

MEMORANDUM

To: Urban Area Planning Commission

From: Lora Glover, Director PCD *Lora*

Date: October 6, 2016

Re: Proposed Landscaping Amendment

Attached for your review and discussion on October 12, 2016, are recommendations from the Urban Area Tree Committee (UATC) regarding an amendment to the landscaping requirements for commercial and industrial development.

The UATC is concerned that our current standards are not adequate for shade coverage and survivability of trees within commercial/industrial parking lots.

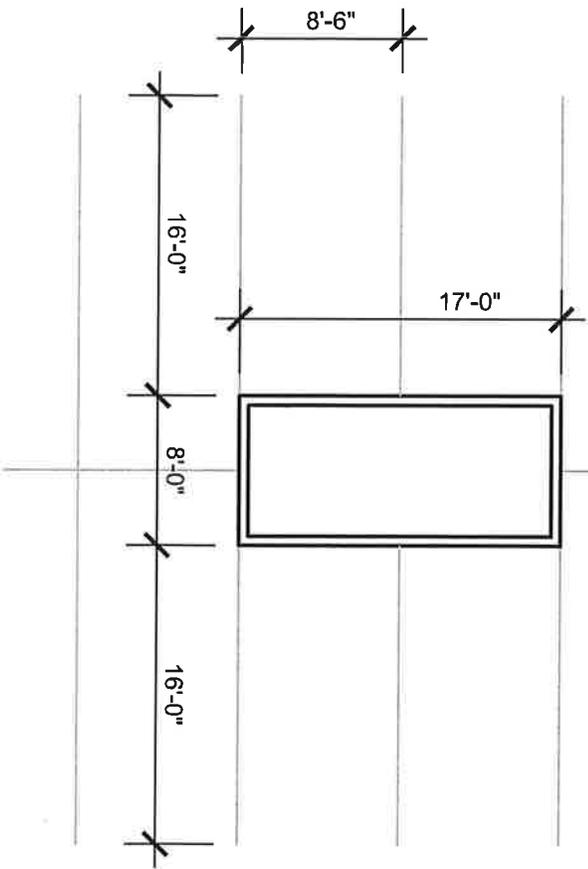
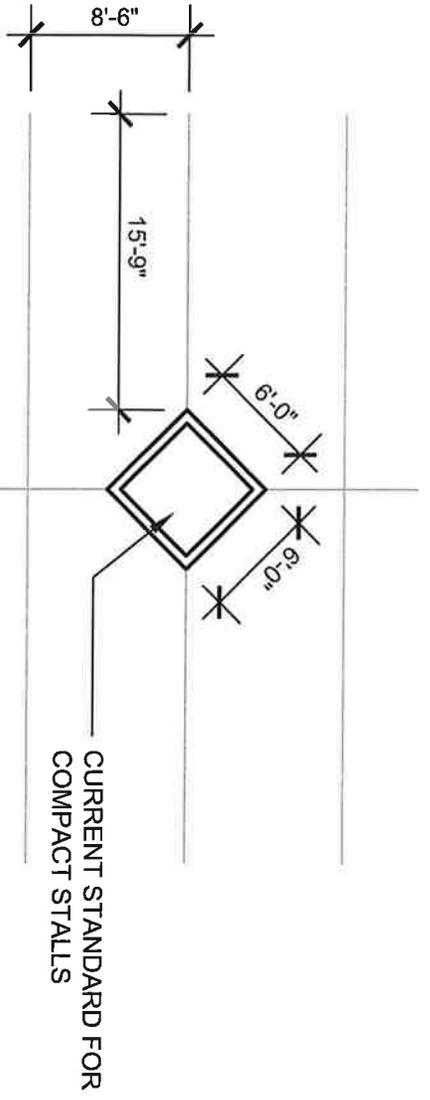
GP Article 23 – UTAC Recommended Updates

