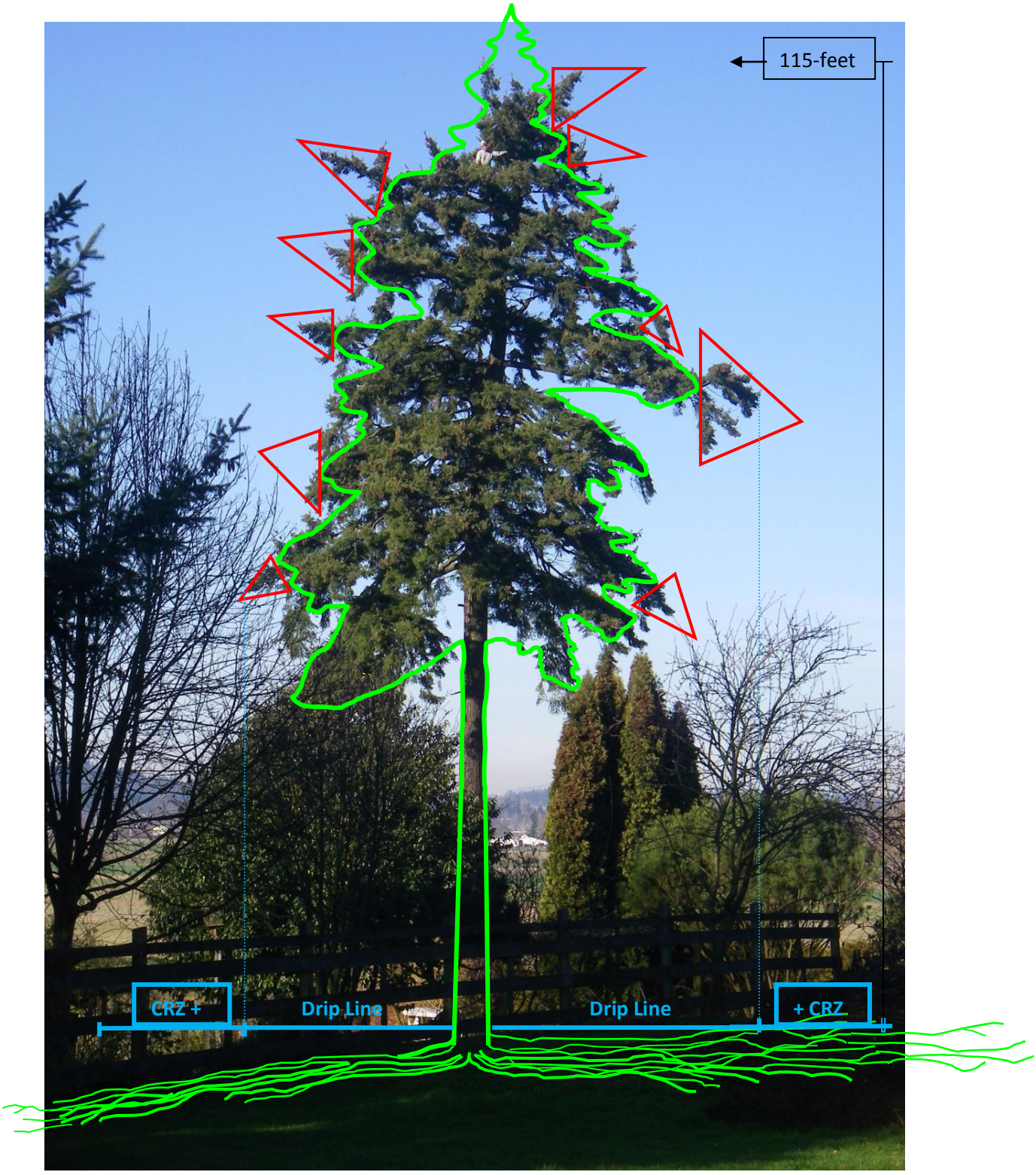
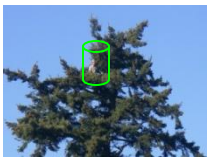
# PACIFIC NORTHWEST CONIFER CARE GUIDELINES

