



City of Portland PP&R Urban Forestry Street Tree Planting Standards

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A. Purpose and Goals of the Standards

Street trees are important to the identity of Portland and for the quality of life of Portland residents. Street trees are part of our physical infrastructure and as such must be cared for as a physical asset. Proper planting and establishment are key factors in maximizing long-term tree survival as well as the benefits of trees.

This document contains planting standards to inform residents, contractors, business owners, City staff, and others of acceptable street tree planting activities within the city of Portland, Oregon. Any person planting a street tree shall do so in an appropriate manner, in order to increase the likelihood of successful tree establishment and survival.

Any person who plants a tree in the City of Portland right-of-way is required to follow the standards described in this document. If these standards are not followed, the tree planter and/or the adjacent property owner may be subject to corrective action and/or penalties under the authority of [Portland City Code Title 11 Trees](#).

There are three main goals for the Street Tree Planting Standards. These goals directly support the [2004 Urban Forestry Management Plan](#) and the [2007 Urban Forest Action Plan](#).

Goal 1: Promote proper stewardship of the urban forest by informing people how to properly plant and establish trees

Care of the urban forest by many knowledgeable people improves and enhances the quality of the urban forest. Many people have the chance to be a steward of the urban forest by being a volunteer, property owner, or resident, or as part of an agency, non-governmental organization, or business. Informing Portland residents of tree care standards can lead to more conscientious stewardship.

Goal 2: Increase the benefits of the urban forest by planting the right tree in the right place, establishing healthy trees, and promoting increased canopy coverage due to high survival rates for street trees

Trees provide the city with numerous benefits, such as reduced stormwater runoff, decreased air pollution, urban heat island mitigation, wildlife habitat, and aesthetic benefits. Proper species selection, planting and care of trees when they are young are strong determining factors in the lifespan and maintenance needs of trees. By ensuring the best practices for planting and care of trees are followed, the urban canopy will produce maximum benefits.

Goal 3: Enhance the resiliency of Portland's urban forest by increasing the age diversity as well as the species diversity of the urban canopy

Diversity in the urban forest increases resiliency by reducing both climate-related and biological risks, namely invasive pests and disease such as Dutch elm disease, Asian longhorned beetle, and emerald ash borer. Planting new trees and replacing senescent trees helps promote age diversity within the urban tree population. Age diversity can reduce the potential of having to replace large portions of the urban canopy during single events, helping to ensure consistent canopy cover throughout the city.

B. Authority and Foundation for the Standards

Portland Parks & Recreation City Nature Urban Forestry (Urban Forestry) issues permits for all street tree planting within the City of Portland under the regulatory authority of Portland City Code Title 11 Trees. This title grants the City Forester the authority to establish standards for planting street trees.

The City of Portland planting standards reflect industry standards and acceptable best management practices for planting, as published in the American National Standards Institute's "ANSI A300 Part 6: Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Planting and Transplanting)" (2012), the International Society of Arboriculture's "Best Management Practices: Tree Planting" (2005), and the American Nursery & Landscape Association's "American Standard for Nursery Stock (ANSI Z60.1-2014)."

This document provides standards specific to right-of-way tree planting within the City of Portland. The City of Portland standards may be more restrictive than those in the publications above, given the City's goals of increasing and enhancing the urban forest. Exceptions to these standards can only be granted by the permitting authority.

C. Street Tree Planting Specifications

1. Permits

Permits are necessary to ensure planting the right tree in the right place. Permits come with a site inspection by a City of Portland Urban Forestry Tree Inspector to help determine appropriate locations for planting trees as well as the appropriate tree for the planting site. This guarantees that the trees planted in the right-of-way are suitable for the urban environment and also helps avoid conflicts with existing infrastructure.

- a. Any person intending to plant a tree in the City right-of-way (i.e. a street tree) shall first obtain a valid permit from Urban Forestry. Street trees shall not be planted without a valid permit.
- b. No substitutions shall be made to the specifications of the planting permit without the written consent of the City Forester.
- c. As part of the permit, the City Forester or the City Forester's designee shall perform an on-site inspection and mark the street tree planting location.
- d. All street tree planting sites are subject to inspection before, during, and after work is completed.
- e. All conditions of the permit shall be met, or the permit may be denied or revoked and/or the permittee subject to corrective actions and/or penalties under the authority of City Code 11.70.

2 Planting Season

The time of year a tree is planted can greatly affect the tree's establishment because newly planted trees require water to survive and grow. Planting during the wet, cool months will help ensure tree establishment and survival.

- a. The planting season in Portland extends from October 1 through April 30. Planting during this timeframe is recommended.
- b. If a permit is issued outside of the planting season, the City Forester may defer planting until the next planting season in order to promote survivability.

3 Street Tree Planting Location

Street trees are a vital part of public infrastructure, reducing stormwater runoff, reducing heat, enhancing property values, and providing wildlife habitat. However, street trees share space with other public infrastructure, requiring careful selection of tree planting locations in the right-of-way. Progressive planting designs are encouraged to incorporate street trees when development occurs. This is another aspect of planting the right tree in the right place, helping to mitigate infrastructure conflicts and supporting maximum tree growth and longevity.