- 23.035 – 3 Parking Lot Landscape Standards. Fifty percent of a paved parking lot's surface shall be shaded by tree canopies within fifteen years of planting with the purpose of increasing the urban tree canopy, reducing urban air temperatures, and reducing rainwater runoff. A minimum tree ratio of (1) tree and 120sq.ft. of landscaped area per (8) parking stalls shall be provided. *(I have second thoughts about this. Perhaps take out the tree/parking stall ratio since we are calling for a tree canopy percentage?)*
- 23.035-3.a Landscaping shall be designed such that there are not more than nine (9) parking stalls between trees. *(currently the code allows up to eleven stalls between trees....Medford's code is eight) Also, the top diagram in Figure 23-1 needs to be updated without the "diamond" planters or eliminated unless G.P. requires the use of "Structural Soil".*
- 23.035-3.?² Parking lot trees shall be planted at least 3 feet from the back of curb or 4 feet of any paved area without a curb or wheel stop.
- 23.035-3.d Parking trees shall have sufficient soil volume to establish and maintain a root system that will support the trees to full maturity. Each tree shall be provided a minimum of two cubic feet of soil volume for each square foot of tree canopy at the projected maturity of the tree.
- 23.035-3.d.1 Soil volume is to be calculated as the landscape area under the tree canopy, free of impervious surface or paving and measured at a minimum depth of 24" and a maximum depth of 36".
- 23.035-3.d.2 For trees in parking lot planters that do not have sufficient landscape area under the canopy, structural soil may be used as an alternative material under the impervious portion of the tree's canopy in order to achieve the required soil volume calculation.
- 23.035-3.f Landscaped end islands shall be provided at the end of parking rows. End islands shall have a minimum internal width of 7-1/2' and minimum internal length of 38' (measured curb to curb).
- 23.035-3.f.1 Landscaped "mid-row" islands shall be a minimum internal width of 7-1/2' and minimum internal length of 19'. See figure ???
- 23.035-3.f.2 Landscaped islands at compact parking stalls shall have a minimum internal width of 7' and a minimum length of 16'. See figure ???
- 23.035-4 (new item). Canopy Calculation Methodology: To simplify the process of determining compliance, the anticipated mature size of the tree (to dripline) shall be used to calculate the area of canopy coverage. See the City of Grants Pass Recommended Tree List for trees that are suitable for parking lots and their mature sizes.

- 23.052-3.a All areas designated for landscaping shall be kept clear of all waste materials and construction debris and shall be excavated to proper depths to allow for required topsoil depths.
- 23.052-3.b All required landscape areas shall contain topsoil that is classified as a loam, clay loam, or sandy loam soil. Soils devoid of organic materials, such as sand or decomposed granite, shall not be used for required landscape areas. Structural Soils may be used as an alternative material under impervious surfaces to meet required soil volume calculations for parking lot trees.
- 23.052-3.c The landscape plan shall provide specifications indicating topsoil at a minimum depth of 12" (24" where trees are required), mature compost added to the topsoil at a rate of three cubic yards per 1,000 sq.ft. of required landscaped area.
- 23.061-1 The landscape installer shall arrange to meet with a City of Grants Pass Inspector at the completion of the project to verify proper installation of the irrigation system, topsoil (and Structural Soil if required).
- 23.061-4 Inspection of the irrigation system shall be conducted by a City of Grants Pass Inspector to ensure the system has been installed per plan and to verify that adjustments have been made to eliminate overspray onto paved surfaces.
- 23.061-5 The landscape installer shall also provide a written statement indicating that the quantities and depths of required materials have been provided. The statement shall also contain the landscape installer's contact information and Landscape Contracting Business license number. *(The city of Medford has a certification requirement that puts the burden on the installer and/or designer to, in essence, guarantee that the installation is true to plan....Lora, can we adopt Medford's requirement?)*
- 23.073-7 Trees shall not be planted within 2 feet of any permanent.....This means that sidewalk cuts in concrete or tree wells shall be a minimum of 4'x4'.
- 23.073-7.a All trees in sidewalk conditions, public or private, shall have soil volume equal to two cubic feet of soil for each square foot of tree canopy. Structural Soil and/or pervious paving materials may be used to satisfy this requirement. *(I think there needs to be a requirement for Structural Soil in street tree plantings. That's just me and based on what I've seen in Medford. We should also add a requirement for irrigation to the street trees in cutouts/tree wells)*
- 23.074 Replacement of Street Trees. Existing street trees.....All new and replacement street trees shall be a minimum of 2" caliper.

