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# CITY OF TENINO

## STREET TREE PLAN

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*Prepared for*

**The City of Tenino**

and

**Thurston County Regional Planning Council**

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City of Tenino

## **STREET TREE PLAN**

### **Introduction**

The City of Tenino’s “physical and aesthetic character” will be enhanced with a long-term plan providing street tree ‘themes’ and space for trees. This street tree plan, coupled with creative landscape plantings and preservation of native trees in new developments, parks, critical areas, open spaces, and residential lots will insure that the environmental health, economic, and aesthetic benefits of trees to a community grow with time

Trees are one of the most useful design elements on individual projects, but must be planned on a community wide basis so that diverse elements of the entire city are linked. This linkage cannot possibly be achieved if urban forestry planning proceeds on a project by project basis. Space for trees must be created to achieve the long-term benefits that trees provide for the entire community.

Cities have embraced a combination of tree protection and tree planting to ensure that the hard concrete lines of development are softened by tree lined boulevards, curved and planted walkways, shady parks, and natural areas. These planted and protected areas are enhanced by the natural instincts of humans to plant trees around their dwellings.

As we continue to press on the edges of our native forests with our increasingly dense urban and suburban structure, the need to design for trees, implement sound tree protection practices, and create long-term planting plans becomes more and more critical.

By working to make our cities more comfortable and pleasant we instill pride in our citizens. Proud citizens will get more involved and work even harder to preserve, protect, and enhance our cities. This is the key to a livable city of the future.

### **Goals of the Street Tree Planning Process**

The following are the goals of the necessary street tree planning process:

1. **Modify street standards to provide space for trees.**
2. **Modify street tree design and planting guidelines to provide for long-term development and health of the trees.**
3. **Update the tree selection list to provide durable, long-term street trees.**
4. Require street trees to be planted on all public and private streets, and in all new industrial, commercial, and residential development.
5. Provide the budget necessary to maintain street trees.
6. Aggressively solicit funding to bring existing major and minor arterials up to this long-term plan.

Only items 1-3 are addressed in this report.

### **Methodology for Developing the Plan**

The evaluation of Tenino’s street tree conditions was undertaken through the following activities:

- Collection of maps, shapefiles, and aerial photos.
- Conducted an inventory and evaluation of the condition and locations of the street trees and open planting spaces on selected arterials and collectors as directed by Thurston County Regional Planning.
- Determine the appropriate tree species for use in the rights-of-ways for comprehensive street tree planning and develop street tree themes for use on the arterials and collectors.

## **Observations**

The first step in management of any resource is an inventory to determine the extent, condition, and needs of (in this case) the street tree community.

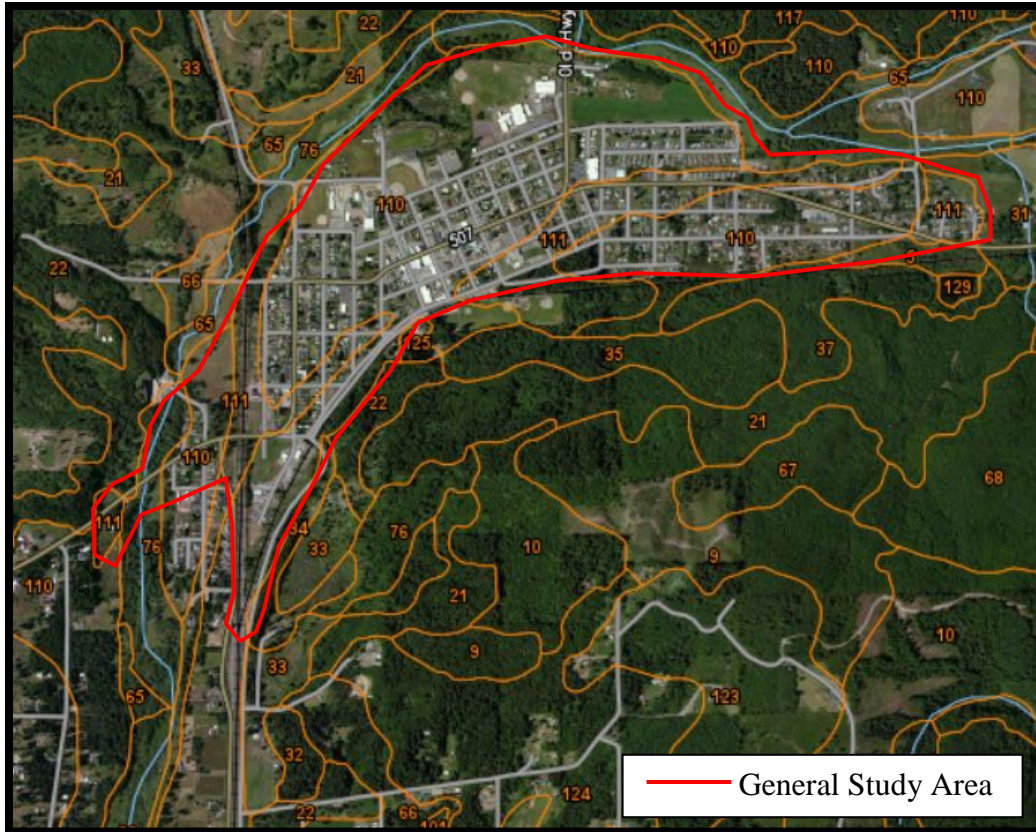
Since all life is rooted in the soil, geologic and soil survey information was examined to determine the physical characteristics of the soils in Tenino. The information pertinent to management of trees includes: general fertility levels, drainage, depth to root restrictions, organic matter contents, plant available water capacity, and windthrow potential. The suitability for wildlife, construction and engineering properties was also examined. This information was then considered when recommendations were made with regard to tree protection areas, tree species selection, and planting designs.

An inventory of the existing street trees on the rights-of-ways along the city arterials and collectors was done, as per Thurston County Regional Planning.

### **Soils and Site Information**

The topography of the study area was flat to gently sloping. The soils are predominantly formed in glacial drift deposited by the most recent of several continent-sized glacial ice sheets. The soils generally consist of compact basal till covered by a thin, discontinuous layer of ablation till.

Over 95% of the study area is on the Spanaway gravelly sandy loam soil type. This is a very deep, somewhat excessively drained soil found on terraces. It formed in glacial outwash and volcanic ash. Permeability is moderately rapid in the subsoil and very rapid in the substratum. The available water capacity for plants is low and the effective rooting depth for trees is greater than 60". Windthrow hazard is slight under normal conditions. Irrigation is necessary to establish new trees and shrubs. This is an intermediate to low productivity site for Douglas-fir and other native tree species.



**Figure 1. Soil Types (in the study area): 110, 111 = Spanaway gravelly sandy loam**

Due to the gravelly, infertile, and droughty nature of the Spanaway soil type, amendment with a silt loam, or silty clay loam topsoil is required to establish new street trees in Tenino.

### The Street Tree Inventory - Designated Arterials and Collectors

The aerial photo in Figure 2 illustrates the locations of existing street trees and open planting spots in the study area. The street trees included planted street trees, trees planted by neighbors in the street tree zone, and native trees in the street tree zone. The street tree zone is simply the area along the edge of the street rights-of-way.

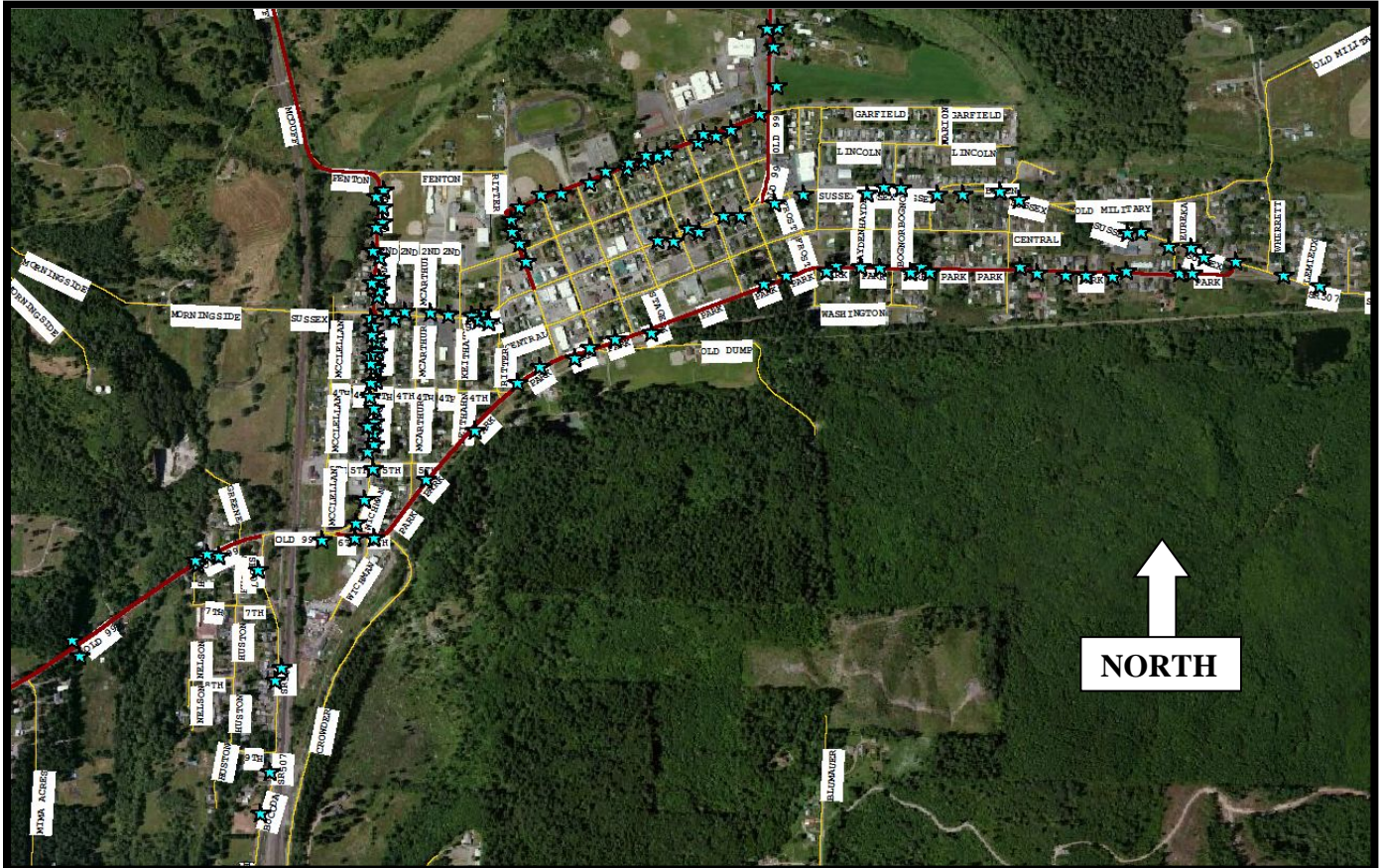


Figure 2. Street tree survey. Each star is an existing street tree or open planting spot. Larger scale maps are included in Appendix II.

The study area included the following arterials and collectors:

- SR507//Sussex Ave.
- Old Highway 99
- Park Ave.
- Wichman St. North
- Howard St. North
- Garfield Ave.

A 100% inventory of existing trees and open planting spots was conducted. Information on tree species, size, condition, and the planting site was collected.

We found 11 species of trees on the rights-of-way (Appendix I). They included a mix of planted trees and native trees in the street tree zone. Hawthorne and flowering plum were the predominant street tree species, with all other species being planted by adjacent landowners, or native trees. The planted street trees ranged from 2 to 10 inches diameter

(measured at 4.5 ft. above the ground line). The other street trees or native trees ranged from 5-28 inches DBH.

The Hawthorne street trees were mostly in ‘Poor’ condition and the flowering plums were mostly rated in ‘Good’ condition. Overall, 22% of the street trees were rated in Good condition, 28% in Fair condition, and 50% in ‘Poor’ condition. Most of the trees in ‘Poor’ condition exhibited major dieback.

**Table 1. Summary of existing trees, tree conditions, and open planting spots on the arterials and collectors in the study area.**

Species	DBH Range (in)	Tree Condition			Total
		Good	Fair	Poor	
Hawthorne	4-10	1		13	<b>14</b>
Flowering Plum	2-7	6	1		<b>7</b>
Cherry	3-10		3	2	<b>5</b>
Bigleaf maple	14-28		1	1	<b>2</b>
Other deciduous	4-5		2		<b>2</b>
Dogwood	7		1		<b>1</b>
Apple	8		1		<b>1</b>
Crabapple	7			1	<b>1</b>
Honey locust	13			1	<b>1</b>
Magnolia	4		1		<b>1</b>
White pine	11	1			<b>1</b>
<b>Total Trees</b>		<b>8</b>	<b>10</b>	<b>18</b>	<b>36</b>
<b>% Composition</b>		<b>(22%)</b>	<b>(28%)</b>	<b>(50%)</b>	
Open Planting Spots					139
Trees/Spots Under Powerlines					94

Our survey found a total of 36 existing street trees and 139 open planting spots (94 under powerlines). Close to 80% of the street tree zone is not stocked with street trees, but potentially could be planted. Some planting spots will require design changes to the rights-of-way to accommodate the trees, however many open spaces occur in the curblawn zones (planter strips). This means that space will need to be created for trees in planter strips, grates cut into sidewalks, bump-outs created on street edges, or space behind sidewalks must be improved for trees.

Figure 3. # Trees vs. Open Planting Spots



Diversity is key in any urban forest. This helps insure that entire urban canopies are not wiped out by common maladies, such as what the Dutch elm disease did to many elms across the U.S., the chestnut blight on American chestnut, and ash decline on several species of ash. Emerald ash borer is likely the next invasive species for our area that will cause major damage.

As a rule of thumb, no more than 10-15% of the urban tree population should be of the same species. Some tree species such as red maples, green ash, London plane, and sweetgum tend to be over planted in the Pacific Northwest urban areas and should be limited or not used.