- a. **Utility marking:** The applicant shall call the Oregon utility notification locate center hotline at 811 or 503-246-6699 (local) or 1-800-332-2344 (toll free) to mark the locations of underground utilities before any ground-disturbing activities take place.
- b. **Spacing requirements:** Mature tree size and planting site size define the minimum tree spacing requirements. Alternative designs may be approved by the City Forester. See Appendix A for a street tree spacing diagram.

Definitions:

- Large planting sites:
 - Improved sites greater than or equal to 6.0 feet wide without overhead high-voltage wires
 - Unimproved sites without overhead high-voltage wires
- Medium planting sites:
 - Improved sites greater than or equal to 4.0 feet wide but less than 6.0 feet wide with or without overhead high-voltage wires
 - Improved sites greater than or equal to 6.0 feet wide with overhead high-voltage wires
 - Unimproved sites with overhead high-voltage wires
- Small planting sites:
 - Improved sites greater than or equal to 3 feet wide but less than 4 feet wide with or without overhead high-voltage wires

- Width is measured perpendicular to the street. If there is a curb, the planting site is measured from the interior edge of the curb to the closest sidewalk edge.

Trees shall be spaced no less than the following distances from existing infrastructure:

- i. Fire hydrants: 10' from fire hydrants.
- ii. Water meters: 10' from water meters and water quality sampling stations for large planting sites; 5' for medium and small planting sites.
- iii. Underground utilities: 5' from underground utilities, e.g. water pipes.
- iv. Gas lines: 5' from gas lines for large and medium planting sites, 3' for small planting sites.
- v. Intersections: 25' from a street intersection, measured from the streetside edge of the curb; street trees located at intersections should follow American Association of State Highway and Transportation Officials (AASHTO) requirements for clear site triangles.
- vi. Driveways, walkways, curb cuts, and alleyways: 5' from driveways, walkways, curb cuts, alleyways, and paved paths.
- vii. Stormwater management facilities: for trees outside of stormwater management facilities, 5' from the outside edge of the stormwater management facility; locations of trees planted within stormwater management facilities shall be determined by the Bureau of Environmental Services and the City Forester.
- viii. Property lines: 2' from property lines.
- ix. Building entrances: Trees should not be planted in front of building entrances.
- x. Traffic signals: 25' from traffic signals.
- xi. Street lights: 25' from street lights for large and medium planting sites; 15' for small planting sites; 15' if a narrow-growing tree species or variety of tree is selected.
- xii. Traffic signs: 20' from the front of stop signs; 20' from the front and 5' from the back of other directional and safety signs, such as yield, pedestrian crossing, school, speed limit, etc. Curvy roads may require additional spacing.
- xiii. Other signs: 10' from the front of other signs such as parking, street name, bus stop signs, etc. and 5' from the back of these signs. Curvy roads may require additional spacing.
- xiv. Bus benches and shelters: 5' from bus stop benches and shelters.
- xv. Utility poles: 5' from non-streetlight utility poles.
- xvi. Guy wires: Trees shall be planted outside of guy wires for large planting sites without overhead, high-voltage wires. Trees may be planted inside of guy wires for medium and small planting sites and large planting sites with

- overhead, high-voltage wires if the tree is at least 10' from the anchor and 5' from the pole and provided there is room for the tree to grow around the wire.
- xvii. Existing trees: 25' from adjacent trees, measured trunk center point to trunk center point.
 - xviii. Overhanging canopy: Street trees should not be planted under existing tree canopy if there will be a conflict as the tree matures. Tree size at maturity should be considered.
 - xix. Existing landscaping: Existing shrubs, raised beds, pavers, and other landscaping may be considered when locating a street tree for planting. These items should not prevent a street tree from being planted when required.
- c. **Site size:** Trees shall not be planted in planting strips that are less than 3 feet wide, measured from the interior edge of the curb to the sidewalk. The City Forester may approve planting in strips less than 3 feet wide on a case-by-case basis.
 - d. **Stormwater management facilities:** The City Forester may approve tree planting in stormwater management facilities on a case-by-case basis.
 - e. **Cutouts:** Concrete cutouts may be created in curbtight sidewalks. Cutouts should be as large as possible to provide ample growing space for the tree. Cutouts that are at least 6'x10' are preferred and encouraged. The minimum standard cutout size shall be 4'x6'. The City Forester and City Engineer may make exceptions on a case-by-case basis. When altering a sidewalk, the permit holder shall obtain a permit from the City Sidewalk Department by calling 503-823-1711.
 - f. **Curbtight sites:** For curbtight sites that do not have room for a cutout but have right-of-way extending beyond the sidewalk on the property side, trees should generally be planted no closer than 2' from the sidewalk. Tree species shall be selected from the largest list appropriate for the site.
 - g. **Medians and traffic circles:** Tree medians and traffic circles shall be planted in coordination with the Portland Bureau of Transportation (PBOT). Tree species shall be selected to fit the median or traffic circle width and to reduce interference with traffic mobility and visibility.
 - h. **Unimproved rights-of-way:** Unimproved rights-of-way include areas without sidewalks and/or curbs.
 - i. Unimproved rights-of-way fall under one of the following two categories:
 - a) Curb no sidewalk – the site has a curb but no sidewalk; right-of-way may extend beyond the curb on the property side
 - b) No curb no sidewalk – there may be right-of-way between the street and the adjacent property; the street may be paved, unpaved, or gravel
 - ii. The presence of overhead high-voltage wires, right-of-way width, existing trees, parking areas, and foreseeable street improvements shall be considered when locating a tree for planting in an unimproved right-of-way site. The current uses of the site, pedestrian circulation, vehicle circulation, safety, and