GP Article 25 – UTAC Recommended Updates

- 25.031-7 Parking lots shall be maintained by the property owner or tenant in a condition free of litter, dust, and dead plant material. Parking lot trees shall be replaced if dead or damaged. Replacement trees shall be a minimum of 2" caliper.
- 25.031-12 Not more than 35% of the total parking spaces in a parking lot may be designated for compact cars (*current code limits it to 25%....35% would allow for more planter space and make it easier to reach the 50% shade goal*).
- 25.033-10 Lighting
- 25.033-10.a Parking lot lighting shall not be located in landscaped islands where parking lot trees are required and shall not be located within 20' of a required parking lot tree.



COMPACT PARKING STALLS

Scale: 1" = 10'-0"

Parking Lot Tree Canopy

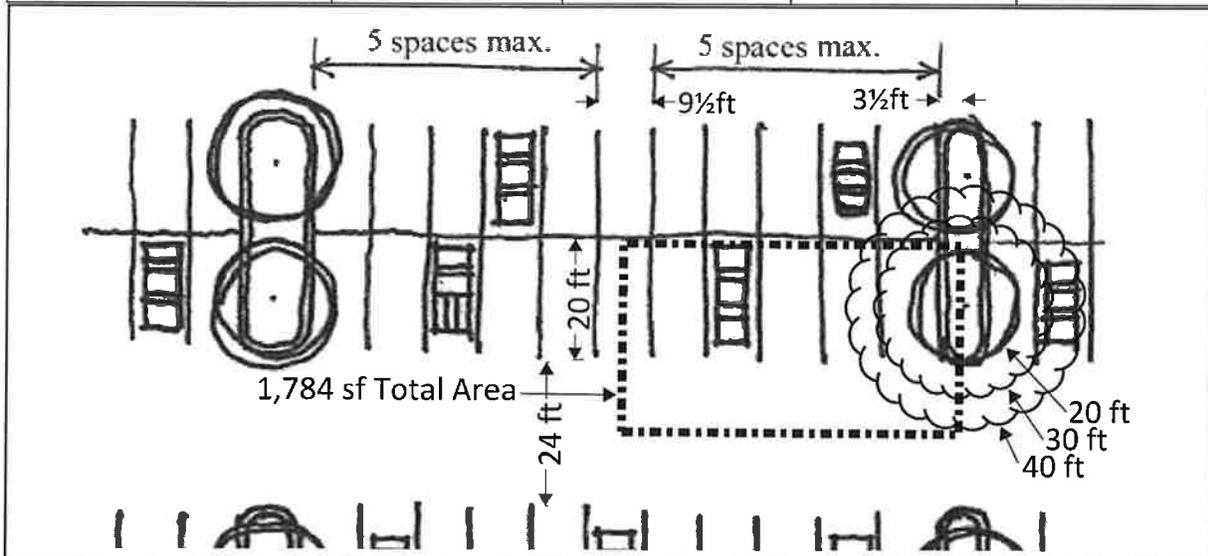
Do current Code standards achieve desirable canopy coverage in parking lots?

Trees provide welcoming shade in parking lots, especially on hot days. They shade cars and pedestrian walkways, reduce glare, screen views, and muffle noise. Trees can reduce the excess heat generated by large expanses of paving and can reduce stormwater runoff and pollution. In time, the shade provided by trees will cool pavement surfaces, reducing air temperatures and mitigating the heat island effect. Planting trees creates more pleasant and attractive parking environments and increases tree canopy cover, making communities greener and healthier places.