Selection of cultivars resistant to known insect or disease problems help to insure that mortality will be limited if outbreaks occur. Ice and snow storms, wind storms, or extended droughts also may impact some tree species differently. Diversity is the key to minimizing damage from abiotic and biotic influences.

There is adequate space in many locations on Tenino streets for larger scale street trees. Many of the best and longest lived street trees are the larger tree varieties. Many of the small flowering tree species are plagued by leaf diseases, twig blights, cankers, and other problems and are short-lived. Hawthorne is one of these species that is often heavily impacted by disease. Even some resistant cultivars will still have problems.

It is recommended that the existing species selection for street trees be modified to improve the quality of the Tenino street trees.



## City Street Tree Maintenance and Recommendations

The 26 street trees (hawthorns, cherries, and flowering plums) maintained by the City of Tenino are generally described as being young and in ‘Poor’ to ‘Good’ condition. Many of these trees are in poor health due to being topped to avoid contact with overhead communication or power lines. The flowering plum trees on South Wichman Street are good examples of healthy street trees beneath power lines. However the turf grass is growing too close to the trees, and tree spacing is too close.



**Photo A. View of existing flowering plum trees on Wichman St.**

Normally, in cities with more and larger trees, all work is prioritized based on the urgency of the work. In our evaluation, we recommend removal of and replacement of 13 of the hawthorns, and two of the cherry trees due to poor health. The following is the recommended prioritization for future street trees.

- **Priority 1 Tree Removal:** Trees designated for removal have structural defects that cannot be cost-effectively or practically treated. The majority of the trees in this category have a large number of dead branches which present a safety hazard. Removal of these branches would leave a severely deformed tree, the live crown would be reduced to the point that mortality was sure, or that the tree is already in irreversible decline. Removal of trees before they are dead and in severe decline helps to prevent property damage or injury, and the tree removal is safer and theoretically less costly for a tree service to remove.
- **Priority 2 Tree Removal:** Trees on public property that are recommended for priority removal should be removed after priority one removals are completed. These trees may be in irreversible decline, but are still structurally sound.
- **Priority 1 Large Tree Pruning:** Trees are recommended for priority one pruning if there is a need to remove hazardous deadwood, hangers, cracked or broken branches. If conditions cannot be determined from the ground, then a lift truck or climber may need to be employed to do a closer inspection of the above ground parts.
- **Priority 2 Small Tree Pruning:** These trees require routine corrective pruning to establish scaffold branches and to raise crown for sidewalk or street clearances. Corrective pruning should be minimal after planting, and should remove crossing, damaged, and extra branches. Pruning for street clearances and sidewalk clearances depends on the length of the crown and growth rate of the tree.
- **Priority 3 Monitor:** Tree has structural defect that cannot be repaired, or is showing minor symptoms of decline. Tree should be monitored in spring after leaf-out and fall before leaf drop and a prescription for care developed.
- **Planting Spot:** This category indicates a vacant planting spot or a stump where a previous street tree had died.

The causes for tree decline and mortality in a city are many and varied. Planting shock or lack of irrigation are the most common causes of mortality for newly planted trees. The gravelly soils in Tenino present a harsh environment for trees even when amended.

The next most common cause of mortality is man-caused injury. Weed eater damage, lawnmowers, bicycles tied to trees, trees vandalized, root disturbance, or run over by cars are the most common reasons newly planted trees failed. Insect or disease problems usually are a problem in later years, unless a tree was infected with disease or infested with insects in the nursery.

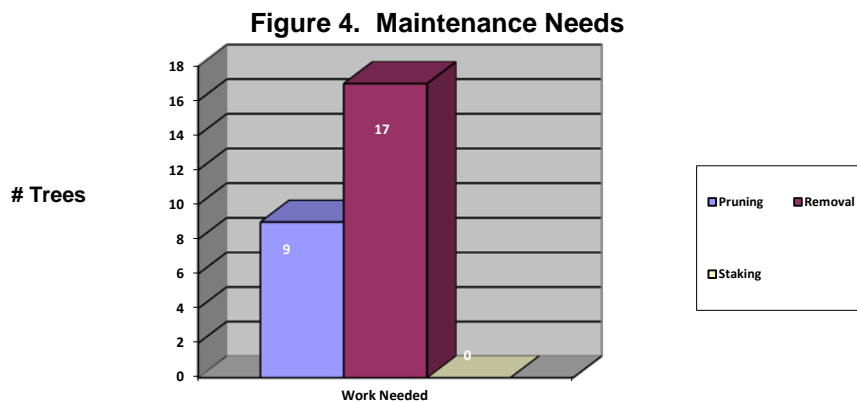
It is important to remove and replace dying trees quickly to eliminate inoculum from disease or insect infestations, to maintain aesthetic quality, and to get a new tree established and growing to maintain some uniformity of the planting.

Maintenance needs by priority is described below. Work should be accomplished by priority. This may require specialized tree contractor to deal with some of the larger hazard trees. Most of the small tree work can be accomplished with city staff.

All small street trees should be inspected on a 3-year cycle. This helps to assure that pruning is accomplished on a timely basis, that damage, decline, mortality, or other problems are addressed quickly. Decline and other insect or disease problems can be identified and control methods implemented before the tree is a total loss.

Individuals that maintain weeds near the bases of trees, mow curb-lawn zones, and that do tree maintenance should be trained to recognize tree problems before they result in mortality.

All pruning should conform to the ANSI A300, Standard Practices for Trees, shrubs and Other Woody Plant Maintenance (2011). This is the recognized standard for all tree care. All pruning should be completed by an International Society of Arboriculture Certified Arborist®, or be supervised by one. It is recommended that at least one staff member of the parks maintenance staff become certified.



### Condition of the Street Trees

A condition rating was assigned to each tree to help assess the health of the street trees. The ratings are adapted from the *Plant Appraisal Guide* (2000), published by the International Society of Arboriculture. The condition of the foliage (if present), twigs, scaffold branches, stem, and roots is assessed, along with any hardware (stakes, cable and bracing) present in the tree. After the tree is evaluated it is rated as: Excellent, good, fair, poor, or dead.

Trees that are rated as dead or poor are usually recommended for immediate removal and replacement. Large trees rated as very poor usually are in irreversible decline due to root disturbance or some other factor. Small trees rated as very poor usually did not establish, or have been severely damaged since planting. Quick replacement of these trees simply gains a year of establishment and growth.

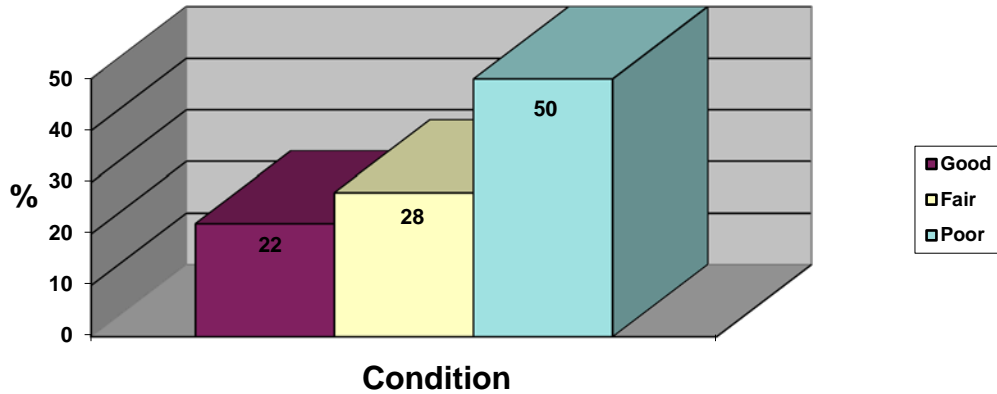
Trees rated as fair and good may need minor cultural care and are expected to be long-term trees. Trees rated as excellent are expected to be long-term trees and require no care at this time.



**Photo B. View of Mt. Ash trees in ‘Poor’ condition on city property adjacent to Park St.**

Approximately 50% of Tenino’s trees were rated as Fair to Good. The following graph provides a summary of the condition of the city trees.

**Figure 5. Condition Classes (%)**



Based on this data, removal and replacement of low vigor trees is recommended, since pruning will not improve tree health.

### **Priority Pruning**

Pruning of any safety hazards should be completed first, followed by the routine maintenance pruning. The routine maintenance pruning should be completed in the dormant season between October 1st and February 15th.

All pruning should conform to the ANSI A300 (2001) *Standard Practices for Trees, Shrubs and Other Woody Plant Maintenance*. This is the standard for proper tree care. All pruning should be done by an International Society of Arboriculture Certified Arborist®.

When contracting with a professional tree service, it should be specified in the contract that they observe the safety guidelines for tree care operations: ANSI Z133.1 - 2001 -- *Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush -- Safety Requirements*.

### **Clearance Requirements**

The types of situations where trees can interfere with visibility include: signs, sidewalks, buildings, street lights, stop lights, or sight distances for pedestrians and motorists. In all cases trees can be pruned to provide adequate clearances.

Trees and other vegetation should be *monitored annually* to identify these types of safety hazards. The annual inspection of all rights-of-way is recommended for about June 1 when the first flush of deciduous tree growth begins to slow. Trees and other vegetation that are close to these signs will begin to obscure site distances and visibility. A second inspection is also recommended for early September, after vegetation growth is complete, but before leaf drop.

The tree that requires clearance pruning should be inspected and pruned for clearance immediately. This should include native vegetation encroaching onto the streets and sidewalks as well as planted street trees.

Sidewalk overhead clearances should be a minimum of 8', but 10' is recommended. Pruning on smaller trees may need to be done over a 3-4 year period to achieve these clearances and avoid stress on the trees. Trees with thorns are especially a hazard. Generally, trees with thorns should not be planted as street trees. Where pruning for sidewalk clearance dramatically changes the look or shape of the tree, notification of the tree owner is recommended. As an option, they could be notified to prune their own trees to provide clearance with a time-frame before the City completes the work.

Street clearances must be maintained to prevent damage to vehicles and to the trees, and to maintain sight distances. A height of at least 15 feet needs to be maintained to the first branches. Any branches hanging lower will be torn off by trucks.

Trained city staff will recognize these clearance problems and correct them during routine maintenance. As a rule of thumb, branches should be pruned before they reach a diameter of 2" at the branch bark collar. This minimizes the wound size and allows a tree to quickly callus over the wound, protecting tree health.

Where branches of private trees encroach into the city rights-of-way, the city can only prune to the rights-of-way edge. In some cases this will leave stubs or unsightly branches that will die back. To maintain tree health and appearance it is recommended that all pruning cuts be made to the nearest lateral branch. Where pruning beyond the rights-of-way edge should occur to protect tree health, then landowner permission is recommended.

### **Overhead Utilities**

The presence of overhead utility wires was noted for 94 (over 50%) of the existing trees and open planting spots. Many of the trees had been crown reduced for the overhead powerlines. Tall growing tree species under powerlines will require repeated pruning to maintain reliability and safety for the public. Only trees with a mature height of 20' or less should be planted under utility lines to avoid costly pruning and deformation of the appearance of trees.



**Photo C. Planter strips under power lines. Space is there for utility friendly trees.**

When these crown reduced trees are replaced due to mortality or other problems in the future, ‘Utility Friendly’ trees should be planted in those planting spots. A list of ‘Utility Friendly’ trees is provided in the section on street tree selections.

### **Curb Lawn Zone Widths**

It is recommended that the designs for all new city streets include a curb lawn zone (the area between the sidewalk and the street) with a minimum width of 5 feet. Six to 8 feet is the more optimal width.



**Photo D. View of open planting spots in Tenino.**

In many cases, especially where large, canopy forming trees are desired, planting the street trees behind the sidewalk is the best location. This moves trees away from the street edge, reducing car damage, pruning for clearances, and will reduce sidewalk damage. Overhead utilities are less of a problem with these planting locations. Private easements for street trees can be obtained.



## **Maintaining the Safety of the Street Trees**

Annual evaluation of larger trees on and adjacent to rights-of-ways is necessary to identify developing hazard trees and to identify clearance pruning needs. This can normally be done with a windshield survey.

## **Removals**

The small street trees recommended for removal are less of a hazard, but should be scheduled for replacement due to poor health and aesthetics.

The average lifespan of an urban street tree varies from 7 to 18 years. Mortality will be ongoing, and replacement should be completed during the next planting season.

Trees that require removal can be removed by city crews or on a lump-sum bid contract with private tree services. It is recommended that all large tree work and other difficult removals be handled by skilled contract tree professionals. Small tree pruning can effectively be handled by city staff.

When crews begin to remove hazard trees, public notices should be posted to avoid concerns by citizens. Much anxiety and public concern can be avoided if citizens understand that only hazard trees are being removed.

## **Sidewalk Damage**

The majority of the street trees in Tenino are smaller trees, so sidewalk heaving is not yet a major problem. However, there will need to be some annual repair activity anytime trees grow near sidewalks or curbs.

Potential problems with new plantings can be minimized by use of root barriers along curbs and sidewalks to deflect or direct roots deeper. This will defer, and with proper tree selection, can eliminate heaving problems.

Where roots of large native trees or ornamental trees adjacent to sidewalks begin to cause heaving, care must be used to avoid severe damage to the tree. Cutting of large lateral anchor roots can cause stability problems, may cause decay, and will reduce the lifespan of the tree.

Minor heaving can be temporarily repaired with an asphalt bridge between the lifted section of concrete, or the lifted edge can be ground flush. As the deflection of the section continues to rise, replacement of the section will be required. A decision to cut the root or bridge the root must be made at this time. If at all possible it is recommended that root cutting be avoided. Curving the sidewalk, leaving a cutout for the root, or raising the grade of the sidewalk to go over the top of the root is recommended. These decisions must be made on a case by case basis. Trees in poor condition, or that would be made hazardous by the activity should be considered for removal.

## Open Planting Spots

The following specifications are to be used to identify an open planting spot:

- A minimum of 5' is needed for a plantable area.
- The minimum distance to the adjacent planted trees is 25'.
- All planting spots are at least 25' away from intersections.
- All planting sites are at least 10' away from fire hydrants, driveway, utility poles and street lights.
- All planting sites are at least 10' away from any visible or identifiable underground electrical vaults.
- Planting spots with overhead (electrical conductors) or side restrictions for growing space are identified.
- Planting behind the sidewalk is preferable to narrow (4') planting spots in many cases. This may require private easements to establish medium to large street trees.