standard setbacks shall also be considered when locating a tree for planting in an unimproved right-of-way site.

- iii. Trees should be located at least 2' from the curb on the property side in unimproved right-of-way planting sites with a curb but no sidewalk.

4 Tree Species Selection

Determining what trees are appropriate for planting in the right-of-way is part of routine, responsible urban forest management. Not all tree species are suitable for the urban environment, so Urban Forestry has developed [Approved Street Tree Planting Lists](#) to help plant the right tree in the right place. The lists help ensure the species selected for planting are appropriate for both the specific site and Portland's urban canopy as a whole, encourage diversity, prevent infrastructure conflicts, and maximize the benefits of the urban canopy.

Increasing the diversity of the urban canopy will help protect the forest from significant future risks, benefitting the health and resiliency of the urban forest. Species selected for planting should take into account local tree diversity as well as site conditions such as microclimate, site aesthetics, and soil type and condition.

- a. **Species selection:** The City Forester shall approve the final species selection for trees planted in the City right-of-way. Trees should be selected from the Approved Street Tree Planting List that conforms to the planting site width and overhead wires specifications.
 - i. Trees on the Portland Nuisance Plant List shall not be planted in the City right-of-way under any circumstance.
 - ii. Any trees planted in environmental (c, p), greenway (n, q, or greenway setback and riverward portion of g, i, and r overlay zones), scenic corridors (s), or Pleasant Valley Natural Resource (v) overlay zones shall be native species.
- b. **Approved Street Tree Planting Lists:**
 - i. 2.5-2.9 foot planting sites with or without overhead high-voltage power lines
*These sites are only granted under special circumstances with approval of the City Forester
 - ii. 3.0-3.9 foot planting sites with or without overhead high-voltage power lines
 - iii. 4.0-5.9 foot planting sites with overhead high-voltage power lines
 - iv. 4.0-5.9 foot planting sites without overhead high-voltage power lines
 - v. 6.0 foot and greater planting sites with overhead high-voltage power lines
 - vi. 6.0-8.4 foot planting sites without overhead high-voltage power lines
 - vii. 8.5 foot and greater planting sites without overhead high-voltage power lines
- c. **Species diversity:**
 - i. When a permit holder plants fewer than 8 trees per calendar year, they may all be the same species.

- ii. When a permit holder plants between 8 and 24 trees per calendar year, no more than 40 percent of the total planted shall be of one species.
- iii. When a permit holder plants more than 24 trees per calendar year, no more than 24 percent of the total planted shall be of one species.
- d. **Mature height, spread, and shape of tree:** The crown of a tree at maturity should not be in serious conflict with neighboring structures. Street trees planted in sites below overhead high-voltage power lines should be selected so they do not grow into the high-voltage power lines.
- e. **Species selection in unimproved rights-of-way:** If there is an adjacent planting site on the same side of the block as the unimproved right-of-way planting site, the width of the improved site may be used to determine the list for tree species selection for the unimproved site. If there is no adjacent planting strip on the same block, the following lists shall be used for tree species selection:
 - i. Unimproved right-of-way sites with overhead high-voltage power lines shall have tree species selected from the “6 foot and greater with overhead high-voltage power lines” list
 - ii. Unimproved right-of-way sites without overhead high-voltage power lines shall have tree species selected from the “8.5 foot and greater without overhead high-voltage power lines” list
- f. **Exceptions:** The City Forester may grant exceptions to or require restrictions on:
 - i. The Approved Street Tree Planting Lists;
 - ii. The species diversity requirement, in order to fulfill or complement an adopted street or landscape plan; and
 - iii. The native species planting requirement, when the proposed species of tree will not likely displace native species and site conditions make planting a native tree species infeasible.
 - iv. Exceptions and restrictions shall be made in writing.

5 Tree Stock Selection

Mature trees are potentially only as good as the nursery stock from which they came. Therefore, it is crucial to carefully select trees for planting that have good form and are free from insects, disease, damage, and decay. To help the tree survive in the urban environment it is also important to select large-caliper trees. Larger caliper trees have an established central leader and typically branch higher, providing necessary clearance sooner than smaller trees. Smaller trees are also more prone to damage and vandalism. Planting larger caliper trees of good nursery stock helps protect the investment in our urban canopy resource.