Most cities require parking lot landscaping that includes tree planting. Small, low-cost trees rarely shade more than one vehicle. Communities can transform their parking lots while adding environmental benefits by planting more trees in parking areas.

The Grants Pass Development Code does not regulate tree canopy in Commercial or Industrial zones where parking lots are typically found.¹ Instead, the Code regulates tree spacing by allowing no more than five parking spaces from any space to a tree as illustrated by Figure 23-1.² This will evenly distribute trees and avoid an expanse of pavement. By applying the maximum spacing standard, the estimated canopy cover at maturity would be:

Tree Size	Canopy Area (s.f.)	Area Outside Canopy (s.f.)	Total Area (s.f.) ³	% Canopy
Small tree, 20' crown	157	1,627	1,784	9%
Medium tree, 30' crown	323	1,461	1,784	18%
Large tree, 40' crown	517	1,267	1,784	29%



¹ Article 11: Tree Retention and Tree Canopy Re-Establishment applies to land divisions in residential zones.

² GPDC 23.035(3)(a)

³ Five and one-half parking spaces plus one-half of the landscape island plus one-half of the travel aisle. The portion of the canopy area that falls within this rectangle is counted.

Parking Lot Tree Canopy

The benefits of increased canopy coverage are well-documented. Unshaded parking areas become extremely hot, contributing to both the urban heat island effect and increase air pollution through enhanced volatilization of reactive hydrocarbons from parked vehicles.⁴

The following is a helpful primer for cities considering a parking lot tree canopy standard.⁵

The success of parking lot shading relies on effectively implementing regulations or guidelines for tree planter size, irrigation, and planting methods to ensure good tree growth. Local empirical data on tree growth in parking lots is needed to develop realistic estimates of tree canopy cover after various time intervals. Technical information and specifications, such as lists of tree species and their respective canopy spread after a set number of years, examples of shade calculations, and construction details, are needed to implement this and other planting provisions.

Key elements of tree shading provisions are:

- Basic performance standards related to the amount of shade or tree planting required. The most common types of standards include:
 - Shading standards based on the amount of shade to be provided by trees after a set period of time, such as 50% of pavement shaded in fifteen years.
 - Maximum distances from any parking stall to a tree.
 - Tree to parking stall ratios.
 - Minimum landscaped area as a percent of paved area in conjunction with tree density standards in the landscaped area.
- Methods used to calculate tree shading and determine the amount of shaded and non-shaded area to be counted in calculations or assess tree planting ratios provided on parking lot plans.
- Person or body responsible for determining that a plan complies with the standards.
- A mechanism to provide for periodic monitoring of parking lots to assure that tree maintenance is adequate and that standards are met.

What levels of parking lot shading are realistic to include in a parking lot shading provision? The answer depends not only on the eventual size that trees will attain under parking lot growing conditions but on the amount of space set aside as growing space for trees. We used *Peper et al's*⁶ empirical crown projection data numbers to calculate how much of the interior paved area of a parking lot would need to be set aside for trees in order to reach a 50% pavement shading goal after 15 years. We made the following assumptions in these calculations;

1. Landscaping consists of shade trees individually planted in 6 by 8 foot planter islands located within the parking lot (i.e., all of the trees' canopy is over the parking lot).

⁴ Air Quality and Parking Lot Shade (Center for Urban Forest Research, 2001)

⁵ Guidelines for Developing and Evaluating Tree Ordinances (International Society of Arboriculture, 2001)

⁶ Peper, P.J.;Mori,S.M.;McPherson, E.G. (submitted) Predictive equations for dimensions and leaf area of San Joaquin Valley street trees. Tree Physiology.

Parking Lot Tree Canopy

(continued)

2. The shade trees used reached an average crown diameter of 21 ft after 15 years (according to *Peper et al*, this is the average size of London plane trees in Sacramento, CA, parking lots after 15 years).
3. Planting islands are configured so that there is no overlapping shade from adjacent trees.
4. All planted trees survive and trees are not topped or otherwise pruned to reduce tree canopy development.
5. Canopy over the planters counts toward the 50% shading requirement even though planters are not actually paved areas.