Knowing the numbers of open spots, coupled with a street tree plan with recommended species easily allows preparation of grant proposals for additional tree planting funds. Having good, demonstrable data on the urban forest will improve success in acquiring grants. These projects are also excellent to get citizen involvement.



**Photo E. View of a well-designed planter strip, however tree wells are not adequate – turf is too close to tree's rootball.**

## The Street Tree Planning Process

The process of street tree planning encompasses all aspects of street design, soils and tree biology, planting, maintenance, and ordinances that affect street trees.

### Planting Design Patterns (Themes)

There are four general designs for planting trees in the community. The type of design depends upon space available, both above and below ground, presence of other native tree stands, the character of the area, and effect desired.

1. **Formal Design:** This approach is strongly advocated to provide spatial definition to street corridors, and continuity between different types of areas within the city. This type of planting scheme works well in grid type street designs and long, linear corridors that lack space for groupings of trees. Trees are normally planted in rows. Species diversity is usually limited, but not so limited that monocultures are created.
2. **Informal Design:** This approach utilizes clustering, planting a variety of species, with irregular spacing intervals by design, or because of space limitations. This design is more often applicable in suburban areas or newly developing areas where space can be created on and off of rights-of-ways for tree plantings. It can however, be used in virtually every zone of the city achieving more species diversity. Informal plantings are most common in parks, and along park corridors.
3. **Combined Design:** In some cases, informal plantings can be used to break-up the more formal rows of trees, where space is provided. This is especially useful in commercial and industrial areas to help break up the moonscape of asphalt and buildings. Plant size, shape, color, seasonal flowering, fall coloration and growth rates are the most critical factors to consider when combining planting designs.
4. **Wildlife Design:** This concept utilizes clusters, layers of vegetation, and a variety of species of trees and shrubs to attract songbirds and small mammals. This design is best utilized near critical areas or other open spaces, and in parks. Safety and security must be considered when creating these types of dense plantings. Most trees with higher value for wildlife trees are not suitable for the street environment due to size, form, or fruit production.

### Mature Tree Size

Street tree plantings are limited by space. Large trees require wide planter strips or areas for the tree roots to explore to avoid damage to curbs, sidewalks, and underground utilities. Powerlines, adjacent buildings, overhanging awnings, and vehicle clearances are the most common above ground restrictions to growing space. Planting a tree with space to achieve its mature size will greatly increase the aesthetics and useful life of the street tree, while dramatically reducing the maintenance costs.

### **Longevity of the Species**

Communities must fight the urge to plant fast growing tree species such as soft maples, poplar, and birch. Generally the fast growing tree species have shorter life-spans, are more easily damaged by storms, and cause more damage to curbs and sidewalks. This results in higher maintenance costs, requires replacement of trees years sooner, and upsets the visual and spatial continuity of the planting. Species such as Norway and sugar maple, linden, northern red and other oaks, and ash species tend to be more durable long-term trees.

### **Tree Character**

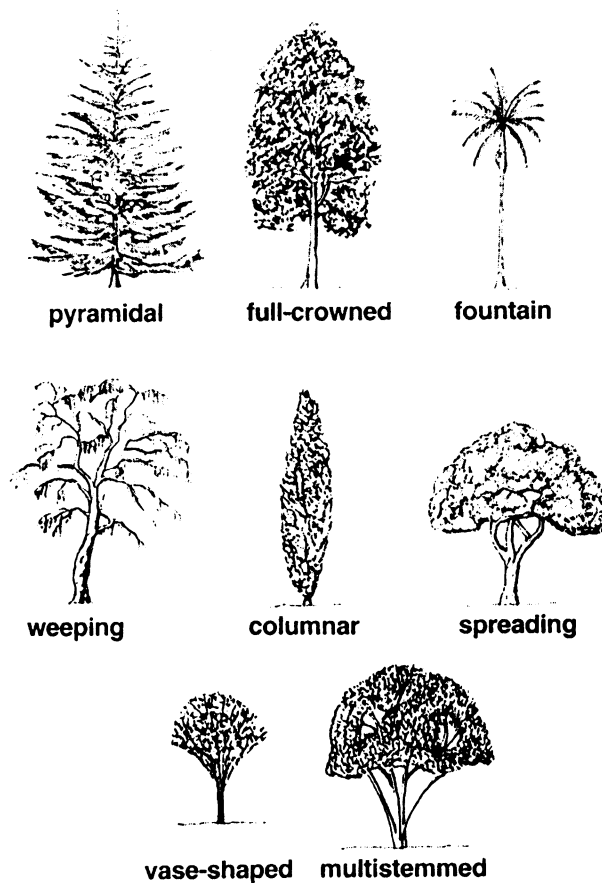
The color of summer and fall foliage, presence of flowers, shape of the crown, color of bark, type of foliage and habit of branches (weeping, upright) give trees their color, texture, and form. These characteristics, along with size, longevity and growing space should be considered when selecting trees for all projects.

These tree characteristics should complement building architecture, define streets and sidewalks, accent adjacent landscaping, and add diversity along Tenino streets.

Trees are defined as having form that is:

1. Columnar
2. Round- full crowned, or spreading (upright, oval, globose)
3. Pyramidal (conical)
4. Vase shaped
5. Weeping
6. Irregular
7. Multi-stemmed
8. Fountain

Multi-stemmed trees are less desirable for street trees due to line-of-sight obstruction and sidewalk clearances. In most cases, tall growing trees are best since it is easy to raise crowns for ground and vehicle clearances. Signs for adjacent businesses can be exposed by crown raising. Ground signs work well with trees.



**Figure 6. Illustration of Tree Shapes.**

The form is critical in selecting trees to fit the growing space, and providing amenities such as screening of incompatible land uses or unsightly buildings, protecting views of vistas or signs, or lining streets in formal designs.

The summer color of a tree generally includes hues of green or shades of red or maroon. Reddish color summer foliage is used to break up the monotony of a formal, linear street tree planting, or accenting an informal design. Long rows of reddish foliage are considered more monotonous than facades created by tall, green canopies.

Fall color is more often considered when selecting seasonal color. Contrasting yellow fall coloration with occasional red or orange colored trees (or vice versa) catches the eye and stirs the ‘ooh and aah’ emotion common to the finale of a fireworks display.

The texture of a tree is not just apparent between conifers and deciduous trees. It varies greatly between deciduous tree species with simple leaves of differing shapes such as oaks and maples, to compound, bi- and tri-pinnately compound leaves on ashes, locusts, and mimosa. Subtle color differences accentuate the differences between leaf shapes.

Conifers also vary greatly in texture. Needle color, length, density, shape, and presence of cones create startling contrasts between tree species. Consider the differences between western red cedar, western hemlock, Douglas-fir, noble fir, and western white pine. All are strikingly different and can create attractive clusters in informal, combined, or wildlife plantings. When combined with deciduous accent trees, year-round beauty is created.

### **Hardiness to the Pacific Northwest**

The temperate climate of Tenino (hardiness zones 7-8 - USDA Hardiness Zone Map) allows many tree species to thrive, though some insect and disease populations also are well suited to the climate. Most of our common and most valued street tree species are native to the Midwestern and eastern United States.

Genetic selection is constantly improving the trees available from nurseries, as is the knowledge of growing them. Some cultivars of Pacific Rim species can further improve the disease resistance of small trees available for use on Tenino streets.

### **Diversity of Street Trees**

It is very important to avoid over planting a single species. We learned from Dutch elm disease and Chestnut blight to populate our cities with a diversity of tree species. Threats from ash decline, an actinomycete that threatens red maple, sudden oak death, oak wilt, gypsy moths, and other maladies will require that urban foresters be vigilant.

### **Tree Selection**

The following selection of trees in Table 2 is suitable for planting as street and landscape trees within the city of Tenino. This list includes large, medium, and small size trees for planting in all types of growing spaces. Species of flowering trees are selected based upon their colors and resistance to insect and disease problems, and low amounts of plant debris.

Species include red, orange, maroon, and yellow fall coloration. There is however, a great variation as to the timing and interval of fall leaf drop. For example, green ash cultivars turn yellow and drop their leaves within a week, while cultivars of white ash will have maroon leaf color, and may persist for 2-3 weeks. Unfortunately, leaf drop is not something that can be controlled if diversity is desired in street tree populations.

Trees that hold and drop leaves all winter long (such as pin oak and sweetgum) are to be avoided. Severe damage has occurred to sweetgums from early snowfalls and ice storms. Most sweetgum varieties will hold their leaves until the end of December (occasional exceptions). While their fall coloration is exceptional, planting more than a few accent trees should be avoided until cultivars with earlier leaf drop are available.

The following is a general list of tree species that should be considered Tenino’s Street Tree List. All commercial, industrial, and residential projects should utilize this list. Selections should be in concert with the continuity provided by existing trees planted on adjacent portions of the street. Where existing street trees are of an undesirable, unhealthy, or inappropriate species, consideration should be given to re-treeing the entire area.

In short, trees can be chosen on a project basis, but must fit the overall plan for what has already been planted, or will be planted as part of the overall comprehensive street tree plan. More specific street tree themes will be provided for all major and minor arterials, and collectors in Table 3.

**Table 2. General list of trees for Tenino.**

COMMON NAME	BOTANICAL NAME	CULTIVAR	MATURE HEIGHT	CROWN SPREAD	SPACING	FALL COLOR
<b>Large &gt;50’ Tall</b>					40-50’	
Autumn Purple Ash	<i>Fraxinus americana</i>	Autumn Purple	50’	35’		Maroon
Sugar Maple	<i>Acer saccharum</i>	Commemoration	60’	35’		Yellow
Greenspire Linden	<i>Tilia cordata</i> ‘Greenspire’					Yellow
Northern Red Oak	<i>Quercus rubra</i>					Red, burgundy
Scarlet Oak	<i>Quercus coccinea</i>		60’	40’		Red, orange
<b>Medium-Narrow Crowns 40-50’ Tall</b>					25-35’	
Bowhall Red Maple	<i>Acer rubrum</i>	Bowhall	40’	15’		Orange
Parkway Maple	<i>Acer platanoides</i>	Columnar-broad	40’	25’		Orange
<b>Medium – Wider Crowns 40-50’ Tall</b>					35-40’	
Norwegian Sunset Maple	<i>Acer truncatum x A. platanoides</i>	Keithsform	45’	35’		Burgundy, red, orange
Summit Ash	<i>Fraxinus pennsylvanica</i>	Summit	45’	25’		Yellow
Patmore Ash	<i>Fraxinus pennsylvanica</i>	Patmore	45’	35’		Yellow
October Glory Red Maple	<i>Acer rubrum</i>	October Glory	45’	35’		Orange
Honeylocust	<i>Gleditsia triacanthos</i>	Shademaster	45’	35’		Yellow
Red Horsechestnut	<i>Aesculus x carnea</i>	Briotti	30’	35’		Yellow
Autumn Gold Ginkgo	<i>Ginkgo biloba</i>	Autumn Gold				Yellow
<b>Small Trees &lt;35’ Tall</b>					25-40’	
Pacific Sunset Maple	<i>Acer truncatum x A. platanoides</i>	Warrenred	30’	25’		Red, burgundy, orange
Black Tupelo Gum	<i>Nyssa sylvatica</i>		35’	20’		Orange, red
Crimson Sentry Maple	<i>Acer platanoides</i>	Crimson Sentry	25’	15’	30-40’	Purple
Snowgoose Cherry	<i>Prunus spp.</i>	Snowgoose	20’	20’		Reddish
Spire Cherry	<i>Prunus x hillieri</i>	Spire	30’	10’		Reddish

City of Tenino – Street Tree Plan

COMMON NAME	BOTANICAL NAME	CULTIVAR	MATURE HEIGHT	CROWN SPREAD	SPACING	FALL COLOR
Flowering Crabapple	<i>Malus spp.</i>	Snowdrift, Red Baron, Prairiefire	20'	20'		Reddish
Japanese Snowbell	<i>Styrax japonicus</i>		25'	25'		Yellow
Rustica Rubra Saucer Magnolia	<i>Magnolia soulangiana</i>	<i>Rustica Rubra</i>	30'	15'		Burgundy
Rocky Mt. Maple	<i>Acer grandidentatum</i>	Schmidt	25'	15'		Red, orange
Galaxy Magnolia	<i>Magnolia spp.</i>	Galaxy	30'	15'		Yellow
Golden Desert Ash	<i>Fraxinus oxycarpa</i>	Aureafolia	20'	18'		Yellow
Chinese Kousa Dogwood	<i>Cornus kousa</i>	Chinensis	20'	20'		
Serviceberry	<i>Amelanchior x grandiflora</i>	Autumn Brilliance	20'	15'		Red, maroon
Flowering Plum	<i>Prunus cerasifera</i>	Thunder-cloud	20'	20'		Purple
Paperbark Maple	<i>Acer griseum</i>		25'	20'		Red
Tatarian Maple	<i>Acer tatarian</i>		25'	20'		Yellow, orange
Trident Maple	<i>Acer buergeranum</i>		20'	20'		Red, orange
Flame Maple	<i>Acer ginnala</i>	Flame	20'	20'		Orange, red, deep red
David's Maple	<i>Acer davidii</i>		30'	25'		Yellow
Sargent Cherry	<i>Prunus sargentii</i>		30'	30'		Reddish
<b>Small Trees – Narrow &lt;35' Tall</b>					25-30'	
Redmond Linden	<i>Tilia americana</i>	Redmond	35'	25'		Yellow
Pyramidal European Hornbeam	<i>Carpinus betulus</i>	Fastigate	35'	25'		Yellow
Hedge Maple	<i>Acer campestre</i>	Evelyn	35'	30'		Yellow
Callery Pear	<i>Pyrus calleryana</i>	Redspire or Cleveland Select	35'	25'		Red, maroon
Red Cascade Mt. Ash	<i>Sorbus americana</i>	Dwarfcrown	18'	8'		
Japanese Tree Lilac	<i>Syringa meyeri</i>	Palibin	7'	5'		

\*Other species or cultivars may be appropriate but must be approved by the City of Tenino.

