOR SELECTING AN ARBORIST

Seattle municipal code 15.43.060 requires that all arborists who perform work on street trees be registered with the SDOT City Arborist's Office. Criteria for this registration are as follows:

1. All tree work performed within the street right-of-way must be under the supervision of an ISA Certified Arborist or an ISA Certified Tree Worker.
2. The firm must carry commercial general liability (CGL) insurance that names the City of Seattle as an additional insured for primary limits of liability. An applicant shall, before issuance of a Tree Service Provider Annual Equipment permit or Street Tree Service Registration, obtain and maintain in full force and effect, at its own expense, CGL insurance for the purpose of protecting the City from all claims and risks of loss as a result of the permittee's activity, occupation, operation, maintenance, or use of a public place in conjunction with the permitted activity. The CGL insurance shall be in an amount specified by the Director of Transportation and shall include: broad form property damage liability; personal injury; and premises operations. .
3. The firm must hold a City of Seattle business license

A. Who should you look for?

Hiring a tree care provider deserves careful consideration and caution. A mistake can be expensive and long-lasting, while the right choice can assure health, beauty and longer life for your trees and landscape. The following suggestions will help you select an arborist:

Check the phone directory, usually under trees or tree care service. Listings in the directory should indicate some degree of permanence. Look for professional membership affiliations, such as the International Society of Arboriculture. Membership does not guarantee quality, but a lack of it may cast doubt on the company's commitment to professionalism.

The International Society of Arboriculture advises homeowners to be wary of individuals who go door-to-door and offer bargains for performing tree work. Most reputable companies are too busy to solicit work in this manner.

Request that the sales person be an arborist or tree worker that has been certified through a program of the International Society of Arboriculture (ISA). This program establishes a minimum standard of performance for appropriate training, experience and knowledge about tree care. Any work on street trees requires a

certified arborist to direct the tree pruning. Additionally, it is best to use an arborist who is familiar with the trees and ordinances of the City of Seattle.

Require a certificate of insurance, including liability for personal injury and property damage (such as your house and your neighbor's), and workers compensation. Phone their insurance company to make certain each policy is current. Under some circumstances, the property owner may be held financially responsible if an uninsured worker is hurt on your property, or if damage is done to a neighbor's property!

Ask for local references and other jobs the company or individual has done in Seattle. Experience, education and good reputation are signs of a good arborist.

Have more than one arborist look at your job and give you a written estimate that clearly states their scope of work. Don't expect a company to lower its bid to match another's bid. Be willing to pay for the estimate if necessary. Two or more opinions and estimates are worth the extra effort.

A good arborist will offer a wide range of services including removal, pruning, fertilizing, cabling, pest control, etc.

A good arborist will not recommend topping (Section 1.32) except in rare circumstances (such as; crown restoration after severe physical or wind damage, or for a formal setting in a restricted space).

A knowledgeable arborist will not use climbing spikes if the tree is to remain in the landscape. These should be used only for tree removal.

Beware of an arborist who is eager to remove a living tree. Removal clearly should be a last resort.

B. The Contract for Services

To be assured of having your work performed to the standards you expect a contract should include all the necessary assurances. Most companies will provide their own contract and should include the following basics:

- Dates that work will begin and end.
- List exactly what will be done (*see Types of Pruning, Section 5.20*). If your tree is to be sprayed, get a written statement detailing the insect or disease to be treated, the chemical to be used and what precautions you need to take (cover patio furniture, keep pets inside, etc.). If fertilizer, how many pounds of fertilizer per inch of trunk diameter will be applied and by what method.
- Cleanup procedures should be listed and whether firewood will need to be cut (and into what lengths) should both be mentioned.
- Clarify if a tree removal includes grinding the stump and surface roots and if so, how deep?
- Will they remove grindings and backfill the hole?
- The total dollar amount you will be charged.

Work is usually priced in one of two ways: (a) as a single price for the job, or (b) on an hourly basis plus materials. When using the latter, be sure to include the wording, "...but not to exceed..."

Using Arborists for Preventative Care

A proactive tree and plant health care program can assure that minor, early pruning will prevent major, corrective pruning later on. An annual inspection will likely help you develop the landscape relatively hazard-free and display attractive curb appeal.

Consulting arborists also offer advice and appraisals, diagnosis of problems and recommend treatment. They also can serve as a 'second opinion', if needed.