Percent of interior paved area occupied by 6 ft by 8 ft planters (1 tree/planter)	Projected parking lot shading after 15 years (average crown diameter= 21 ft)
5% of paved area	35%
7% of paved area	49%
10% of paved area	70%

¹ Peper, P.J.;Mori,S.M.;McPherson, E.G. (submitted) Predictive equations for dimensions and leaf area of San Joaquin Valley street trees. *Tree Physiology*.

If we assume that trees are also planted at the edge of the parking lot to provide at least partial shading, less than 7% of the parking lot are would need to be devoted to tree planters to reach 50% shading in 15 years, again assuming that fast-growing trees with relatively large crowns are used. If tree crown diameter is only a bit smaller after 15 years (17.5 ft), a full 10% of the paved area will be required for tree planters to attain 50% canopy. Good data on actual sizes trees attained in parking lots under local growing conditions are essential for developing planting specifications that will result in desired levels of canopy cover. Further information and technical considerations related to parking lots and shade trees can be found at Center for Urban Forest Research website at http://wcufre.ucdavis.edu/park_ordinances.htm.

Commercial Benefits⁷

A study performed by Kathleen Wolf at the Center for Urban Horticulture at the University of Washington, Seattle determined that urban trees improve economic stability of retail environments by attracting businesses and consumers. Well maintained landscaping, including canopy trees, attracts consumers and increases their rate of return by setting a positive mood and sending messages of quality.

- In business districts with trees consumers are willing to pay 11 percent more for goods than in treeless districts.

⁷ Talking Trees: An urban Forestry Toolkit for Local Governments (USFS, 2006)

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- In addition, consumers give 30 percent higher ratings to the quality of goods, and 80 percent higher amenity and comfort ratings for tree-lined commercial streets.

Vehicles parked in the shade of a tree will have an interior temperature twenty to thirty degrees Fahrenheit cooler than a vehicle parked in the sun. This can increase the duration and frequency of consumer visits and their willingness to pay for parking.

Canopy versus Shade

A tree canopy shades the area under the tree. It also casts a shadow to the side away from the sun. The shadow receives a similar benefit as shade under the canopy but the relief is transitory as the sun moves. It is easier to specify tree canopy in regulations. It is also easier to measure and monitor canopy by aerial photography. While the terms may be used interchangeably in the parking lot tree ordinances, precise usage in code and educational materials avoids confusion.

Suggestions

The City of Davis, California is one of the pioneers of parking lot canopy regulations, setting a standard of 50% shading by tree canopy 15 years after development. Many communities including Sacramento followed suit with various shading requirements. Unfortunately, little or no enforcement over the years meant that Davis did not achieve their goals. Lessons learned from Davis, Sacramento, and other cities are instructive.

To increase tree canopy and shade, it will be necessary to increase tree numbers, provide more soil volume for tree roots, and establish a coordinated network of City staff and landscape professionals to ensure proper tree care. Successful implementation relies on clear policy formulation, concise regulations, ongoing education, and periodic enforcement. The following suggestions are intended to provide what a tree needs to grow—adequate space, soil, and water. There are also suggestions to evaluate parking requirements in order to reduce the amount of surface to be shaded.

- Establish an achievable standard for canopy coverage.
- Calculate canopy coverage by dividing canopy area by the area subject to the shade plan. Use a gross calculation including planters, sidewalks, and other non-parking areas.
- Compliance periods are generally 15-20 years.
- Consider a sliding scale for canopy coverage based on lot size. For example, trees in parking lots of 5 to 24 spaces must provide 30 percent lot shading; 25 to 49 spaces, 40 percent shading; and 50 percent shading must be attained in lots of 50 spaces or more.
- Require a shade plan and a shade calculation table.
- Define the area subject to the shade plan.