If conifers are used in informal plantings, then the following species are appropriate for use in Tenino:

- Western red cedar (*Thuja plicata*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Giant sequoia (*Sequoia gigantea*)
- Alaska Yellow Cedar (*Chamaecyparis nootkatensis* and 'Pendula')
- Austrian pine (*Pinus nigra*)
- Deodar Cedar (*Cedrus deodara*)
- Shore Pine (*Pinus contorta* var. *contorta*)
- Western white pine (*Pinus monticola*-blister rust resistant cultivars)



All trees planted as street trees and other landscape trees in Tenino should meet the standards defined as the American Standard for Nursery Stock (ANSI Z60-1-2004). This standard specifies height, caliper, and rootball diameter standards for nursery stock. It also provides standards for container stock and shrubs.

In addition to specifying that stock meet the ANSI standard, the stock should have 1) strong central leaders for all but small, spreading trees, 2) show evidence of cultural pruning by the nursery, including corrective pruning and crown raising, 3) be free of damage from nursery lifting and shipping to site, 4) be free of insects, diseases, and other pests, and 5) the rootball should be intact, not broken from rough handling.

The trees should not be picked up from the nursery until time to plant the trees. Most project sites are not set up to protect trees from freezing temperatures, drying, vandalism, theft, and other maladies. If they are brought in early, all balled and burlap material should have rootballs covered with sawdust or clean woodchips, and irrigation must be provided daily in absence of rains (except during the dormant season). During the dormant season the woodchips or sawdust must just be kept moist. Container stock must be irrigated daily during the growing season. The trees must be monitored closely. Holdover time should be minimal (less than 1 week if possible).

Trees must be handled carefully when they arrive from the nursery to avoid stem and branch damage, and to avoid breaking the rootball. Plan the operation to minimize handling of the trees. If the rootball is broken, then consider that the tree is now a bare root tree, and the potential for survival and rapid establishment has been greatly reduced. Do not accept broken root balls from the nursery.

If trees are included as part of a contract, provide detailed specifications to prevent planting of inferior or damaged trees. Do not be afraid to reject trees due to poor quality. A detailed tree specification for use on projects is provided in Appendix III.

To help insure that proper size of high quality trees of the desired species are procured for street projects, it is recommended that the City of Tenino procure their own trees and bid only the installation of the trees on projects. For large future projects, it is recommended that a reputable nursery be contracted to provide the species, quality, and numbers of trees needed for the project. Tree quality will be greatly improved and the street tree design plan will continue to move in the planned direction.

### **Street Tree Themes**

The following street tree themes are recommended to provide tree-lined corridors, canopies over the streets, and linkages between differing zones in the city. Detailed descriptions are provided for what were determined to be the highest need, and highest profile areas. The remainder of the arterials and collectors are described in Table 3.

#### SR507/Sussex Avenue

This stretch of highway includes the downtown core plus more open rural residential land uses on either end of town.

There is little existing tree planting space within the downtown core. The sidewalks abut the building frontages and are narrow. There is no space for trees in grated planter pits. The only potential to establish new trees in the downtown core is to create ‘bump-outs’ along the sidewalk/street edge, at the expense of parking. These types of bump-outs are common in cities today, and have a calming effect on traffic.



**Photo E. View of downtown core from the west to the east. No space for trees unless created. Illustrates potential bump-out traffic calming structure with space for a tree.**



**Photo F. View of an actual bump out constructed on busy street.**

The street profile for almost the entire corridor is a 2 lane highway with sidewalks abutting the curbs. There is space for trees on the parking strip abutting the highway, but no space in the sidewalk or behind the sidewalk.

It is recommended that canopy forming trees be planted on 35 to 50 ft. centers in bump-outs along both sides of the highway in the downtown core. Where store awnings or building frontages prevent the planting of a tree with a wide canopy, then trees with narrower or columnar crowns could be used. It is important to minimize mixing tree species to provide linkage and continuity between the east and west ends of town.

The design should establish trees on a wide spacing, incorporating 3-4 different canopy forming and flowering tree species along the way. There are additional obstacles to a uniform design, including distribution and transmission power lines along portions of the route.

Where there is space behind the sidewalk outside the downtown core, then trees can be planted on private property.

Summary: Planting design – Formal

Primary street tree species – Northern red oak

Secondary street tree species – Autumn purple ash

Secondary columnar tree species – Parkway maple

Accent tree species – Snowgoose cherry

Utility Trees – Kousa dogwood, ‘Snowdrift’ flowering crabapple

This planting scheme, coupled with replacement of some poor quality trees and creation of additional planting spots will change this Sussex Avenue/SR507 into a tree lined corridor. The green canopy of foliage and splendid fall coloration will warm the appearance of the street and traffic will slow. Businesses and residents will find this will be a friendly and comfortable street to shop, walk, bike and jog along, most unlike the stark conditions today. The linkage between the east and west ends of town complete.



**Photo G. Plenty of space for trees, with some overhead powerline restrictions.**

The following table provides a summary of the proposed street tree themes for all major and minor arterials and collectors in Tenino.

**Table 3. ‘Street Tree Themes’ for all major and minor arterials and collectors.**

STREET	SEGMENT		PRIMARY TREE	SECONDARY TREE	ACCENT TREE	UTILITY TREE
	FROM	TO				
SR507/Sussex Ave.	City Limits	Old 99	Northern Red Oak	Summit Ash	Galaxy Magnolia	Autumn Brilliance Serviceberry
SR507/Sussex Ave.	Old 99	Ritter	Parkway Maple	European Hornbeam	Japanese Ivory Silk Tree	Trident Maple
SR507/Sussex Ave./Wicham/6th	Ritter	City Limits	Black Gum	Redmond Linden	Flowering Plum	Paperbark Maple
Old Highway 99	SR507/Sussex Ave.	City Limits	Autumn Purple Ash	Columnar Tuliptree	Snowgoose Cherry	Snowgoose Cherry
Park Ave.	Crowder Rd.	SR507	Autumn Purple Ash	Pacific Sunset Maple	Flame Maple	Flame Maple
Park Ave.	Crowder Rd.	SR507/Sussex Ave.	Patmore Ash	Norwegian Sunset Maple	Snowdrift Fl. Crab	Autumn Brilliance Serviceberry
Wichman St. North	Sussex Ave. West	Fenton Ave. West	Norwegian Sunset Maple	Commemoration Sugar Maple	Rustica Rubra Saucer Magnolia	Galaxy Magnolia
Howard St. North	Garfield St.	SR507/Sussex Ave.	October Glory Red Maple	Shademaster Honeylocust	David’s Maple	Trident Maple
Garfield Ave.	Howard St.	Old 99	Greenspire Linden	Summit Ash	Snowgoose Cherry	Desert Ash

## Street Profiles for Trees

The ideal street profile to create a tree-lined street with canopy forming trees would include 8' planter strips plus a 12-18' wide medians. Future designs of major and minor arterials should consider this type of design where rights-of-ways permit. This design provides adequate space above and below ground for trees, minimizing damage to curbs and sidewalks. The feel and look of driving, bike riding, jogging, and walking on these types of streets in 30 years will please residents of Tenino. To achieve this effect, we must plan for it and plant it today.

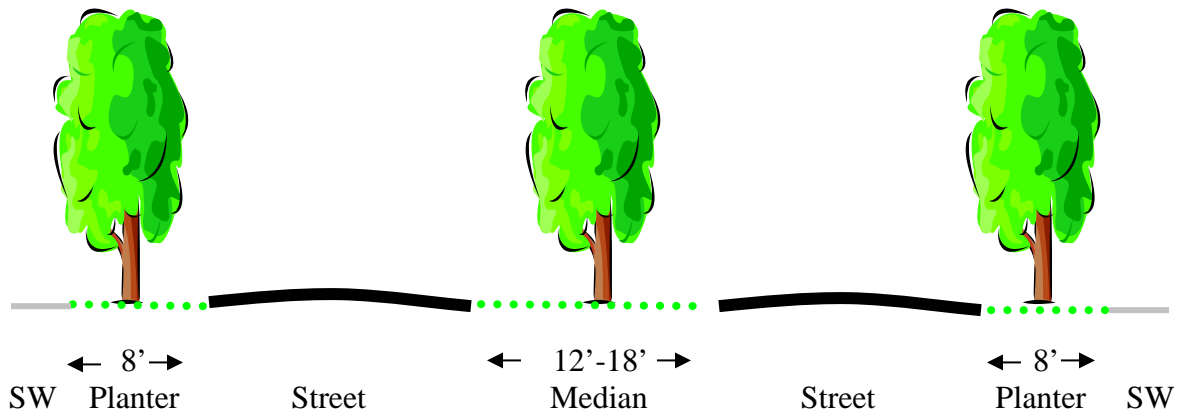


Figure 7. Ideal street design for development of maximum canopy, while providing separation between streets and sidewalks.

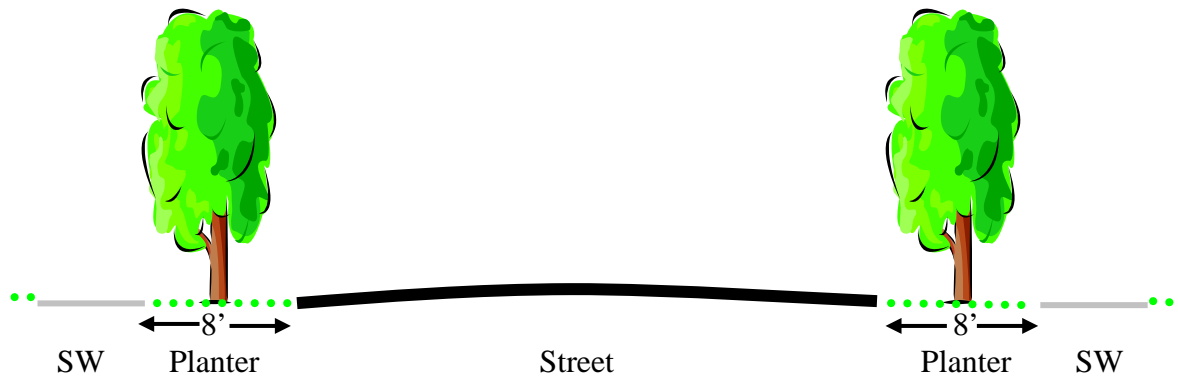


Figure 8. When space does not allow development of a full median, providing 8' planter strips will allow development of large, canopy forming trees. Planter strips should not be less than 6' wide. These narrow widths will only allow planting of small to medium sized trees that will not produce the canopy effect.

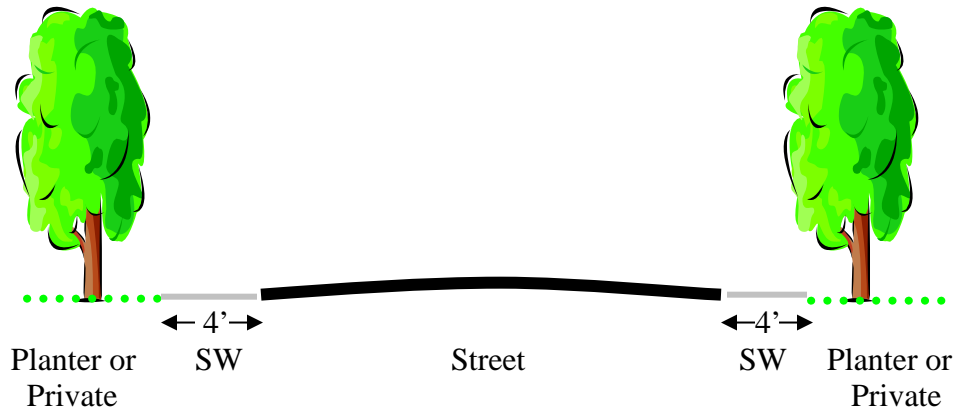


Figure 9. This is a commonly occurring street design in Tenino. Street trees, when they occur, are located on private property, or occasionally in planter strips.

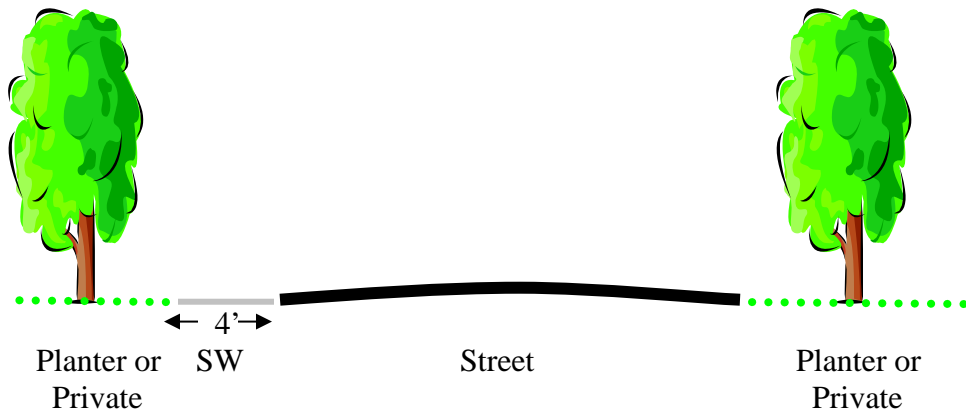


Figure 10. This is a commonly occurring street design in older neighborhoods in Tenino. In some cases no sidewalks occur. Most street trees are privately planted, without uniformity of design or occurrence.

### Planting Space Recommendations

When designing sidewalks for street tree plantings, an 8' wide planter strip is recommended to accommodate large, canopy forming trees. Narrower strips increase the potential for heaving of the sidewalks and curbs. Five feet should be considered to be an absolute minimum for a planter strip, and then tree size must be adjusted for the decreased rooting space. Placing trees between the vehicle and the pedestrian provides a feeling of safety for sidewalk users, though trees are more susceptible to vehicle damage in this location.

For trees, the most desirable location is behind the sidewalk where the tree can exploit the larger soil volumes of yards and open space. Development of a canopy over the street will take longer, and will be less effective. However, trees in this location will have greater longevity and cause less hardscape damage.