- a. **Tree caliper:** Broadleaf trees shall be at least the minimum caliper size as defined below at the time of planting. The City Forester may make exceptions to the required caliper size on a case-by-case basis. Tree caliper shall be measured at 6 inches above the tree’s natural ground line for trees less than or equal to 4 inches caliper, or at 12 inches for trees greater than 4 inches caliper.

i. **Broadleaf tree size requirements:**

Development type	Street tree minimum caliper size
One and two family residential	1.5 inches
Multi-dwelling residential	2.0 inches
All others	2.5 inches

ii. **Conifer tree size requirements:** Conifer trees shall be a minimum of 5 feet in height at time of planting.

b. **Tree stock:** Trees shall be grown and harvested in accordance with the standards in the *American Standard for Nursery Stock* ([ANSI Z60.1-2014](#) or the most current edition). Trees acquired for planting in the City right-of-way shall be nursery-grown in a USDA hardiness zone suitable for the region.

Trees acquired for planting in the City right-of-way shall exhibit the following characteristics:

- i. Healthy and vigorous, with trunk and limbs free from insects, disease, defects, injuries, and decay
- ii. Single trunk that is straight, with a well-developed leader and good trunk taper
- iii. Well-distributed branches that are considerably smaller diameter than the trunk, with wide-angled branch attachments or branch attachments that are appropriate for the tree form.
- iv. A fibrous root system
- v. **Bare root trees:** Bareroot trees shall have abundant root growth, with both larger anchor roots and smaller fibrous roots. Roots shall not be broken, torn, decayed, or damaged. Bareroot trees shall be planted prior to bud-break.
- vi. **Balled and burlapped (B&B) trees:** B&B trees shall have a firm root ball. The root ball shall not be loose, broken, or desiccated. The trunk shall be solidly attached to the root ball. The root ball shall be large enough to support the tree caliper size. Minimum root ball diameters for selected sizes of shade trees (ANSI Z60.1) shall be:

Caliper (inches)	Minimum root ball diameter (inches)
1	16
2	24
3	32
4	42

- vii. **Container trees:** Roots shall be well-developed enough to hold the potting substrate together. At sale, trees should have been growing in their current containers for approximately one year. The tree shall not be pot bound or have matted or girdling roots. The soil shall not be desiccated.
- viii. **Fabric bag trees:** The trunk shall be solidly attached to the root ball. The root ball shall not be broken or desiccated.

6 Transporting and Storing Trees

Once a large, healthy, vigorous tree has been purchased, care must be taken when transporting the tree to the planting site. Digging and transporting stresses the tree and makes the tree vulnerable to desiccation. Trees wrapped too tightly during transport can lead to sweating. It is important to cover the tree properly during transportation and storage while ensuring adequate moisture and ventilation. Trees have the best chance for survival if they are planted in the same year they are dug.

- a. Trees should be dug during the tree's dormant season and dug to retain as many fibrous roots as possible. Trees shall be transported, stored, and handled with proper care to ensure appropriate protection against desiccation and injury at all times and stages of planting. Any person acquiring a tree for planting in the City right-of-way shall undergo precautions to ensure protection of the tree during transportation and storage.
- b. When binding for transportation, trees shall be bound so as not to cause damage to the trunk, roots, or branches. Trees should be bound with soft material.
- c. Trees shall be lifted and moved properly, generally from the root base and not from the trunk.

7 Root Barriers

It is ideal to plant the right tree in the right place in order to reduce tree conflicts, but the right-of-way is not often an ideal place for a tree to grow due to narrow space, compacted soil, and hard surfaces such as sidewalks. Tree roots can grow underneath sidewalks and lift or crack the sidewalk. Damaged sidewalks create safety concerns and are expensive to replace, and trees that cause infrastructure damage again and again can become less desirable to retain through the end of their natural lifespan.

The best protection for sidewalks is to plant the right tree in the right place. This means planting small trees in small spaces and big trees in big spaces. However, extra protection can be taken by installing root barriers at the time of planting. A root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots.

- a. **Root barrier installation:**
 - i. Root barriers shall be installed in all improved right-of-way planting sites less than 4 feet wide, including planting strips and tree wells. Root barriers are recommended for all other planting site sizes in improved rights-of-way.

- ii. Root barrier products shall be installed along the sidewalk side only, in a linear fashion (see Appendix B for a diagram). Root barriers shall be centered on the planting spot.
- iii. Root barriers shall be commercially produced for the purpose of deflecting tree roots downward. Root barriers shall be installed as per the manufacturer's instructions. Root guide ridges shall face towards the tree, with the back flush against the sidewalk. The top of the root barrier shall be ½-1 inch above the finished soil grade or level with the sidewalk, whichever is lower, when installation is complete.

b. Root barrier materials:

- i. Root barriers should generally be made of polypropylene, polyethylene, or polystyrene, at least 0.060 inches thick, with vertical root guides every 6 inches. Root barrier products should specify use as a tree root barrier.
- ii. Root barriers shall be at least 12 inches deep and at least 6 feet long. If the root barrier is made of panels, panels shall lock together to achieve the 6-foot length.
- iii. Alternative root barrier materials may be approved by the City Forester.

