



APPROVED STREET TREES FOR MISSOULA

**Street Trees for Missoula
and a Guide to Their Selection,
Planting, and Long Term Care**

**Prepared by
City of Missoula Parks and Recreation Department
June 10, 2014**

**Recommended
by the
Parks and Recreation Board
June 10, 2014**

**Adopted by
City Council Resolution No. 7891
July 28, 2014**



APPROVED STREET TREES FOR MISSOULA, MONTANA JULY 28, 2014

Introduction

This list is established to provide a quick reference of allowable street trees for use by homeowners, business owners, developers, engineers, and landscape architects.

Using the List

The list is divided into three height groups, Class I-Small trees, Class II-Medium trees, and Class-III-Large trees. Each group lists the trees by common name and botanical name. Where a cultivated variety, or cultivar, is available, the cultivar is listed below the species.

The characteristics of each specie or cultivar are listed to the right of the common name. When selecting a tree, determine the limitations of the planting site. Look for trees that are suitable for your site based upon the site limitations.

Where a cultivar has characteristics different from the parent species, such as height or spread, those characteristics will be identified separately. Where the cultivar characteristics are similar to the parent species, such as rooting depth or growth rate, the box will be blank.

On sites where shading is needed, the amount of shade cast by the tree is located in the shading column. The approximate square footage of shade cast by a tree is calculated by the shadow of a 15 year old tree at noon on the first day of Summer. Actual shade production will be determined by the growth rate of a tree on a particular site.

When a proposed tree is not on the list of approved trees, consult with the City Forester before planting the tree.

Selection

The master list of recommended trees for Missoula contains a general description of each tree and the appropriate use for the tree. For ease of use, the list is divided into Class I-Small, Class II-Medium, and Class III-Large trees. Class I-Small trees are generally 30 feet in height or less at maturity. Class II-Medium sized trees are generally 30 feet to 60 feet in height at maturity. And finally, Class III-Large trees are generally 60 feet in height or taller at maturity.

All of the trees on this list have characteristics which make them desirable. Most of the trees on this list are suitable for locations other than along city streets. Though there are no pest free trees, the trees listed in this document have been selected for their resistance to injurious insects or diseases. The information accompanying each tree species is meant to be used as a guide for decision making purposes.

The height and spread figures are given for trees at maturity. Trees with rapid growth rate can be expected to grow at least two feet per year when young. Those with moderate growth rates will grow between one and two feet per year when young. Slower growing trees will generally grow less than one foot per year when young. Please remember, growth rates are considered in general terms. Soil conditions and water availability will greatly influence the actual growth rate of a tree.

For purposes of calculating the approximate shading area provided by a particular tree species or cultivar, shading square footages are provided. The square footage area is based upon the shadow of a 15 year old tree on June 21 at noon. The shadow is based upon the growth of the tree under normal landscape conditions. In *Manual of Woody Landscape Plants – Their Identification, Ornamental Characteristics, Culture, Propagation and Uses* 6th Ed., Dr. Michael Dirr provides growth estimates based upon field observation throughout North America.

Root growth is listed as shallow, medium or deep. These are relative terms and describe the root system in its natural setting. The majority of a tree's root system is typically within the upper three feet of soil. However, actual soil conditions on site, as well as irrigation patterns, will ultimately determine the depth of rooting of a tree.

Spacing recommendations are based upon future growth estimates. These minimum spacing distances provide for adequate canopy growth, while still providing for aesthetics. Planting trees too close together for initial effect will typically result in poor performance as the trees grow and mature.

The planter width column provides a minimum planter size for each tree. The widths are based upon typical rooting patterns in a natural setting, and the mature size of the tree. Specific site conditions may require a wider planter than that recommended. Planting a tree in too small of a planter will typically lead to poor tree performance, infrastructure damage, or both.

The comments section provides helpful insight into special characteristics of a particular tree. Specific comments are noted for those species that have limiting characteristics. General pruning requirements are also included.

Users of this list should keep in mind that no tree species is perfect and no one species will meet all the needs of a particular area. It is important that a selected tree species or cultivar be adaptable to the space available, laterally, horizontally and vertically, while meeting the aesthetic needs of the area.