Often driveways, water meters, signs, and other obstructions limit strict, uniform spacing for street trees. Compromises must then be made to achieve the visual and spatial effects provided by rows of street trees. Street tree spacing will be determined primarily by the mature size of the tree being planted. However, the purpose of the tree also is a factor.

If one is trying to screen objectionable views or less attractive structures, then tighter street tree spacing may be desirable. In an area where attractive architecture, signage, or views are to be preserved, then widen the tree spacing. Do not over plant. This will simply increase initial establishment costs, as well as future maintenance costs. Always consider the desired future visual and spatial effects – linkage, beauty, and shade.

The following are the recommended targets for street tree spacing, understanding that **variations may occur** due to obstacles or the desired effect.

<u>Tree Type/Size</u>	<u>Spacing Between Trees</u>
Large Street Trees	40'-50'
Medium Street Trees	35'-40'
Columnar Trees	25'-35'
Small Trees	25'-35'

Informal planting designs utilizing conifers in cluster plantings should be 12'-15' on center, depending on the use of accent trees in the cluster. Each conifer must have two sides of its crown free to grow. These types of clusters of tall growing trees must be planted at least 25' from overhead utilities, and 15' from awnings, buildings, and signage. Screen plantings should be designed on a project by project basis and the plant spacing designed for the species used and the effect desired. Species other than listed in Table 1 may be used when dense screens are desired.

Compromises to this ideal design while still achieving some of the feel, would be 6' planter strips with a median. Any design that places the sidewalk against the curb with the trees behind the sidewalk will sacrifice the separation of pedestrians from traffic that the planter strip provides. Though planting trees behind the sidewalk where unlimited root zone occurs is good for the tree, the same feeling of security and visual beauty is not achieved.



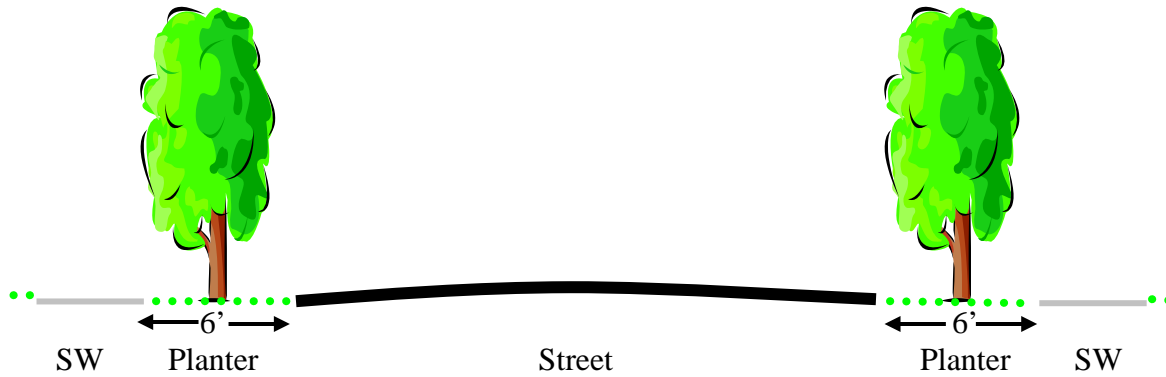


Figure 11. If space does not allow for 8’ wide planter strips, then 6’ can still be planted with medium to large street trees, however potential for root damage is higher.

### **Street Tree Planting and Maintenance**

Ideally, the responsibility and budget for the planting and maintenance of street trees should be with the Parks Maintenance division of the Public Works Department.

The selection and design of street tree plantings should be completed by a landscape architect or urban forester, and be reviewed by the Planning Department and the Parks Maintenance Division to insure that it furthers goals outlined in the street tree plan, is compatible with the existing site conditions and the overall goals of the city.

#### **Budget**

As the street tree numbers grow, the maintenance, and thus the maintenance budget must grow. A minimum of \$45-49 per tree per year is required to provide adequate care for a street tree population. As the street tree population matures, these numbers will increase. The budget should be increased annually based on the new plantings, and with a modifier for inflation.

#### **Stock Quality**

All trees should meet the American National Standard for Nursery Stock (ANSI A60.1-2004), have a strong, central leader and show evidence of cultural care in the nursery. The trees should not be damaged, and should be free of insect, insect eggs, disease, and other problems. The root balls should well-wrapped with burlap and unbroken. Trees with broken root balls, damage, poor form, or other problems should be rejected. A detailed contractual specification is included in Appendix III for street projects.

It is strongly recommended that the City of Tenino remove the street tree procurement from the overall street project contract, and only contract for planting. The city should contract for trees in advance with a reputable nursery to insure that the numbers, species, size, and quality of trees are available when a project is constructed. This will eliminate

substitution, accepting less than high quality trees, and holding stock on site for extended periods of time (1 week is the target).

### **Preparing the Planting Hole**

The planting hole within the planter strip or behind the sidewalk often contains structural soils used in the preparation of the sub grade for the street and sidewalks. If the planter strip will be planted with grass, the entire planter strip should be backfilled with topsoil that has a silt loam or loamy sand texture. The organic matter content should be 4-6%. It should be free from contaminants.

The area where the tree is to be planted should be excavated to the proper depth so the root ball sits on native soil, and the top of the root ball will be 1” above the final soil grade. The planting hole should be at least 3 times the diameter of the rootball of the street tree. The edges of the planting hole should be shaved off to eliminate the glazed or compacted hole edge.

If a hardpan or other compacted layer occurs that will cause perching of water in the planting hole, this layer should be fractured by over excavating the hole and backfilling the native material. The area under the rootball should be firmed to prevent settling of the tree. In cases where drainage cannot be improved by over excavating, installation of drain tile may be necessary to drain the planting hole and the surrounding root zone.

### **Orientation of the Tree**

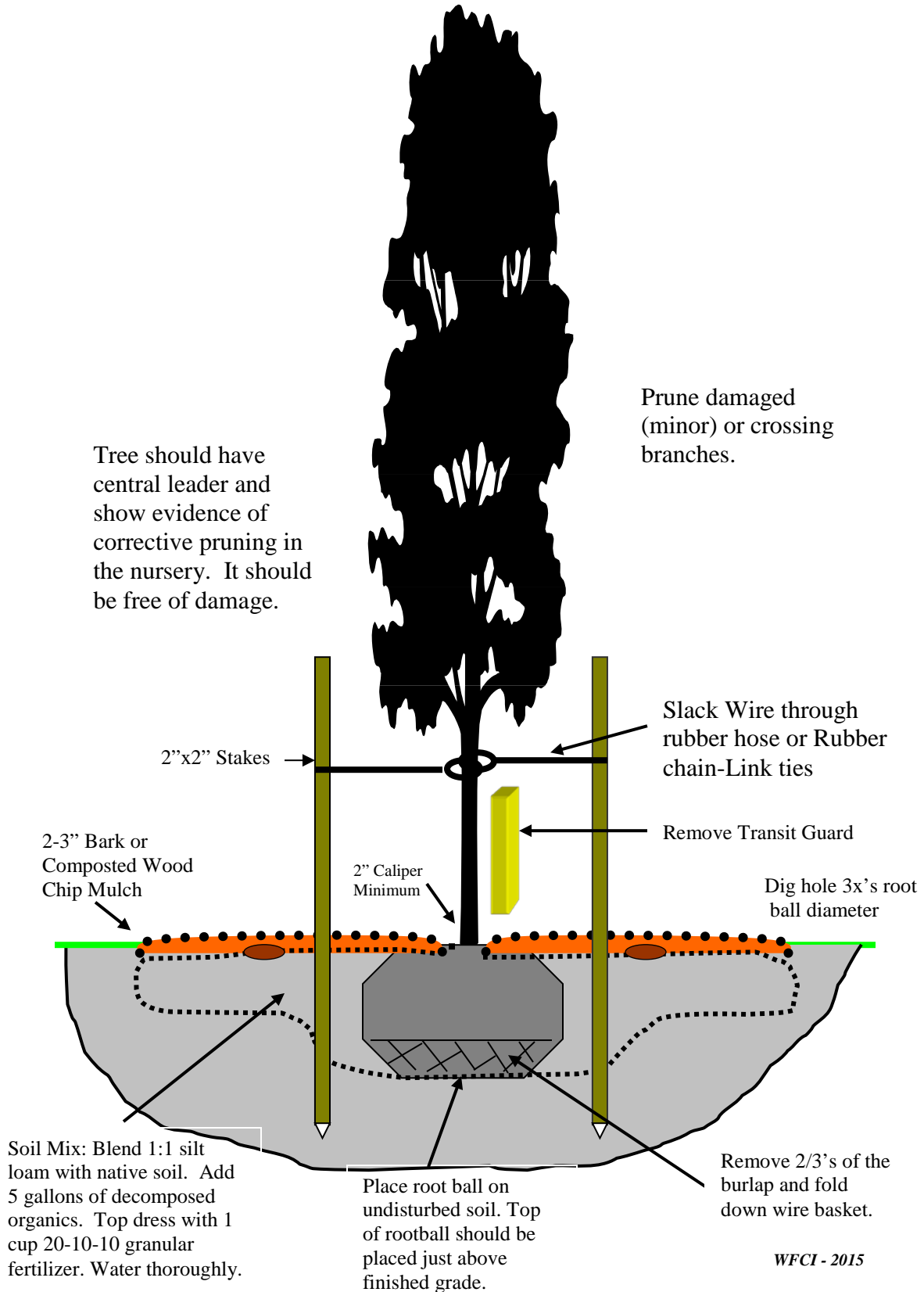
Plant the tree in the same orientation as it grew in the nursery. Most trees will be marked at the base to indicate the north side of the tree. This will reduce the potential for sunburn of the bark.

### **Tree Grates**

Every effort should be made to avoid planting trees in tree grates within a sidewalk. Planting behind the sidewalk and within planter strips will provide a microclimate much more conducive to tree growth and survival. Planting trees at the back of a sidewalk edge with half-grates is a better alternative than full grates within a sidewalk.

If the only planting location is within the sidewalk and tree grates must be used, then the minimum size grate should be 5’ x 5’. If smaller grates must be used, then small street tree cultivars must be selected for these limited spaces. Preparation of the planting soils and space is similar to planting in planter strips.

**FIGURE 12. STREET TREE PLANTING DETAIL**



### **Burlap and Wire Basket**

Remove twine ties from the root collar of the tree and fold the burlap down into the hole exposing at least 2/3's of the root ball. If desired, cut out the extra burlap. If the tree has a wire basket, leave it on until the tree is in the ground and stabilized. Prior to completing backfill, cut out the upper 2/3's of the wire basket and remove from the hole.

Complete backfilling with the topsoil mix. In areas with gravelly soils, blend the topsoil with native soils. In areas of Tenino with sandy loams, utilize the native material or imported topsoil's with additional silt and organic matter. If native sandy loams are used, then incorporate organic matter as described on the planting diagram.

### **Fertilization**

Trees should be fertilized with a granular formulation of 20-10-10 at a rate of 6 pounds per 1000 square feet of surface area. This amounts to approximately 2 ounces per tree. Do not incorporate the fertilizer into the planting hole or fill soils. Salt burn of the new roots may occur. Do not apply any other root stimulants. Good weed control must accompany fertilization treatments.

### **Watering**

All trees should be thoroughly water in to eliminate air pockets and settle the soil around the rootball. Create a small 4" high berm with soil to create a well for holding water from irrigation. This berm should be located 12" outside of the rootball.

The rule of thumb for water is to apply 2" of water per week, or follow the rates listed below:

<u>Tree Caliper</u>	<u>Gallons per Week</u>
1"	5
2"	10
3"	13
4"	18
5"	23

Monitor soil moisture contents in the root ball and the surrounding soil to determine the actual watering frequency and amounts.

### **Mulching**

All trees should be mulched for a distance of at least 2 times the rootball diameter with 2-3" of bark mulch or composted wood chips.

## **Staking**

All deciduous trees 1.5” to 2.5” caliper and conifers taller than 5’ should be staked with two stakes. Trees should be staked with 2” x 2” or round wooden stakes that are 6’ long. The stake must be tall enough to provide support to the tree. The stakes should be driven firmly into the ground outside of the root ball. They should be placed straight up and down, and be equidistant from the tree. Trees should be oriented to support the tree against the prevailing winds.

The stake ties should be rubber chain-link, installed snug but not stretched. The tree needs to be able to move slightly to develop normal stem diameter and taper. Avoid wire and hose ties.

The stakes and ties should be inspected several times in the first year. Vandalism and accidental damage occurs frequently. Once the tree becomes established, usually one year, remove the stakes and ties. Ties left on trees long-term will often girdle the tree. Trees larger than 2.5” caliper will require 3 stakes. Trees larger than 4” caliper should be guyed with three cables and buried earth anchors.

## **Trunk Wraps**

Trunk wraps are used to prevent sunburn on new trees. This is usually not a problem, however if trunk wraps are used, they should be made of paper and left on the tree for 1 year.

Transit guards should not be left on the tree as trunk wraps. They are designed to protect the stem of the tree during transport only. Molds, insects, and other fungi may be attracted to the moist, shady confines of the transit guard.

## **Root Collar Protectors**

Plastic sleeves should be installed on all newly planted trees to protect the root collars from lawn mowers and weed eaters. These protectors should be left on the trees until trees are 6” caliper, or the protector becomes snug.

Grass and weeds should not be allowed to grow in the tree well, removing the temptation to mow or weed-eat near the stems. Root collar damage from weed eaters is a major cause of tree mortality, and/or reduced vigor.

## **Pruning**

Newly planted trees that were well cultured in the nursery should need only minor pruning to remove crossing branches, or branches damaged during transport and planting. Pruning in successive years to provide sidewalk and street clearance, improve the branch structure of the tree, and maintain central leaders, should conform to the American

National Standard ANSI A300 (2001), *Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices* (Pruning).

This small tree pruning is critical to provide a strong tree and branch structure for the future, minimizing storm damage, and the need for additional pruning. Pruning should be completed by an arborist certified by the International Society of Arboriculture, or supervised by a certified arborist. No more than 20% of the live branches should be pruned in any one year.