8 Excavation

Proper excavation is paramount for ensuring tree survival. Planting a tree too deeply is one of the most common causes of poor tree establishment. If the hole is dug too deep initially, a pedestal of soil should be added and compacted to prevent settling. The width of the hole is also essential for providing room for the tree roots to grow, securing nutrients and stabilizing the tree. Urban soil can be very compacted and a large planting hole helps break up the compaction for the newly planted tree.

- a. The planting hole shall be at least 2 times the width of the root ball (see Appendix C for a diagram) or 4 feet in diameter, whichever is greater. The hole shall be centered on the tree locate mark in the planting strip. The sides of the hole shall not be glazed and an auger shall not be used to dig the tree planting hole.
- b. The depth of the hole shall not be deeper than the height of the tree's root flare. See Appendix C for a diagram.
 - i. A pedestal of undisturbed earth or compacted soil shall be left for the tree to prevent settling. If it is necessary to add soil to reduce the depth of the planting hole, the pedestal shall be well compacted before placing the tree.

9 Preparing the Tree for Planting

The tree should be free of all foreign objects before planting to prevent accidental girdling of trunk or branches. It is easiest to remove objects from the tree before it is in the ground; the tree can be gently leaned over so tags or bindings in the branches can be reached and removed. If any competing leaders are present, the less dominant one may be removed to promote vigorous growth of the dominant leader and reduce the likelihood of future structural defects. Making sure the roots are prepared for planting will also reduce

the likelihood of future structural defects, such as girdling roots, which can eventually strangle the tree and lead to tree mortality.

- a. **Bindings:** All foreign objects such as twine, bindings, and tree tags shall be removed from the tree trunk and branches prior to planting unless otherwise required to be retained, such as tree species tags for identification.
- b. **Pruning:** Dead or broken branches shall be pruned with clean, sharp hand pruners at the branch collar. Crossing branches may also be pruned prior to planting. Peeling the bark or snipping too close to the bark or too far from the branch collar shall be avoided. Pruning activities shall not leave branch stubs or damage the branch collar.

If more than one leader is present, the smaller leader or the leader with a defect may be removed or reduced just prior to planting in order to protect the main leader from competition.

The tree shall not be topped.

Only damaged or girdling roots may be pruned prior to planting. Healthy roots shall not be pruned.

- c. **Container trees:** The container shall be removed immediately prior to planting. If circling roots are present, the encircling outer roots shall be broken up to prevent tree girdling. The root flare shall be exposed.
- d. **B&B trees:** All string, plastic, wire, and any other non-living material shall be removed from the root ball. The root flare shall be exposed. Outer roots should be loosened up to encourage proper growth.

All of the burlap and wire shall be completely removed from the root ball before backfilling. The packing materials shall not be rolled down under the root ball.

- e. **Bare root trees:** Torn or damaged roots shall be pruned with a clean pruning cut.
- f. **Fabric bag trees:** The fabric bag shall be cut and removed from the tree immediately prior to planting. If circling roots are present, the encircling outer roots shall be broken up to prevent tree girdling. The root flare shall be exposed.

10. Installation

Tree root balls can be fragile and heavy, so it is essential to lift the tree by the root ball, not by the trunk, when placing it in the hole. Broken root balls can damage tree roots and inhibit tree establishment. Take time to orient the tree once it is in the hole, making sure the main branches are clear of the sidewalk and street so they are less likely to interfere with traffic. The tree will grow as you place it, and it will be aesthetically pleasing if it is centered and planted straight.

- a. Foreign materials such as stones, rope, twine, etc. shall be removed from the planting hole prior to placing the tree.
- b. Trees should be lifted from the root ball, not the trunk. Trees shall be gently placed on a pedestal of undisturbed or compacted soil. Care shall be taken to ensure the root flare will be at or slightly above grade once the site is backfilled.

- c. The tree shall be centered in the planting strip and on the tree locate mark. The tree shall be vertically plumb.
- d. The tree shall be oriented so the main branches are parallel to the street and sidewalk in order to reduce interference with pedestrian and vehicular traffic.

11. Backfilling

Care should be taken when backfilling to provide stability to the tree without compacting the soil. Trees need a combination of air, water, and nutrients from soil to thrive. Leaving large air pockets should be avoided, as this could starve the adjacent roots of water and nutrients and lead to settling and instability. Compacting soil too much could suffocate the tree from lack of oxygen to the roots or make it difficult for the roots to expand into the surrounding soil.