Parking Lot Tree Canopy

- Provide partial credit for overlapping and perimeter trees (more credit for trees on south and west perimeters).
- Do not allow trees not on the approved Tree List. Improve the Tree List if necessary.
- Be sure crown diameters are not overstated on the Tree List. Consider specifying more trees per area or greater canopy area as trees often underperform in typical parking lot conditions.
- List best practices for site preparation and tree planting such as soil preparation, amendments, irrigation, wind protection, and root barriers. Provide a tree planting detail.
- Increase tree well and planning island minimum dimensions to 8 feet.
- Require soil in tree wells to be excavated to a depth of 3 feet and amended as necessary.
- Consider the use of structural soils 12 inches under paved surfaces to allow root penetration without damage to the pavement and to retain parking spaces while increasing soil volume for trees in parking islands. This will benefit both the tree and long-term maintenance of the parking lot. Additional information can be found at: <http://www.hort.cornell.edu/departement/faculty/bassuk/uhi/pubs.html>
- To promote overall tree health, no more than 25 percent of the total planted trees should be from one species.
- Do not allow substitutions after the shade plan has been approved.
- Require irrigation for plant survival. These areas benefit most from tree shading of parking stalls in the summer due to higher temperatures.
- Plant trees to align with the parking stall lines to prevent their damage by car bumpers.
- Integrate vegetated swales into the facility to treat stormwater, promote infiltration, and increase soil volume for trees. These can be designed within planting islands and around the perimeter. These swales also serve as water quality filtration strips and can be an amenity on the site.
- Follow-up to ensure trees are actually planted, and not removed shortly after planting.
- Consider a warranty period of 3-5 years and financial security. The City would replant dead or damaged trees not replanted by owner within the warranty period.
- Evaluate required parking dimensional standards to reduce parking surfaces.
- Provide wider stalls for short term uses (turnover of five or more cars per day), and narrower stalls for long-term uses (turnover of one or two cars per day).
- Increase the minimum ratio of compact to full-sized spaces.
- Evaluate required parking ratios to decrease the number of unused parking spaces. Consider a maximum ratio. Consider options for peripheral and overflow parking with corresponding alternatives for landscaping, tree canopy, and surface.
- Reduce conflicts between trees, lighting and signage by coordinating location of trees, light poles, and signs. 1) Reduce the maximum height of parking lot light poles to the height trees are typically pruned for clearance. 2) Amend sign ordinances to allow

Parking Lot Tree Canopy

monument signs (eye-level signs located near the street) and promote site designs that locate businesses closer to the street and move parking behind the buildings.

- Create a checklist for periodic inspections for damage, disease, and infestation; staking; irrigation; and ground cover.
- A demonstration project and workshop would be instructive for 1) office staff who review and approve shade plans and parking lot plans, 2) landscapers who would plant and tend the trees, and 3) inspectors who look for common problems and deficiencies.

Additional Reading (all available online)

Trees, Parking and Green Law: Strategies for Sustainability; Kathleen L.; Wolf College of Forest Resources, University of Washington; February 2004.

Parking Lot Tree Shading Design and Maintenance Guidelines; City of Sacramento; 2003.

Sacramento's Parking Lot Shading Ordinance: Environmental and Economic Cost of Compliance; E. Gregory McPherson; Landscape and Urban Planning 57 (2001) 105-123.

Parking Lot Shading Guidelines and Master Parking Lot Tree List; City of Davis, California.

Parking Lot Shade Regulations: Review and Recommendations Prepared for the City of Davis; Jennifer Tso, Tree Davis, 2014.

Planting Trees in Parking Lots, Urban Watershed Forestry Manual Part 2: Conserving and Planting Trees at Development Site; Karen Cappiella; Tom Schueler, and Tiffany Wright; USDA Forest Service, Northeastern Area State and Private Forestry; 2006.