### **Inspections**

The newly planted trees should be inspected several times in the first year to adjust stakes and note other cultural concerns. Prior to release of the 1 year bond or end of the 1 year guarantee for trees planted as part of a street project, the trees should be inspected by a certified arborist. Trees that were unhealthy or poorly handled often ‘hang on’ for some time after planting. Specialized expertise is needed to identify the trees that are in decline, but still alive. This inspection must take place when trees are foliated.

### **Timing of Tree Planting**

Tree planting should not occur between May and October. Trees planted during this time will be stressed and survival and establishment will be reduced. The following is a general window for planting the different types of trees.

<u>Stock Type</u>	<u>Timing of Planting</u>
Balled and Burlap	October 15 <sup>th</sup> through May 1 <sup>st</sup>
Containerized	October 15 <sup>th</sup> through May 1 <sup>st</sup>
Bare-Root Stock	February 15 <sup>th</sup> through April 15 <sup>th</sup>

Fall planting of B&B and containerized stock is preferred, since tree roots will grow for part of the winter. This will improve establishment and early growth.

### **Maintenance Recordkeeping**

As trees are planted in the city of Tenino, maintenance records need to be updated on the street tree inventory system. This will help with tracking of stake removal, weed control, pruning needs, and hazard assessment. This system is up and running and simply needs to be maintained and refined as needed.

Street Tree Management Units. – The only soils based separation in Tenino street tree populations are soils that are 1) excessively drained gravels, 2) sandy soils, and 3) poorly drained soils.

Geographically, it is recommended that the management units be based on the Tenino planning areas.

**Figure 13. Calendar for tree planting and maintenance activity.**

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tree Planting:												
Balled & Burlap and Containerized	←————→									←————→		
Bare-Root Stock		←————→										
Fertilization: Surface Applied			↔			↔				↔		
Watering					←————→							
Weed Control			←————→									
Integrated Pest Management – Scouting		←————→										
Pruning:												
Spring Flowering Trees					↔							
Summer Flowering Trees	←————→									←————→		
All Other Shade Trees and Conifers	←————→									←————→		
Storm Damage Assessment-As Needed	←————→											

## **Trees and Planting Specifications**

The following summarizes the tree and planting specifications:

All trees and shrubs should conform to the American Standard for Nursery Stock ANSI Z60.1-2004 for size, root ball diameter, and quality, and be planted according to industry standards, including mulching. All street trees should have a well-defined central stem and show evidence of corrective cultural pruning in the nursery.

Tree planting should occur in the spring between March 1 and June 1, or preferably in the fall between October 1 and December 1. Irrigation should be provided to the trees and shrubs at least weekly during the summer, in the absence of adequate rainfall.

## **Summary**

We found 26 planted, city maintained street trees and 139 open planter spaces within the study area. Ninety-four of these open planter spaces had overhead powerlines or other restrictions on tree size. The existing flowering plum street trees were in good condition, however most other existing street trees were in poor condition.

In the downtown area, the best opportunity to make the greatest change or improvement in tree cover is to create space and plant trees along Sussex Avenue/SR507 through the downtown core. Currently there is no space for trees, and the soil condition under the existing concrete is likely poor. The only opportunity for trees in this area is to create bump-outs for tree planting along the street. Significant cost and soil improvement will be required. We have recommended a more columnar, medium scale street tree (Parkway Maple) for use in this area. It is a hardy tree that can tolerate challenging locations.

On other city streets, planting in the existing curblawn zones (planter strips) yards or private property behind the sidewalks will provide the best opportunity for trees that will thrive. If native forest encroaches on the street and there is little to no space for street trees, then do not plant street trees.

Street tree maintenance for the 26 trees is good. However the species mix needs to be diverse and many open planting spaces exist. Over time, planting trees in these 139 open spaces will change the look and feel of Tenino.

If trees are added to the arterials and collectors in Tenino the connectivity of the corridors will be improved from one of the street to the other, traffic will slow, people will linger downtown longer, and the overall aesthetics of the city will be improved. Trees like infrastructure must be planned – if space is not created and trees planted today, our great grandchildren may be having this same conversation in 30 years.



## **Appendix I**

### **Tree/Planting Spot Inventory**

**(6 pages attached – tree numbers on list  
correspond to map in Appendix II)**

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
400			Other	Other	Other	Routine	open space, overhead powerlines, 200 ft
401	Locust - Honey	13	Poor	Other	Other	Routine	topped, overhead powerlines
402	Other - Deciduous	5	Fair	None	Other	Routine	overhead powerlines
403	Other - Deciduous	4	Fair	None	Other	Routine	overhead powerlines
404			Other	Other	Other	Routine	open space, 100 ft x 5 ft
405			Other	Other	Other	Routine	open space, overhead powerlines, 2300 ft, brush and trees growing off row
406			Other	Other	Other	Routine	open space, 2300 ft, brush and trees growing off row
407			Other	Other	Other	Routine	open space, overhead powerlines, along rr row, 2300 ft,
408			Other	Other	Other	Routine	open space, 60 ft
409			Other	Other	Other	Routine	open space, 60 ft x 10 ft
410			Other	Other	Other	Routine	open space, 700 ft x 10 ft
411			Other	Other	Other	Routine	open space, brush growing off row, 100 ft
412			Other	Other	Other	Routine	open space, overhead powerlines, 300 ft
413			Other	Other	Other	Routine	open space, 80 ft x 8 ft
414			Other	Other	Other	Routine	open space, overhead powerlines, 60 ft
415			Other	Other	Other	Routine	open space, 35 ft
416			Other	Previous Failure	Other	Routine	open space, planter, 100 ft x 6 ft
417			Other	Other	Other	Routine	open space, planter, overhead powerlines, 30 ft x 6 ft
418			Other	Other	Other	Routine	open space, planter, 70 ft x 6 ft
419	Hawthorne	9	Poor	Major Dieback	Remove tree	Routine	topped
420			Other	Other	Other	Routine	open space, planter, 110 ft x 6 ft
421			Other	Previous Failure	Other	Routine	open space, planter, 40 ft x 6 ft
422	Hawthorne	9	Poor	Major Dieback	Remove tree	Routine	topped
423	Magnolia	4	Fair	None	Prune	Routine	prune for clearance
424			Other	Other	Other	Routine	open space, planter, 40 ft x 6 ft
425			Other	Other	Other	Routine	open space, planter, 25 ft x 6 ft
426			Other	Other	Other	Routine	open space, planter, 15 ft x 6 ft
427			Other	Other	Other	Routine	open space, planter, 40 ft x 6 ft
428			Other	Previous Failure	Other	Routine	open space, between rd and sidewalk, 60 ft x 10 ft
429	Pine - White	11	Good	None	Prune	Routine	prune for clearance
430	Hawthorne	5	Poor	Major Dieback	Remove tree	Routine	topped
431	Hawthorne	5	Poor	Major Dieback	Remove tree	Routine	topped
432	Hawthorne	5	Poor	Major Dieback	Remove tree	Routine	topped
433	Hawthorne	10	Poor	Major Dieback	Remove tree	Routine	topped
434	Hawthorne	9	Good	Major Dieback	Remove tree	Routine	topped

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
435			Other	Other	Other	Routine	open space, 40 ft
436			Other	Other	Other	Routine	open space, 40 ft
437			Other	Other	Other	Routine	open space, 90 ft x 10 ft
438	Apple	8	Fair	None		Routine	
439			Other	Other	Other	Routine	open space, brush growing off row, 150 ft x 10 ft
440			Other	Other	Other	Routine	open space, overhead powerlines, brush growing off row, 200 ft
441			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
442			Other	Other	Other	Routine	open space, overhead powerlines, 150 ft x 10
443			Other	Other	Other	Routine	open space, overhead powerlines, 150 ft x 10 ft
444	Cherry - Other	10	Poor	Major Dieback	Remove tree	Routine	topped, overhead powerlines
445			Other	Other	Other	Routine	open space, overhead powerlines, planter, 40 ft x 6 ft
446	Cherry - Other	6	Fair	None	Prune	Routine	prune for clearance, overhead powerlines
447	Cherry - Other	3	Poor	Minor Dieback	Remove tree	Routine	overhead powerlines
448			Other	Other	Other	Routine	open space, overhead powerlines, planter, 30 ft x 6 ft
449			Other	Other	Other	Routine	open space, overhead powerlines, planter, 35 ft x 6 ft
450	Plum - Flowering	2	Good	None	Other	Routine	prune for clearance, overhead powerlines
451	Plum - Flowering	2	Good	None	Other	Routine	prune for clearance, overhead powerlines
452	Plum - Flowering	2	Good	None	Other	Routine	prune for clearance, overhead powerlines
453			Other	Other	Other	Routine	open space, overhead powerlines, planter, 30 ft x 6 ft
454	Plum - Flowering	7	Good	None	Other	Routine	prune for clearance, overhead powerlines
455	Plum - Flowering	7	Good	None	Prune	Routine	prune for clearance, overhead powerlines
456			Other	Other	Other	Routine	open space, overhead powerlines, planter, 35 ft x 6 ft
457			Other	Other	Other	Routine	open space, overhead powerlines, planter, 15 ft x 6 ft
458			Other	Other	Other	Routine	open space, overhead powerlines, planter, 45 ft x 6 ft
459			Other	Other	Other	Routine	open space, overhead powerlines, planter, 50 ft x 6 ft
460			Other	Previous Failure	Other	Routine	open space, overhead powerlines, planter, 75 ft x 6 ft
461			Other	Other	Other	Routine	open space, overhead powerlines, planter, 30 ft x 6 ft

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
462			Other	Other	Other	Routine	open space, overhead powerlines, planter, 30 ft x 6 ft
463			Other	Other	Other	Routine	open space, overhead powerlines, 80 ft
464			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
465			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
466	Cherry - Other	8	Fair	None	Other	Routine	overhead powerlines
467			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
468			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
469			Other	Other	Other	Routine	open space, overhead powerlines, 100 ft
470			Other	Other	Other	Routine	open space, 50 ft
471			Other	Other	Other	Routine	open space, 50 ft
472			Other	Other	Other	Routine	open space, overhead powerlines, 350 ft x 8 ft
473			Other	Other	Other	Routine	open space, overhead powerlines, 120 ft x 8 ft
474			Other	Other	Other	Routine	open space, overhead powerlines, 80 ft x 8 ft
475			Other	Other	Other	Routine	open space, 70 ft x 9 ft
476			Other	Other	Other	Routine	open space, 60 ft x 12 ft
477			Other	Other	Other	Routine	open space, 250 ft
478			Other	Other	Other	Routine	open space, 40 ft
479			Other	Other	Other	Routine	open space, 50 ft
480			Other	Other	Other	Routine	open space, 30 ft
481			Other	Other	Other	Routine	open space, 40 ft
482			Other	Other	Other	Routine	open space, 450 ft
483			Other	Other	Other	Routine	open space, overhead powerlines, 140 ft x 9 ft
484			Other	Other	Other	Routine	open space, overhead powerlines, 240 ft x 9 ft
485			Other	Other	Other	Routine	open space, overhead powerlines, 120 ft
486			Other	Other	Other	Routine	open space, overhead powerlines, 20 ft x 8 ft
487	Maple - Bigleaf	28	Poor	Major Dieback	Prune	Routine	crown clean
488			Other	Other	Other	Routine	open space, 40 ft x 12 ft
489	Maple - Bigleaf	14	Fair	Minor Dieback	Prune	Routine	crown clean
490	Plum - Flowering	3	Fair	None	Prune	Routine	prune for clearance
491	Plum - Flowering	3	Good	None	Prune	Routine	prune for clearance
492			Other	Other	Other	Routine	open space, 30 ft x 6
493			Other	Other	Other	Routine	open space, overhead powerlines, between rd and sidewalk, 20 ft x 8 ft
494			Other	Other	Other	Routine	open space, overhead powerlines, between rd and sidewalk, 50 ft 8 ft
495			Other	Other	Other	Routine	open space, overhead powerlines, between rd and sidewalk, 75 ft 8 ft
496			Other	Other	Other	Routine	open space, between rd and sidewalk, 40 ft 8 ft

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
497			Other	Other	Other	Routine	open space, overhead powerlines, 250 ft
498			Other	Other	Other	Routine	open space, overhead powerlines, planter, 50 ft x 2 ft
499			Other	Other	Other	Routine	open space, overhead powerlines, planter, 80 ft x 5 ft
500			Other	Other	Other	Routine	open space, overhead powerlines, planter, 80 ft x 5 ft
501			Other	Other	Other	Routine	open space, overhead powerlines, planter, 90 ft x 5 ft
502			Other	Other	Other	Routine	open space, overhead powerlines, planter, 75 ft x 5 ft
503			Other	Other	Other	Routine	open space, overhead powerlines, planter, 30 ft x 6 ft
504			Other	Other	Other	Routine	open space, planter, 20 ft x 6 ft
505			Other	Other	Other	Routine	open space, planter, 55 ft x 6 ft
506			Other	Other	Other	Routine	open space, overhead comm lines, planter, 80 ft x 6 ft
507			Other	Other	Other	Routine	open space, overhead comm lines, planter, 20 ft x 6 ft
508	Hawthorne	9	Poor	Major Dieback	Remove tree	Routine	topped, overhead comm lines
509	Hawthorne	7	Poor	Major Dieback	Remove tree	Routine	topped, overhead comm lines
510	Hawthorne	7	Poor	Major Dieback	Remove tree	Routine	topped, overhead comm lines
511	Dogwood - Flowering	7	Fair	None	Prune	Routine	prune for clearance, overhead comm lines
512	Crabapple	7	Poor	Major Dieback	Remove tree	Routine	overhead comm lines, topped
513	Cherry - Other	10	Fair	None	Other	Routine	overhead comm lines, topped
514	Hawthorne	6	Poor	Major Dieback	Remove tree	Routine	overhead comm lines, topped
515	Hawthorne	4	Poor	Major Dieback	Remove tree	Routine	overhead comm lines, topped
516	Hawthorne	4	Poor	Major Dieback	Remove tree	Routine	overhead comm lines, topped
517	Hawthorne	5	Poor	Major Dieback	Remove tree	Routine	overhead comm lines, topped
518			Other	Other	Other	Routine	open space, planter, 60 ft x 2 ft
519			Other	Other	Other	Routine	open space, planter, 45 ft x 2 ft
520			Other	Other	Other	Routine	open space, planter, 30 ft x 2 ft
521			Other	Other	Other	Routine	open space, planter, 30 ft x 1 ft
522			Other	Other	Other	Routine	open space, planter, 30 ft x 2 ft
523			Other	Other	Other	Routine	open space, 80 ft
524			Other	Other	Other	Routine	open space, 50 ft
525			Other	Other	Other	Routine	open space, 750 ft
526			Other	Other	Other	Routine	open space, 225 ft
527			Other	Other	Other	Routine	open space, 200 ft