- a. Trees shall be backfilled with the original soil that was excavated from the site, unless more soil is needed or the soil is compacted or very poorly drained. Soil used to fill the planting hole shall be reasonably clear of rocks, roots, debris, weeds, ash, cement, concrete, tar, and all other foreign matter. Soil shall not be frozen when backfilling.
- b. Dirt balls shall be broken up. Soil shall be tucked around the root ball or bare roots so no large air pockets are left. The soil shall be gently tamped while backfilling. Care shall be taken to not compact the soil. The root ball shall not be stood upon or walked on.
- c. The tree shall be plumb after the hole has been filled.
- d. The tree's root flare shall be visible above grade once the planting hole is backfilled (see Appendix C for a diagram).
- e. **Soil amendments:** In most cases, soil should not need to be amended and the planting hole should be backfilled with the soil that was removed. Amendments should generally not be used unless the soil is compacted or very poorly drained.
 - i. If soil amendments are used, the planting hole shall be dug at least 3 times wider than the width of the root ball.
- f. **Berm:** Once the planting hole has been backfilled, a soil berm 3-5 inches high and at least 3 feet in diameter or to the edges of the planting strip, if the strip is narrower, should be formed around the tree (see Appendix C for a diagram). Soil shall not be piled up around the root flare or trunk of the tree.
- g. **Water:** After the berm is formed, the tree shall be watered slowly and deeply until the ground is saturated. Check the tree for settling and compact the soil gently if the tree needs straightening.

12. Mulching

Mulching is vital for retaining moisture, providing nutrients, removing competition from weeds and other plants, and preventing damage from mowers and weed whackers. It is important to obtain mulch from a weed-free source to prevent the spread of weeds, which can compete with trees and other plants. Mulch can be used to help protect the tree

throughout its lifetime, as long as the mulch is kept away from the trunk to prevent opportunities for decay.

- a. Mulch shall be a weed-free natural plant material with no additives or treatments.
- b. Mulch shall be applied to newly planted trees using the 3-3-3 rule: lay mulch down in a uniform 3-inch thick layer, 3 inches away from the tree trunk, in at least a 3-foot diameter circle around the tree or to the edges of the planting strip, if the strip is narrower, after the soil berm has been created.
- c. Mulch shall be kept away from the trunk to prevent trunk decay and the formation of surface roots.
- d. The mulch zone should be weeded and the mulch replenished as needed during tree establishment and throughout the life of the tree.

13. Staking

Stakes stabilize the tree and provide a visual and physical protective barrier against accidental trunk injuries. However, leaving a tree staked for too long can prevent the tree from developing stabilizing roots. Also, tree tie material should be selected to prevent trunk injury.

- a. Newly planted street trees shall be staked. All staking materials shall be removed no later than one year after the planting date.
- b. The tree shall be staked with two wooden stakes driven into undisturbed soil outside of the mulch zone (see Appendix F for a diagram).
- c. Stakes shall be made of untreated 2x2-inch wood. Stakes shall be placed opposite of each other, equidistant from the tree trunk and parallel to the curb. Drive the stakes into the ground until they cannot be pulled out by hand. Stakes shall stand plumb or angled slightly outward, away from the tree. The roots of the newly planted tree shall not be disturbed while installing stakes.
- d. The tree shall be loosely tied to the stakes. The tree tie material shall loosely encircle the trunk to prevent abrading the bark or constricting the tree. Any tree tie material used shall be biodegradable and shall not damage the trunk. Ties shall be located no higher than $\frac{2}{3}$ the height of the tree. The tree shall be able to sway in the wind, which helps establish strong support roots and trunk. Ties should be checked periodically to ensure room for the tree to grow. Ties and stakes shall be removed immediately if there are signs of damage to the trunk.

14. Tree Grates

Tree grates are typically installed in tree wells in high pedestrian traffic areas and help prevent soil compaction around the tree. However, tree grates require ongoing maintenance and can girdle a tree when left unmaintained. Tree grates are not recommended.

- a. Tree grates should generally not be used for trees planted in City rights-of-way.

- i. The City Forester may make exceptions to install tree grates in coordination with the Portland Bureau of Transportation (PBOT).

15 Tree Establishment and Aftercare

Trees need watering for at least the first three years for proper establishment. Only structural types of pruning, and pruning to remove dead or broken branches, are recommended during the first few years. After the tree is established, it can be pruned to provide clearance over the street and sidewalk.

a. Watering:

- i. During the dry and hotter months from about May to October, trees should be watered with approximately 15 gallons of water per tree per week, or more as needed. Watering once a week, slowly and deeply, will encourage deep root growth. Newly planted street trees should be watered regularly during dry seasons for at least the first three years.
- ii. Watering shall not be applied in a manner that causes settling or exposure of the tree's roots.
- iii. During the remaining months of the year, the root zone shall be monitored for dryness and watered as needed. It can take up to five years for a newly planted tree to establish itself in a new environment.

b. Pruning:

- i. All pruning shall be conducted in accordance with the City of Portland PP&R Urban Forestry "Street Tree Pruning Standards."

16 Long-Term Monitoring and Maintenance

Portland's City Code confers the responsibility of the care of street trees on the adjacent property owner. With proactive monitoring, maintenance needs and changes in the tree will be more readily apparent. To keep trees providing maximum benefits throughout their lifetime, tree work should be performed by an experienced, practicing Certified Arborist in order to ensure proper tree care. Property owners and tree care providers play an essential role in ensuring a vibrant future for the urban forest.