Program Considerations

The Development Code applies to new development and expansion of existing land uses. When tree canopy regulations are enacted, new parking lots would be the sole beneficiaries as well as a few existing parking lots through nonconforming upgrades. The vast majority of parking lots in the City would continue to have nominal canopy coverage if any at all. A more systematic approach would upgrade existing parking lots as resources are available from dedicated funding sources such as the soil and water conservation districts, urban renewal agency, and community development block grants. The maximum effect is achieved by targeting several parking lots in one area. Tree planting could be contracted to landscaping firms and inspection services could be contracted to retired individuals with the proper expertise, both administered by City staff.

Whatever direction a tree canopy program takes, a tree canopy will develop only through dedicated efforts to nurture young trees and manage older trees. Tree canopy establishment is an actively-managed process, especially in the early years of tree growth. Proper planting gives the tree the best conditions for a head start. Additional diligent effort is needed to establish the tree and maintain health and vigor.

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During the establishment phase in a tree's life cycle, primary growth occurs in the root system, with minimal growth in the canopy. The science of planting trees is aimed at encouraging this root growth and reducing post-planting stress. With good planting techniques and soil conditions, the establishment phase takes one growing season per inch of trunk diameter. On small trees (up to four inches in diameter), trunk diameter is measured at six inches above the soil line. That is, a one-inch caliper tree typically takes one year for roots to establish. A two-inch diameter tree typically takes two years. With poor planting techniques and/or poor soil conditions, the establishment phase may take many years. It is common to observe trees that never establish, but rather simply hang on for a few years and gradually decline. A significant increase in annual twig growth indicates that roots have become established and that the tree is shifting into the growth phase.⁸

The inspector has a significant role in the root establishment phase. The inspector would observe tree planting to verify conditions consistent with code standards and recommended best practices; and conduct a final inspection to test irrigation and confirm staking and mulch placement. The final inspection becomes the start date for the 3-5 year warranty period. Through the summer of the first growing season, the inspector would check irrigation and mulch. Through the winter of the first growing season, the inspector would check staking. In subsequent years until the end of the warranty period, the inspector would check irrigation and mulch and monitor tree health. At the end of the warranty period, the inspector would verify vigorous twig and leader development as signs of tree establishment.

A warranty period may be controversial for a low value item such as a tree planting (estimated cost \$500-\$1,500 per tree depending on site preparation), especially on private property. However the long-term public value of the tree canopy is justification for a warranty period to secure the owner's commitment to care for the tree. A warranty is a common method to secure performance. Examples of warranties related to land use and development include:

- The City requires a one-year maintenance bond as a warranty at the close of a Public Works project. Within the one-year maintenance period, the owner is responsible to repair or replace any defect at Owner's expense, or else the City calls the financial guaranty associated with the warranty to correct the defect.
- When it is necessary to mitigate for unavoidable impacts to wetlands, and the permittee elects to implement a mitigation project, the Oregon Department of State Lands requires monitoring and reporting for a minimum of five years and long-term stewardship of the mitigation site. The five-year warranty period is secured by a financial surety. The purpose of a financial security instrument is to guarantee the performance of the mitigation and provide to the Department financial resources to conduct the mitigation in the event of default of the mitigation obligation. A final signed financial security instrument will be required prior to permit issuance.⁹

⁸ Care of Recently Planted Trees, Garden Notes #635 (Colorado Master Gardener Program, Colorado State University).

⁹ Chapter 8: Compensatory Mitigation Planning for Wetlands and Tidal Waters - At a Glance (Oregon Department of State Lands, 2011)

Parking Lot Tree Canopy

- The Oregon Forest Practices Act requires replanting of seedlings that must be healthy and out-competing surrounding vegetation by the end of the fifth growing season following harvest. The Forestry Department reviews replanted sites and may cite, fine, or order the reforestation of sites that are not complying. The Forestry Department examines reforestation compliance annually. The Forestry Department may require a bond or other financial guarantee prior to authorizing an operation.¹⁰

¹⁰ ORS 527.760(2)