## SAFE PRUNING TECHNIQUES FOR LARGE, HEALTHY EVERGREEN TREES




Remnant 72-inch DSH Douglas-fir (*Pseudotsuga menziesii*) in Snohomish, WA



# CONIFER CARE GUIDELINES

**A COMPILATION OF PREVAILING TREE KNOWLEDGE**

The purpose of this protocol is to describe ideal, step-by-step management practices for large, evergreen trees in Alaska, British Columbia, Idaho, Oregon, and Washington. In creating a consistent approach to both individual tree and stand preservation, these guidelines strive to mitigate risk through research-based assessments and experience-tested methods for remediation, pruning, removal, and replanting of coniferous species. The goals here are to promote overall health, safety, ecological function, and community values of trees within the Pacific Northwest Bioregion. For each tree:

1.) **IDENTIFY** the particular tree species to its scientific name/cultivar. Note key features, including relative size, growth/decay patterns, distribution, & insect/disease vulnerability. Measure the tree's Diameter at Standard Height (DSH = 52-inches above grade), & review local tree rules (Jacobsen).

2.) **OBSERVE** the tree's environment, aspect in the landscape, proximity to surrounding buildings/trees, local weather influences, site history, condition, foliage quality, branch attachments, structural integrity, critical/total root zone, insect/disease evidence, appraised value, local/global utility, aesthetics, & client/neighbor needs (Shigo, who would add that Arbor[i]culture has a silent "i").

3.) **EVALUATE** risk with a PNWISA Tree Risk Assessment (TRA) or ISA TRA Qualification (TRAQ). Use this process to calculate how the probability of failure relates to all targets within a radius of 1.5x the tree height. Pay particular attention to structural issues, growth response, root health, pathogens, seasonal/climate forecasts, prior tree work, construction history, legal considerations, & future developments (Dunster).

4.) **MITIGATE** the critical factors affecting the roots, trunk, and canopy. As needed, consider:

RESTORATION of at least the Critical Root Zone (CRZ = 1-foot radius/1-inch DSH) to increase root respiration, infiltrate moisture, build soil, and promote fine root growth. This aeration can be performed by hand, pneumatically, or hydrologically. Add compost, nutrients, microbes, and/or phytochemicals ONLY after testing to determine imbalances in the soil ecology (Urban).

PRUNING to limit the width of the tree for wind flow AROUND (not through) the canopy, decrease leverage down the stem, reduce end weight on limbs, encourage exterior foliage re-growth, preserve interior epicormic growth, clean out major dead wood greater than 1-inch in diameter (Mattheck).

[Seriously] THINNING trees IN, not "out." Please, THIN TREES IN where necessary. TH**IN**!

REMOVAL of trees that have an unacceptable risk to surrounding targets, structural weaknesses beyond repair, invasive insects/pathogens, a documented case of excessive property damage, outgrown the space, a replacement with a more suitable species, & legal justification (Lilly).

REPLANTING saplings with outward-oriented roots placed with the buttress tissue at grade to maximize long term growth. Choose a diversity of species that are native/acceptable to the site, grow well in the area, complement surrounding landscape arrangement, & hold their value over time (Ball).

MAINTAINING root health with high quality mulch, effective irrigation, and annual inspections. Use with at least 6-inches of disease-free Arbor-chips from the same tree or similar plant classification to protect roots, retain moisture, reduce over-compaction, improve soil function (Chalker-Scott).

5.) **DECIDE** on the appropriate work plan that prioritizes the International Society of Arboriculture (ISA) Best Management Practices, 2006 ANSI Z-133 safety standards, efficient work, ecological effectiveness, and customer satisfaction (Matheny and Clark).

6.) **COMPLETE** the tree work through the following techniques, utilize safe practices, communicate clearly with others involved, reserve time to learn, innovate carefully, and think OUTSIDE…

AERATE the ground within the tree's drip line/CRZ, carefully loosening a prescribed area of the soil 8 to 10-inches deep with a pitch fork, Air Spade, or water jet. Establish that the visible basal trunk is where the buttress roots emerge from the ground and move away any excess dirt or debris piled against the stem. Grass and invasive species will directly compete with the trees roots, so eliminate any weeds around the trunk to enhance fine root function (Holers).