- a. It is the responsibility of the adjacent property owner to monitor the health and maintain the street tree. Proactive monitoring can catch adverse conditions before they threaten the health of the tree. Being familiar with the typical conditions of the street tree will make changes more readily apparent.
- b. Street trees shall be regularly monitored for:
 - Watering, weeding, and mulching needs
 - Insects, disease, or decay
 - Bark and limb damage, including sunscald
 - Pruning needs
 - General decline

- c. If any changes of concern are noticed, contact Urban Forestry for a health inspection. Permits from Urban Forestry are required for any work on street trees.

D. Definitions

Auger: A tool or device used for boring holes, usually in wood, soil, or ice

Berm: a small ridge of soil 3"-5" high, to be formed in a 3' diameter circle around a newly planted tree

Branch collar: the area of slight swelling where a branch attaches to the trunk of a tree

Broadleaf: any tree that has wide, flattish leaves, unlike a conifer tree

Caliper: the diameter measurement of a tree trunk, in inches, measured at 6 inches above the tree's natural ground line for trees less than or equal to 4 inches caliper, or at 12 inches for trees greater than 4 inches caliper

City Forester: the Manager of Urban Forestry, or the Manager's designee

City of Portland or City: the governing body of Portland, Oregon

City right-of-way: the area between neighboring properties including street surfaces, curbs, sidewalks, and/or additional areas on either side of the sidewalk; interchangeable with "right-of-way" for the purpose of this document

Conifer: any tree that has cones and needle-like or scale-like leaves, unlike a broadleaf tree

Curbtight: when the curb lies directly adjacent to the sidewalk and there is no planting strip. The sidewalk may or may not have tree cutouts. The right-of-way may or may not extend beyond the sidewalk on the property side

Cutout: a concrete cutout in a curbtight sidewalk for planting a street tree in the right-of-way; also called a tree pit or a tree well

Establishment: the period of time it takes to care for a newly planted tree so it survives planting

Girdling roots: when the roots of a tree circle the trunk or other roots; this can strangle the tree and cause tissue death

Glazed: glazing occurs when the sides of the tree planting hole becomes smooth and creates a barrier against the passage of water

Grade: ground level

Guy wires: cables that attached utility poles to the ground in order to provide stability and tension to the pole

Improved right-of-way: right-of-way containing a curb and a sidewalk, or medians or traffic circles separated from the street lanes by a curb

Large planting sites:

- Improved sites greater than or equal to 6.0 feet wide without overhead high-voltage wires
- Unimproved sites without overhead high-voltage wires
- Width is measured perpendicular to the street. If there is a curb, the planting site is measured from the interior edge of the curb to the closest sidewalk edge.

May: refers to a practice that is allowed but not required

Median: the paved or planting strip in the middle of the road, separating directional lanes

Medium planting sites:

- Improved sites greater than or equal to 4.0 feet wide but less than 6.0 feet wide with or without overhead high-voltage wires
- Improved sites greater than or equal to 6.0 feet wide with overhead high-voltage wires
- Unimproved sites with overhead high-voltage wires
- Width is measured perpendicular to the street. If there is a curb, the planting site is measured from the interior edge of the curb to the closest sidewalk edge.

Nuisance Plant List: a list within the “Portland Plant List” that identifies nuisance trees and plants.

Planting strip: a continuous strip of unpaved surface between a sidewalk and a curb

Planting site: street tree planting location; may be improved or unimproved right-of-way

- Large planting sites:
 - Improved sites greater than or equal to 6.0 feet wide without overhead high-voltage wires
 - Unimproved sites without overhead high-voltage wires
- Medium planting sites:
 - Improved sites greater than or equal to 4.0 feet wide but less than 6.0 feet wide with or without overhead high-voltage wires
 - Improved sites greater than or equal to 6.0 feet wide with overhead high-voltage wires
 - Unimproved sites with overhead high-voltage wires
- Small planting sites:
 - Improved sites greater than or equal to 2.5 feet wide but less than 4 feet wide with or without overhead high-voltage wires
- Width is measured perpendicular to the street. If there is a curb, the planting site is measured from the interior edge of the curb to the closest sidewalk edge.

Plumb: vertically true

Pot bound: when a tree is left to grow too many seasons in the container and the roots circle the inside of the pot

Pruning: refers to cutting or removing any part of the branching structure of a tree in the crown, trunk, or root areas

Right-of-way: see “City right-of-way”

Root barrier: a device installed in the ground between a tree and the sidewalk intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots

Root flare: the area of slight swelling where the trunk meets the first large support root; the tree's natural ground line

Shall: indicates a practice is mandatory

Should: refers to a practice that is highly recommended but not mandatory

Small planting sites:

- Improved sites greater than or equal to 2.5 feet wide but less than 4 feet wide with or without overhead high-voltage wires
- Width is measured perpendicular to the street. If there is a curb, the planting site is measured from the interior edge of the curb to the closest sidewalk edge.