The final consideration is the availability of trees on the list. Every effort is made to list trees that are commercially available, and to work with local nurseries to ensure they are stocked. If the tree is not in stock at a local nursery, ask the salesperson to order the tree and have it shipped in. When a particular tree is not available at the grower, a substitute with similar characteristics may be selected from the list.

Questions regarding street tree characteristics may be called into the Missoula City Forester at 406-552-6270.

Planting

Heavily compacted soils, or soils with high clay content, typically limit the movement of oxygen to within only a few inches of the surface. To minimize the potential impact to curbs and sidewalks, adequate soil preparation is essential. Proper soil preparation not only fosters deeper root systems, it provides adequate growing conditions that ultimately lead to healthier trees. Where possible, till the soil within the entire boulevard to a depth non-compacted soil is reached.

Landscape Detail PR-101 provides directions for proper tree planting of Balled and Burlap tree stock. Proper planting will ensure the tree thrives for many years. The detail is included in this document for your reference. Improperly planted trees will not attain their full potential, and will be adversely affected by pest problems. Place the root crown of the tree at or slightly above finish grade. The top of root ball is not always the top of root crown. Trees are typically planted deep in the container, and in the field. You will need to remove excess soil and girdling roots before planting the tree.

Plastic root barriers provide a measure of protection for curbing and sidewalk. However, they do not guarantee damage prevention. To provide the greatest level of protection, root barriers must be installed properly, with at least ½-inch of barrier above final grade, mulch, or turf thatch layer. Failure to install the root barrier properly will result in roots growing over the top of the barrier, rendering it ineffective.

Turf at the base of a young sapling can inhibit the production of new roots, stunting the tree's growth. Chemicals secreted by the roots of turfgrass act as a growth regulator for tree roots. Further, string trimmers and mowers used to maintain the turf will damage the trunk of the tree. The easiest way to solve this problem is to create and maintain a turf ring around the tree. The Missoula tree planting detail shows a minimum tree ring diameter of three feet.

Apply a three to four-inch thick layer of composted mulch within the tree ring. Mulch keeps the soil cooler for new roots, reduces water loss, and reduces the growth of weeds. The mulch also provides a visual barrier for weed eaters and lawn mowers. Make sure the mulch is kept from the base of the tree. Do not form mulch “volcanoes” around the base of the tree. Not only are the “volcanoes” unsightly, they damage the trunk of the young tree.

Maintenance

Proper irrigation is essential to good tree growth. Do not over water the tree! Over watering removes oxygen from the soil. Inadequate oxygen in the soil leads to root death and shallow rooting. In turn, shallow rooting causes damage to turf, maintenance equipment, sidewalks, buildings, and other landscape improvements. In either case, the tree is often removed prematurely. Water trees, shrubs, groundcovers, and turf based upon need, not time! Less water needs to be applied in the Spring and Fall than in the Summer. The typical water need is 0.32 inches of water per day in the middle of July, but only a tenth of that in early Spring or late Fall! Increase water applications as the need increases. Begin to decrease the water application as the season cools and the days shorten. Apply water more infrequently, but to a greater depth. A good rule of thumb for newly planted trees is to slowly apply 5 to 10 gallons of water per week to the rootball for every inch in diameter. Proper irrigation saves money and fosters good plant growth!