PRUNE only the parts of the canopy needing attention, NOT exceeding 15% of a healthy tree's living tissue. I recommend the Double-System Technique (DST) (See #9). Ascend to the highest, structurally sound part of the canopy with redundant tie-in points. Inspect the top 10% of the tree for its structural/growth pattern and only disturb this zone only if there are co-dominant tops. In the middle 60% of the canopy, use a pole saw to suppress the longest limbs to a suitable, secondary branch. Encourage downward-orientated branches, discourage upward growth, evaluate the multiple tops/attachments, and check for trunk weaknesses. Use a secondary rope to lower large limbs/hangers and retain it as an ANSI-required access line when working above 70-feet of height. Secure the rigging with slings, carabiners, and assistance on the ground. Maintain the lowest 30% of the lateral limbs to shade the roots, balancing their length with structural/clearance needs. Leave some broken stubs and dead branches less than 1-inch diameter to promote epicormic growth and materials for wildlife.

REMOVE trees only after receiving the necessary permits and permission based on local regulations and neighborhood courtesy. For large trees, set a single line for secondary support of the climber's flip line and spurs. Fir High Risk trees, utilize surrounding trees for back-up anchors. Rig the pieces to be lowered for ease of movement, anticipate the physics involved with the ground workers, and prevent damage before it happens. Leave a suitable habitat snag or nurse log to emulate old growth characteristics. Salvage valuable wood for timber, furniture, or wooden bowls (Krauss).

REPLANT the site according to code requirements and long-term woodland management goals. Where possible, add native understory plants to add protection to the root area and pre-plant replacement trees to be established when another tree is scheduled to be removed. Successful trees need healthy roots. Choosing the best species practicing proper plant installation will continue to create positive impacts for years after the work is completed (Flott).

MULCH the root zone with a suitable mix of local materials. Arrange some deadwood around the tree to define the CRZ, secure the organic materials, and prevent foot traffic. Amend the soil as needed and water these supplements into the aeration holes if needed. Distribute the chipped branch tips back onto the roots and spread evenly approximately 6" thick. A chipper may not be needed if you can process the foliage with hand tools and arrange the parts close to the ground (Reichardt).

7.) **REVIEW** the effectiveness of the techniques used for reaching the stated goals. Arboriculture is "the art, science, technology and business of utility, commercial and municipal tree care," and needs to continue changing to suit the needs the urban/rural forests. The growth patterns and inherent value of old trees are being understood as more precious than previously recognized, and taking care of them demands our adaptation and respect. (Altenoff, Koch, Sillet, and Van Pelt)

8.) **PHOTOGRAPH** the project before, during, and after completion for the record.

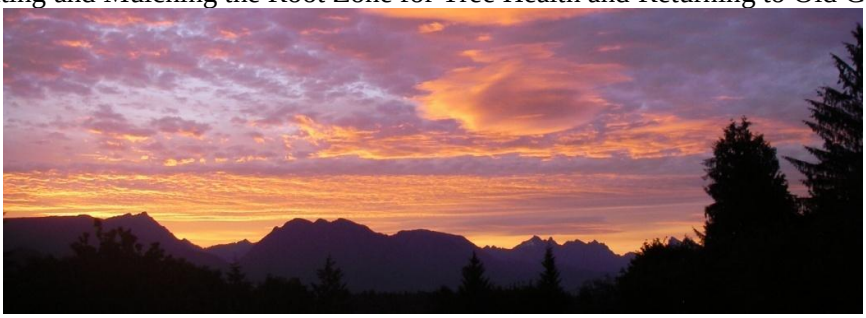

Downtown Seattle from Mercer Island and the Highlands Neighborhood



Tree Solutions Inc. standards for Pruning and Removals to Prevent Damage



Aerating and Mulching the Root Zone for Tree Health and Returning to Old Growth



9.) **REVIEW THE DOUBLE-SYSTEM TECHNIQUE (DST)** to utilize a higher standard for safe climbing. This technique is based on the observation that many ice-climbers have two climbing lines while they are carrying ice axes and crampons that can easily sever a rope with a misplaced swing/step. Because really, why use only one rope when you can use two? Why climb the tallest trees without being set-up for ground rescue? Why not take advantage of a system that can easily triangulate one's position for increased stability? Is a chest harness optimal ergonomics? What else?