Stormwater management facility: a street feature designed for stormwater capture and filtration

Street tree: any tree planted in the City right-of-way, whether in improved or unimproved right-of-way

Traffic circle: a median circle in the middle of an intersection

Unimproved right-of-way: right-of-way areas without sidewalks and/or curbs. Unimproved rights-of-way fall under one of two categories:

- i. Curb no sidewalk – the site has a curb but no sidewalk; right-of-way may extend beyond the curb on the property side
- ii. No curb no sidewalk – there may be right-of-way between the street and the adjacent property; the street may be paved, gravel, or undeveloped in any way

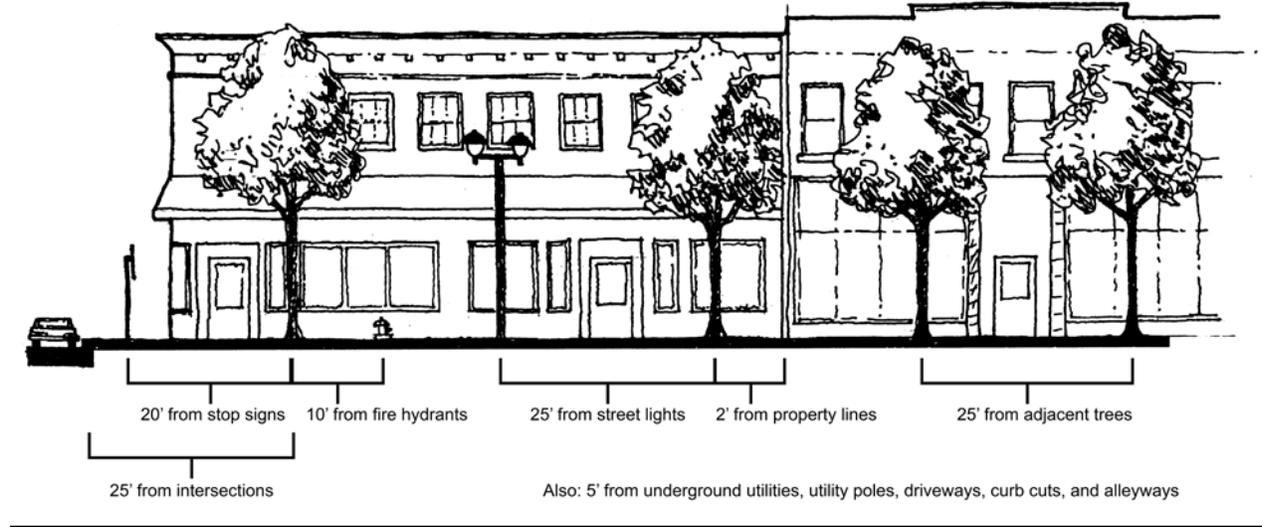
Urban Forestry: City of Portland Parks & Recreation Urban Forestry

E. Resources

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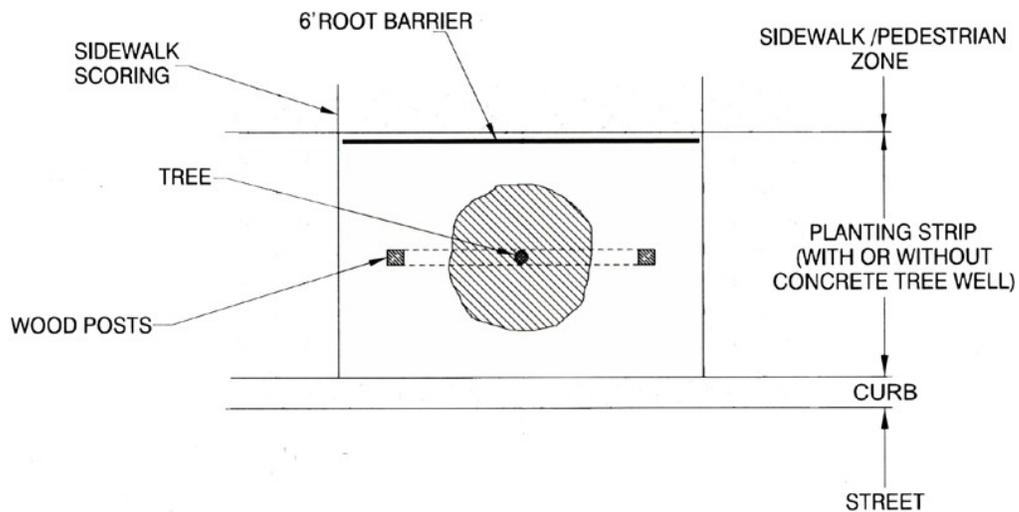
Appendix A: Street tree spacing diagram

Street tree minimum spacing distances:



Appendix B: Root barrier installation at sidewalk

Overhead view of root barrier installed along the sidewalk with newly planted street tree



Appendix C: Street tree planting diagram

Profile of a newly planted street tree

Diagram not to scale