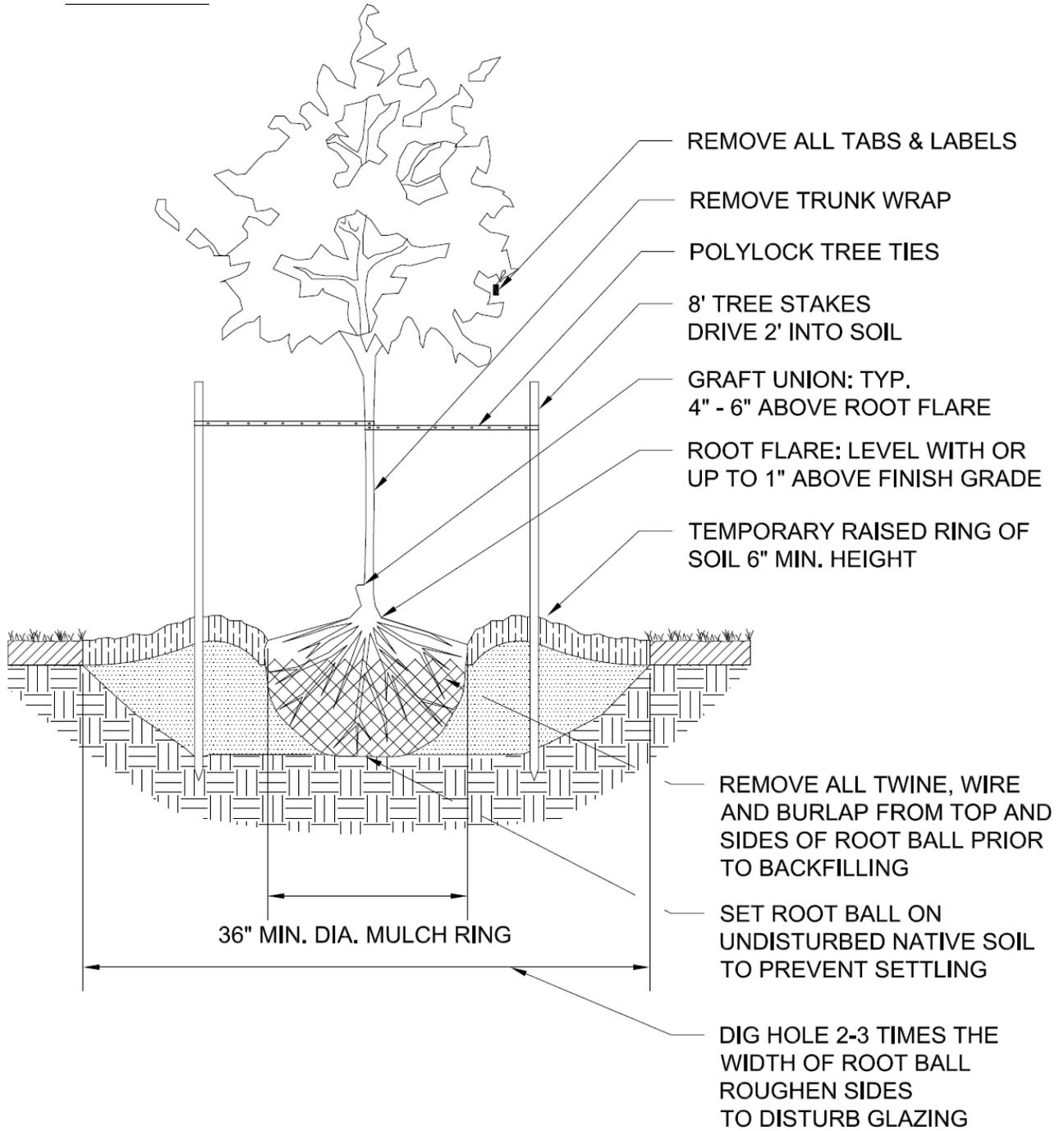
Maintain a turf free tree ring around each tree. The ring will provide basic protection from string trimmers and lawn mowers. Increase the ring size as the tree grows. Apply additional mulch as the old mulch decays. Do not allow weeds or turf to overgrow the tree ring!

Prune the trees only as necessary, removing no more than one-quarter of the canopy at any one time. Early developmental pruning will establish the long-term structure of a tree. Reference the comment section for information on the developmental pruning needs. Some species or cultivars require more aggressive developmental pruning than others. “Bleeding” trees, such as maple or birch, should be pruned in late-Summer or Fall. For more pruning information, please reference the current ANSI A300 Pruning Standards and the Best Management Practices for Pruning Manual.

Do not top trees. This practice destroys the natural defense mechanisms of a tree, and allows wood decay to progress unimpeded. Plant a smaller tree if space is limited.