**A.) The basic principle of the DST is to double-up every aspect of climbing gear in the tree.** This way, if any piece fails or is used incorrectly, there will always be a back-up already in place. These actions conform to both ANSI-Z300 and the ISA Tree Climbing Championships.

**B.) Install the ropes from the ground and test the attachment.** I connect a 200-foot static line to a 200 foot climbing line with a locking carabiner, 25+KN pulley, and rope thimble. There is a short 8-mm cord that backs-up the pulley system when it is attached to the climbing rope with an additional carabiner. I added 6-feet of tubular webbing as a friction-saving sleeve that can float along the static line as the rope passes over the tie-in branch. Initially, I set the climbing line so that it is clipped to itself through the pulley, essentially treating it as a single-line during the ascent. The back-up cord clips to a prussic hitch that effectively holds the climbing line in place.

Setting my throw-line over several branches within 1-foot of the trunk involves begins with an accurate Big Shot/hand throw. Then, I pull up a heavier throw-weight almost to the tie-in point so that I can lower the weight down the trunk. Repeating this process with the other side of the throw-line generally results in a string running up and down the trunk. With this, I can pull up my static/climbing lines as well as a back-up line. I have been experimenting with a 250-foot, 8-mm Department of Redundancy Dept. line/hitch. The extra rope is available for potential rescue.

**C.) Anchor the ropes to independent slings and belay devices around the base of the tree.** I have two 20-foot sections of bull line with steel carabiners/belay devices on one end and friction hitches/carabiners along the middle. This creates adjustable anchors for the static/back-up lines.

**D.) Use a Uniscender/Rope Wrench/ascender/self-tending friction hitch and foot locking to ascend the ropes.** I have a Rock Exotica Uniscender for my primary climbing system and use a V-T for my back-up line. I tend the Uni with a V-T on my leg loop. Either way, having two ropes and a friction device that you can quickly un/weight makes foot locking that much easier.

**E.) Inspect and reposition the anchor near the top of the tree.** At this point, you adjust the static line and webbing for optimal placement closer to the trunk. I clip my climbing line back to the Uniscender utilize the pulley in a more smooth-running system. I prefer to use the pulley for the climbing rope in my Uniscender, and keep the other rope as a back-up line.

**F.) While working, stop at each major whorl, flip-line around the trunk/limbs, and prune the branch tips with a pole saw from a comfortable stance.** This way, the climber's weight is primarily on the tree and there is less time spent hanging in the harness. This systematic approach organizes the pruning process for a large tree into 10-foot sections.

**G.) To reach the ends of the longest limbs, put a sling/carabiner around a higher branch, clip it to one of the ropes, and set-up a triangulated work position.** I generally reserve the back-up line for an additional support by clipping it to a sling/carabiner on a nearby limb. Even a minor deflection in the rope angles provides increased stability during a limb walk.

**H.) For emergency lowering of the climber, unlock the static ropes from the belay devices.** When the system is set at 100-feet, the climber can be lowered to the ground at any height. If the system is anchored above 100-feet, the rescuer can attach an additional line to the static and bypass the belay system to lower the climber to the ground. As the injured climber's flip line must be detached, I imagine that it is best to have the rescuer ascend the tree and reserve the ground crew for additional lowering options.

**I.) IMPROVE the DST to suit your climbing needs!** As this is an evolving technique, climber input is essential to develop a safe, efficient, effective style to work on large-scale trees.

10.) **RESOURCES CITED**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**PLEASE SEND YOUR QUESTIONS/COMMENTS TO: nicholas@treesolutions.net or call me at (206) 963-4302. I will be updating this document for my ISA Toronto 2013 presentation...**


**Thank you!** **NWD**