Tree List - Existing Trees and Open Planting Spots

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
528			Other	Other	Other	Routine	open space, 50 ft
529			Other	Other	Other	Routine	open space, 150 ft
530			Other	Other	Other	Routine	open space, 250 ft x 4 ft
531			Other	Other	Other	Routine	open space, overhead powerlines, 100 ft
532			Other	Other	Other	Routine	open space, overhead powerlines, 900 ft x 8 ft
533			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft x 8 ft
534			Other	Other	Other	Routine	open space, overhead powerlines, 450 ft x 8 ft
535			Other	Other	Other	Routine	open space, overhead powerlines, 100 ft x 10 ft
536			Other	Other	Other	Routine	open space, overhead powerlines, 45 ft x 10 ft
537			Other	Other	Other	Routine	open space, overhead powerlines, 80 ft x 7 ft
538			Other	Other	Other	Routine	open space, overhead powerlines, 50 ft x 7 ft
539			Other	Other	Other	Routine	open space, overhead powerlines, 90 ft x 10 ft
540			Other	Other	Other	Routine	open space, overhead powerlines, 45 ft x 6 ft
541			Other	Other	Other	Routine	open space, overhead powerlines, between rd and sidewalk, 100 ft x 7 ft
542			Other	Other	Other	Routine	open space, overhead powerlines, between rd and sidewalk, 150 ft x 5 ft
543			Other	Other	Other	Routine	open space, planter, 120 ft x 2 ft
544			Other	Other	Other	Routine	open space, planter, 50 ft x 2 ft
545			Other	Other	Other	Routine	open space, planter, 40 ft x 2 ft
546			Other	Other	Other	Routine	open space, overhead powerlines, 200 ft
547			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft
548			Other	Other	Other	Routine	open space, overhead powerlines, 200 ft
549			Other	Other	Other	Routine	open space, overhead powerlines, 200 ft
550			Other	Other	Other	Routine	open space, mountain ash snd maples planted off row, 1500 ft
551			Other	Other	Other	Routine	open space, overhead powerlines, 30 ft x 10 ft
552			Other	Other	Other	Routine	open space, 300 ft
553			Other	Other	Other	Routine	open space, 30 ft x 8 ft
554			Other	Other	Other	Routine	open space, overhead powerlines, 225 ft x 4 ft
555			Other	Other	Other	Routine	open space, 200 ft
556			Other	Other	Other	Routine	open space, 200 ft
557			Other	Other	Other	Routine	open space, overhead powerlines, 200 ft x 8 ft
558			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft x 8 ft
559			Other	Other	Other	Routine	open space, 250 ft x 6 ft
560			Other	Other	Other	Routine	open space, overhead powerlines, 100 ft
561			Other	Other	Other	Routine	open space, 100 ft x 6 ft
562			Other	Other	Other	Routine	open space, 40 ft
563			Other	Other	Other	Routine	open space, overhead powerlines, 40 ft x 8 ft

Tree List - Existing Trees and Open Planting Spots

Tree #	SPECIES	DBH (in)	CONDITION	PROBLEM	WORKNEEDED	WRKPRIORTY	COMMENTS
564			Other	Other	Other	Routine	open space, 40 ft x 8 ft
565			Other	Other	Other	Routine	open space, 100 ft x 8 ft
566			Other	Other	Other	Routine	open space, 100 ft x 8 ft
567			Other	Other	Other	Routine	open space, overhead powerlines, 50 ft x 9 ft
568			Other	Other	Other	Routine	open space, overhead powerlines, 50 ft x 6 ft
569			Other	Other	Other	Routine	open space, overhead powerlines, 100 ft x 6 ft
570			Other	Other	Other	Routine	open space, overhead powerlines, 50 ft x 12 ft
571			Other	Other	Other	Routine	open space, 250 ft
572			Other	Other	Other	Routine	open space, 20 ft x 10 ft
573			Other	Other	Other	Routine	open space, 50 ft x 4 ft
574			Other	Other	Other	Routine	open space, 35 ft x 4 ft

**Appendix II**

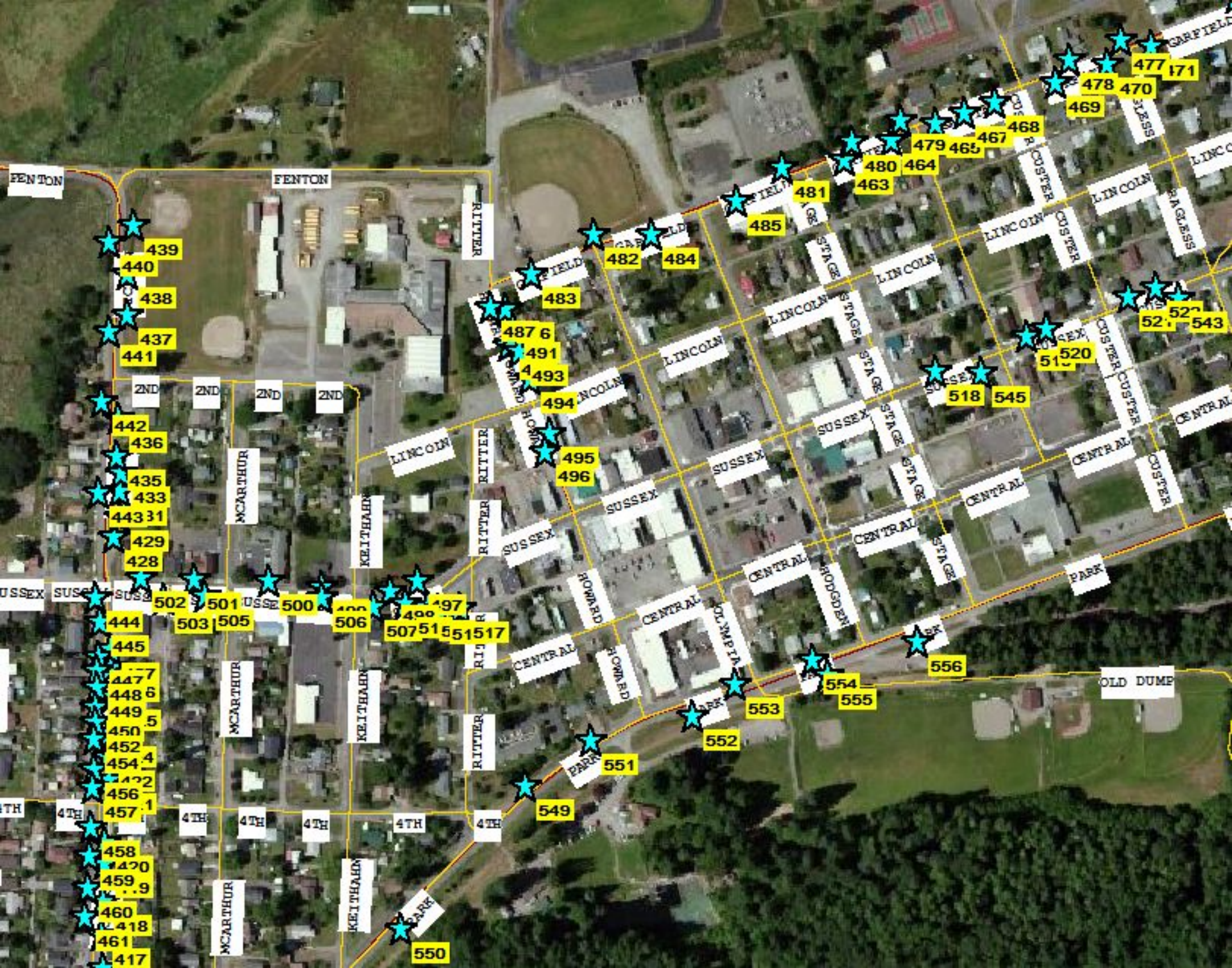
**Tree/Planting Spot Locations Mapped**

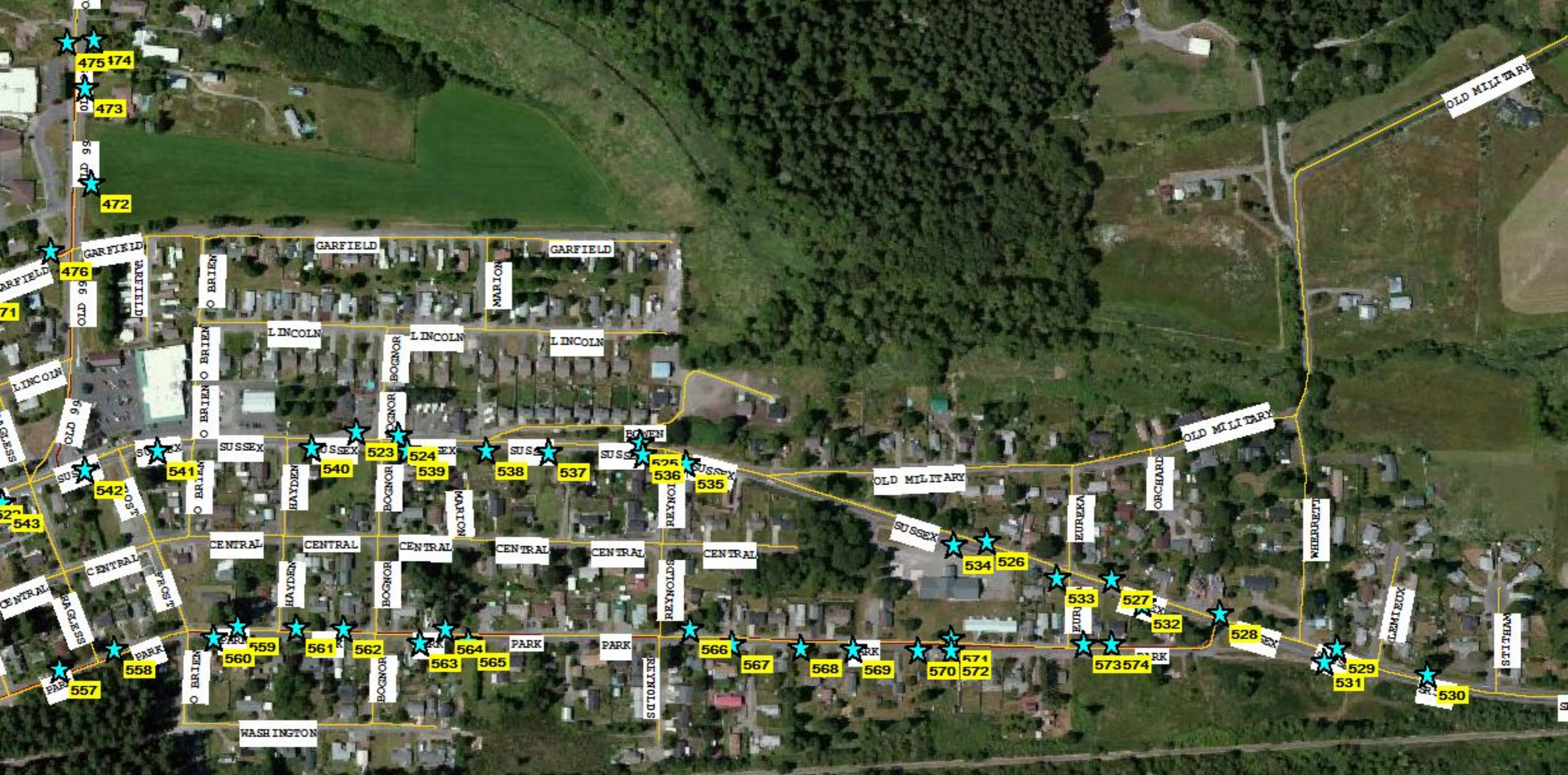
(West, Middle, and East Sections of Tenino)

**(3 pages attached)**









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OLD MILITARY

OLD MILITARY

OLD MILITARY

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## Appendix III

### Tree Planting Specifications To Be Used for Tenino Street Tree Planting Projects

#### I. Description of Work

These specifications include standards necessary for and incidental to execution and completion of planting street trees.

A. Specifications for the planting hole design, tree planting, mulching and watering are included.

B. Protection of existing features. During construction, protect all existing trees, shrubs, and other specified vegetation, site features and improvements, structures, and utilities specified herein and/or on submitted drawings. Removal or destruction of existing plantings is prohibited unless specifically authorized by the owner.

#### II. Applicable Specifications and Standards

A. *Principles and Practice of Planting Trees and Shrubs*. 1997. International Society of Arboriculture, P.O. Box GG, Savoy, IL 61874

B. *American Standard for Nursery Stock*. 1996. American Association of Nurserymen, Inc. 1250 I Street NC Suite 500, Washington, D.C. 20005

C. *Standardized Plant Names*. 1942. American Joint Committee on Horticulture Nomenclature, Horace McFarland Company, Harrisburg, Pennsylvania. (Second edition).

#### III. Planting Season

A. Planting shall be done within the following dates:

Balled and Burlap (B&B) trees and shrubs: October 15 to May 1st

Containerized trees and other: October 1<sup>st</sup> to May 1<sup>st</sup>.

Bare rooted trees and shrubs: February 15<sup>th</sup> to April 15<sup>th</sup>.

B. Variance: If special conditions exist that warrant a variance in the above planting dates, a written request shall be submitted to the project owner stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of project owner.