SECTION 6.00 – TREE REPORTS

INTRODUCTION

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

6.05 REPORT FOR INDIVIDUAL TREE REMOVAL PERMIT

A. Tree Removal Permit

The procedure (*see Tree Removal Checklist, Appendix M and Removal of Regulated Trees, Section 3.05*) involves three steps which must be completed and approved to *remove a protected tree*. The information contained within the application will be reviewed by the City Arborist for response within approximately 10 – 15 working days.

B. Submittals

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

A completed application for the protected tree removal (delivered to the City of Seattle, City Arborist, 700 Fifth Avenue, Suite 2300, P.O. Box 34996, Seattle, WA 98124-3996)

An arborist report prepared by a *Certified Tree Risk Assessor or Qualified Tree Care Professional*. (This requirement may be waived by the City Arborist in some cases).

C. Written authorization

To *remove* a *street tree*, the property owner shall first have obtained written permission (a Street Use permit) from SDOT's City Arborist.

6.10 TYPE OF REPORT: LETTER FORMAT

A. Letter Report

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

Removal

If for a tree *removal* (i.e., an application request for a single tree removal only, not in connection with a property development), the report shall provide information and determination whether the tree is dead, hazardous or constitutes a nuisance under SMC Title15.

6.15 LETTER REPORT - SUBMITTALS

A. Standard information

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

structure, imminent danger of failing (ISA Hazard Rating, *see appendix C*); interface with utility services; conclusion and recommendation(s), photographs (required) and Tree Protection Instructions (if needed).

B. Specific situations

Other conditions may require the following additional information on an as needed basis if requested by the reviewing City staff: tree protection plans; appraised value (*see Tree Appraisal, Section 6.40 below*); and any other supporting information, photographs, diagrams, etc. that may be necessary.

6.30 TREE PROTECTION AND PRESERVATION REPORT

All *street trees* to be retained on a development site shall be shown on approved sets of civil, building and landscape plans and shall be protected during the construction process. *A Tree Protection and Preservation Plan* submitted for review by the SDOT Urban Forestry Division is required when trees to be saved may be *injured* by *disturbance*. The tree preservation plan shall assume compliance with standards in Section 2.00 of this *Manual* (*see Protection of Trees During Construction, Section 2.00*). In addition, the following submittal information must be included in the report:

A. Scope & Construction Phasing

The *tree protection and preservation plan* shall provide written recommendations for the health and long-term welfare of trees that are to be followed during the following distinct phases and conditions: preconstruction; during construction, post construction, demolition activities; methods of avoiding injury, damage treatment and inspections. Schedules shall be included.

B. Critical Root Zone

The *tree protection and preservation plan* shall establish a tree protection zone (CRZ) for each tree to be fenced and clearly outline site-specific measures for protection of the trees during construction and describe a plan for continued maintenance of those trees after construction. The CRZ can include or exceed the drip line. After project approval, any changes to the protection measures must be approved in writing, by the *City Arborist*. The tree protection plan shall include the following *site plan* elements:

6.35 SITE PLAN

A. Disclosure of all street 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. This *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 (*see Tree Disclosure Statement, Appendix I*). 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 City.

B. Plans submitted to the City

In addition to the above information, final improvement plans shall include and show the following information: show the *CRZ* of any tree to be retained and denote a 5-foot tall chain link type 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.

C. 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.

6.40 TREE APPRAISAL

Landscape value may contribute from seven to 20-percent of the real estate property value. An individual tree has an inherent value to the real estate that can be determined by an appraisal prepared by a certified/consulting arborist. An appraisal is a process for determining a monetary opinion of the value of a tree as it relates to either the property; a group of trees; and/or the immediate community. A *certified arborist or Qualified Tree Care Professional* is required to determine this value, and must exercise good and fair judgment by adjusting the basic value by the tree's condition and location. There are two methods to determine tree value; (1) the Replacement Method, based upon the size and availability of the replacement tree or, (2) the Trunk Formula Method, if the tree cannot be replaced (e.g. not sufficient room on site or it is too large to replace). In all cases, the type of formula used must be identified.

6.45 APPRAISAL METHODS

The *certified arborist* or *Qualified Tree Care Professional* 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.

A. The Replacement Cost Method

Replacement cost method applies to smaller trees with a trunk size up to 4-inches in diameter (replaceable.) For this method, the appraised value shall be determined by combining: price quote + transportation + planting + other costs and applying the condition and location value to the tree. The sum of these is the appraised replacement cost.

B. The Trunk Formula Method

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 Washington 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. (See - Determining the tree value, Section 3.25).