**IV. Planting Locations**

A. The landscape contractor (hereafter referred to as Contractor) shall plant at locations to be determined and marked by the owner or other person representing the owner (hereafter referred to as the Owner's Representative).

B. Locations for individual trees will be supplied by the Owner's Representative. In some cases, the location may be inferred from reference to some identifiable field object or from some line that can be constructed in the field.

C. No tree that grows over 25 feet at maturity shall be planted under electrical utility wires.

D. No tree or shrub shall be planted within 10 feet of fire hydrants, driveways, streetlights, or intersections, or as specified by local ordinance.

**V. Underground Utility Location**

A. The Contractor shall contact the local utility companies for verification of the location of all underground utility lines in the area of the work. The Contractor shall be responsible for all damage resulting from neglect or failure to comply with the requirement.

B. Trees shall not be planted closer than 10 feet from water service connections, sewer laterals, or gas lines, unless so directed by the Owner's Representative. The Contractor shall be responsible for moving trees if planted closer than the specified distance.

**VI. Materials**

A. Topsoil provided shall be declared by the Contractor to be free from subsoil, roots, stones over 1 inch (2.5 cm) in diameter, herbicides, contaminants, and other extraneous materials. The Contractor shall dispose of materials removed. Topsoil shall be silt loam or loamy sand with 4 to 6 percent organic matter (by weight). Topsoil shall not be used in a frozen or muddy condition. The Contractor shall remove all surplus materials.

B. Plants shall be true to species and variety specified and nursery-grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the project for at least 2 years. They shall have been freshly dug (during the most recent favorable harvest season).

Unless specifically noted, all plants shall be of specimen quality, exceptionally heavy, symmetrical, and so trained to be favored in development and appearance as to be unquestionably and outstandingly superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well-branched and densely

foliated when in leaf; free of disease and insects, eggs, or larvae' and shall have healthy well-developed root systems. They shall be free from physical damage or other conditions that would prevent vigorous growth.

Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leaders, bark abrasions, sunscald, disfiguring knots, insect damage, or cuts of limbs over  $\frac{3}{4}$  in (2 cm) in diameter that are not completely closed will be rejected.

Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the Owner's Representative. Use of larger plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.

Caliper measurements shall be taken on the trunk 6 inches (15 cm) above the natural ground line for trees up to and including 4 inches (10 cm) in caliper, and 12 inches (30 cm) above the natural ground line for trees over 4 inches (10 cm) in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of size is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Measurements specified are minimum size acceptable after pruning, where pruning is required. Plants that meet measurements but do not possess a standard relationship between height and spread, according to the American Standards for Nursery Stock, shall be rejected.

Substitutions of plant materials will not be permitted unless authorized in writing by the Owner's Representative. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety with a corresponding adjustment of the contract price.

C. The plant list at the end of this section is for the Contractor's information only, and no guarantee is expressed or implied that quantities therein are correct or that the list is complete. The Contractor shall satisfy himself that all plant materials shown on the drawings are included in his bid.

D. All plants shall be labeled by plant name and size. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Plant labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering.

E. Certificates of Plant Inspections: Certificates of inspection shall accompany invoices for each shipment of plants as may be required by law for transportation. Certificates are to be filed with the Owner's Representative prior to acceptance of the material. Passing inspection by federal or state governments at place of growth does not preclude rejection of plants at the work site.

## **VII. Selection and Tagging**

A. Plants shall be subject to inspection for conformity to specification requirements and approval by the Owner's Representative at their place of growth and upon delivery. Such approval shall not impair the right of inspection and rejection during progress of the work. Inspection outside the state of Washington and Oregon shall be made at the expense of the Contractor. A Contractor's representative shall be present at all inspections.

B. A written request for the inspection of plant material at their place of growth shall be submitted to the Owner's Representative at least 10 calendar days prior to digging. This request shall state the place of growth and the quantity of plants to be inspected. The Owner's Representative may refuse inspection at this time if, in his/her judgment, sufficient quantities of plants are not available for inspection.

C. All plants shall be selected and tagged by the owner at their place of growth. For distant materials, photographs may be submitted for pre-inspection review.

## **VIII. Digging and Handling Plant Materials**

A. Trees designated B&B shall be properly dug with firm natural balls of soil retaining as many fibrous roots as possible in sizes and shapes as specified in the most recent edition of the *American Standard for Nursery Stock*. Balls shall be firmly wrapped with non-synthetic, rottable burlap and secured with nails and heavy non-synthetic, rottable twine. Root collar will be apparent at surface of ball. No trees with loose, broken, or manufactured balls will be planted, **except with special written approval before planting.**

B. Plants grown in containers shall be of appropriate size for the container as specified in the most recent edition of the *American Standard for Nursery Stock*, and be free of circling roots on the exterior and interior of the root ball.

C. All other types of nursery stock shall also conform to the *American Standard for Nursery Stock*.

## **IX. Transportation and Storage of Plant Material**

A. Fresh dug material is given preference over plant material held in storage. Plant material held in storage will be rejected if excessive growth or dieback of branches has occurred in storage.

B. Branches shall be tied with rope or twine only, and in such a manner that no damage will occur to the bark or branches.

C. During transportation of plant material, the Contractor shall exercise care to prevent injury and drying out of the trees. Should the roots be dried out, large

branches broken, balls of earth broken or loosened, or areas of bark torn, the Owner's Representative may reject the injured tree(s) and order them replaced at no additional cost to the owner.

D. Plants must be protected at all times from sun or drying winds. Those that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil covered with wet wood chips or other acceptable material, and kept well watered. Plants shall not remain unplanted any longer than 3 days after delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.

#### **X. Mechanized Tree Spade Requirements**

Trees may be moved and planted with an approved mechanical tree spade. The tree spade shall move trees limited to the maximum size allowed for the similar B&B root ball diameter according to the *American Standard for Nursery Stock*, or the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller. The machine shall be approved by the Owner's Representative prior to use. Trees shall be *planted* at the designated locations in the manner shown in the plans and in accordance with applicable sections of the specifications.

#### **XI. Excavation of Planted Areas**

A. Locations for plants and outlines of areas to be planted are to be staked out at the site. Approval of the Owner's Representative is required before excavation begins. A minimum of 30 percent total planting must be staked out before inspection.

B. Shrub beds are to be excavated to a depth of 1 foot (30 cm) unless otherwise indicated. Ground cover beds are to be excavated to at depth of 6 inches (15 cm), unless otherwise indicated. Tree pits shall be excavated three times wider than the diameter of the ball, unless otherwise specified by the Owner's Representative, and only as deep as the root ball to be placed in the hole. If initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped. The sides of all plant holes shall be sloped and the bottoms horizontal. On slopes, the depth of the excavation shall be measured at the center of the hole. Poor quality subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill or otherwise spread around in the landscape area. Pits shall not be left uncovered or unprotected overnight.

C. Detrimental soil conditions: The Owner's Representative is to be notified, in writing, of soil conditions that the Contractor considers detrimental to the growth of plant material. These conditions are to be described as well as suggestions for correcting them. Proper water drainage must be assured.



D. Obstructions: If rock, underground construction work, tree roots, or obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Owner's Representative. Where locations cannot be changes as determined by the Owner's Representative, and where digging is permitted, submit cost required to remove the obstruction to the depth of not less than 6 inches (15 cm) below the required hole depth. Proceed with work after approval of the Owner's Representative.

## **XII. Planting Operations**

A. Plants shall be set at the same relationship to finish grade as they were to the ground from which they were dug. Plants must be set plumb and braced in position until prepared topsoil has been places around the ball and roots. Plants shall be set so that they will be the same depth 1 year later. The trunk of the tree is not to be used as a lever in positioning or moving the tree in the planting hole.

B. Ropes, strings, and wrapping from the top half of the root ball are to be removed after the plant has been set. All waterproof or water repellant wrappings shall be removed from the ball. Remove at least the top half of the wire basket before backfilling.

C. The roots of bare root trees shall be pruned at the time of planting to remove damage or undesirable roots (those likely to become a detriment to future growth of the root system). Bare root trees shall have the roots spread to approximate the natural position of the roots and shall be centered in the planting pit. The planting soil backfill shall be worked firmly into and around the roots, with care taken to fill in completely with no air pockets.

D. When specified by the Owner's Representative, amend the backfill soil by adding 4-6 percent (by weight, 20-35 percent by volume, depending on materials) composted organic matter.

E. Basins are to be formed around tree and shrub root ball with a raised ring of soil as indicated on drawing.

F. Planting areas are to be finish graded to conform to grades on drawing after full settlement has occurred.

G. Plants are to be thoroughly watered immediately after planting.

H. Any excess soil, debris, or trimmings shall be removed from the planting site immediately upon completion of each planting operation.

### **XIII. Guying, Staking, Wrapping, Pruning and Mulching**

A. Stake all deciduous trees over 1.5 inch caliper and all conifer trees over 5 feet tall.

B. Staking and guying shall be completed immediately after planting. Trees up to 2.5 inches caliper are to be staked with two stakes and separate flexible ties as shown on drawings. For larger trees, use 3 guy wires and ground anchors. Ground anchors are to be driven at approximately a 45-degree angle to ground plane and distributed at 120 degree intervals around the trunk. Guying cables, turnbuckles, and hose are to be attached securely until the tree is well supported.

C. Guying and staking materials: Ground anchors shall be arrowhead shaped earth anchors of malleable iron castings, aluminum castings, or stamped steel. Staking wire shall be pliable 12-gauge galvanized, twisted two strands. Guying cable shall be 5 strand, 3/16 in (5 mm) diameter steel cable. Vertical supporting stakes shall be sound hardwood or pine. They shall be a minimum of 2 x 2 in. (5 x 8 cm) in diameter, 6-8 feet (2.4 m) long, and pointed at one end. Rubber chain-link ties are to be used to secure the tree to the stakes.

D. Plants are to be pruned at the time of planting and according to best horticulture practices. Pruning of all trees will include the removal of injured branches, double leaders, water sprouts, suckers, and interfering limbs. Healthy lower branches and small twigs close to the center should not be removed, except as necessary to clear sidewalks or streets. All pruning cuts shall be clean and smooth, with the bark intact and uninjured at the edges. In no case shall more than 25% of the branching structure be removed, **leaving the normal shape of the plant intact.**

E. All trees, shrubs, and other planting beds will be mulched with a mixture of composted wood chips or bark previously approved by the owner. The composted mulch will be free of materials injurious to plant growth, branches, leaves, roots, and other extraneous matter. The mulch will be 2 to 3 inches deep on trees and shrubs. The depth of mulch on the planting beds will be 2-3 inches. Mulch must not be placed within 3 inches (8 cm) of the trunks of trees or shrubs.

F. Anti-transpirant, if required, shall be an emulsion that provides a protective film over plant surfaces and is nontoxic to all plants used. It shall be delivered in containers of the manufacturer and mixed according to the manufacturer's directions.

### **XIV. Maintenance of Trees, Shrubs and Vines**

A. Maintenance shall begin immediately after each plant is planted and continue until the Owner's Representative has confirmed its acceptance.

B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, tightening and repairing guy and stakes, resetting plants to proper grades and to an upright position, restoration of the planting saucer, and furnishing and applying such sprays or other materials as are necessary to keep planting free of insects and diseases and in vigorous condition.

C. Planting areas and plants shall be protected at all times against trespassing and damage of all kinds for the duration of the maintenance period. If a plant becomes damaged or injured, it shall be treated or replaced as directed by the Owner's Representative at no additional cost.

D. Watering: Contractor shall irrigate, as required, to maintain vigorous and healthy tree growth. Over-watering or flooding shall not be allowed. Contractor shall use existing irrigation facilities and furnish any additional material, equipment, or water to ensure adequate irrigation. During periods of restricted water usage, all governmental regulations (permanent and temporary) shall be followed. Should modifications of existing irrigation systems and/or schedules facilitate adherence to these regulations, the Contractor shall notify the owner of the suggested modifications. The Contractor may have to transport water from other sources when irrigation systems are unavailable.

#### **XV. Acceptance**

A. The Owner's Representative shall inspect all work for acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date of inspection.

B. Acceptance of plant material by the Owner's Representative shall be for general conformance to specified size, character, and quality and shall not relieve the Contractor of responsibility for full conformance to the contract documents, including correct species.

C. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner's Representative, the Owner's Representative shall certify in writing that the work has been accepted.

#### **XVI. Acceptance in Part**

A. Work may be accepted in parts when the Owner's Representative and Contractor deem that practice to be in their mutual interest. Approval must be given in writing by the Owner's Representative to the Contractor verifying that the work is to be completed in parts. Acceptance of work in parts shall not waive any other provisions of this contract.

## **XVII. Guarantee Period and Replacements**

- A. The guarantee period for trees and shrubs shall begin at the date of acceptance.
- B. The Contractor shall guarantee all plant material to be in a healthy and flourishing condition for a period of 1 year from the date of acceptance.
- C. When work is accepted in parts, the guarantee periods extend from each of the partial acceptances to the terminal date of the guarantee of the last acceptance. Thus, all guarantee periods terminate at one time.
- D. The Contractor shall replace, without cost, as soon as weather conditions permit, and within a specified planting period, all plants determined by the Owner's Representative to be dead or in an unacceptable condition during and at the end of the guarantee period. To be considered acceptable, plants shall be free of dead or dying branches and branch tips and shall bear foliage of normal density, size, and color. Replacements shall closely match adjacent specimen of the same species. Replacements shall be subject to all requirements stated in the specifications.
- E. The guarantee of all replacement plants shall extend for an additional period of 1 year from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner's Representative may elect subsequent replacement or credit for that item.
- F. The Contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program. If changes are recommended, they shall be submitted in writing to the Owner's Representative.

## **XVIII. Final Inspection and Final Acceptance**

- A. At the end of the guarantee period and upon written request of the Contractor, the Owner's Representative will inspect all guaranteed work for final acceptance. The request shall be received at least 10 calendar days before the anticipated date for final inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner's Representative at that time, the Owner's Representative shall certify, in writing, that the project has received final acceptance.

**XIX. Planting Diagram - STREET TREE PLANTING DETAIL**