City of Missoula Planting Detail

SECTION



1. Plant material must meet the minimum acceptable standard set by the American Association of Nurserymen's American Standard of Nursery Stock: ANSI Z60.1. Broken, damaged, diseased, or substandard stock are prohibited from being planted in the public right-of-way and will be rejected.
2. Only class I (small growing) trees are permitted to be planted under or within fifteen (15') of overhead utility lines.
3. Prune only broken or damaged branches. Do not apply fertilizer at time of planting.
4. The root flare is the point where the top most structural root emerges from the trunk. The depth of the root ball shall be measured from the root flare to the bottom of the root ball. Handle B&B plants carefully when transferring to planting hole. Lift or carry by holding the root ball, not the trunk.
5. Remove any excess soil from the top of the root ball to expose the root flare. Place tree in planting hole with root flare level with or up to 1" above finish grade.
6. Remove all wire baskets and rope from root ball. Be careful to keep the root ball intact.
7. Remove all burlap from the root ball. Be careful to keep root ball intact.
8. Straighten, cut and remove any circling roots.
9. Backfill planting hole 2/3 full with existing soil, settle with water, continue to fill with soil, water again. Water thoroughly after installation to eliminate air pockets.
10. Construct a temporary raised ring of soil at edge of root ball to contain water. Remove or breach before winter.
11. Construct mulch ring with a minimum 36" diameter to a depth of 2" - 4"; leave 3" bare ground between mulch and tree trunk.
12. Set stakes parallel to prevailing wind and outside of root ball. Ties must be 1" wide minimum, flexible belt-like strapping. Do not use rope or wire. Do not over-tighten around tree. Ties should be tight enough to support the tree while allowing it to sway. Remove stakes and ties within one year after installation.
13. Trees benefit when irrigated separately from turf. Water new trees during summer months to a depth of 12" - 18" once per week (about 5 gallons of water per caliper inch) for the first 3 growing seasons. During periods of drought, new trees may need more frequent watering.

Bibliography

Benzie, Sam. 2000. *The Encyclopedia of North American Trees*. Firefly. Buffalo, New York

Dirr, Michael A. 1997. *Dirr's Hardy Trees and Shrubs*. Timber Press. Portland, Oregon

Dirr, Michael A. 2009. *Manual of Woody Landscape Plants – Their Identification, Ornamental Characteristics, Culture, Propagation and Uses* 6th Ed. Stipes Publishing LLC. Champaign, Illinois

Fitzgerald, Tonie, Melissa Burt, Jim Flott, Sydney McCrea, Diane Notske, and Mike Terrell. 2002. *Landscape Plants for the Inland Northwest – Including Native and Adapted Plants*. Washington State University Co-operative Extension. Pullman, Washington

Gilman, Edward F. 1997. *Trees for Urban and Suburban Landscapes*. Delmar Publishers. Albany, New York

Harlow, William M., and Ellwood S. Harrar. 1969. *Textbook of Dendrology* 5th Ed. McGraw-Hill. New York, New York

Jacobson, Arthur Lee. 1996. *North American Landscape Trees*. Ten Speed Press. Berkeley, California

Natural Resources Conservation Service. *Plants Database*. <http://www.plants.usda.gov/java/>

Class I – Small Stature Trees – Less Than 30 Feet

Common Name Scientific Name	Height	Spread	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Trident maple <i>Acer buergerianum</i>	25' – 30'	25'	Moderate	Medium	4'	20' - 25'	No	A small shade tree with a round shaped crown and small, 3-lobed leaves. The leaves are glossy green turning yellow to red in the fall. <u>This tree must be properly pruned to grow more upright and provide needed pedestrian and vehicular clearance.</u> Somewhat drought tolerant.
Rocky Mtn. Glow maple <i>Acer grandidentatum</i> 'Schmidt'	30'	20' - 25'	Slow	Deep	3'	20' - 25'	No	Small round headed shade tree for areas of restricted space. Iridescent reddish orange fall color. Drought tolerant when established.
Apollo maple <i>Acer sacharrum</i> 'Barrett Cole'	25'	10'	Slow	Medium	4'	10' – 15'	No	Small, columnar canopy. Needs fertile, well-drained soil. Fall colors are yellow to red. <u>Needs developmental pruning.</u>
'Crescendo' sugar maple <i>Acer saccharum</i> 'Morton'	25' – 30'	25' – 30'	Slow	Medium	5'	25'	No	Excellent heat and drought tolerance. Good branch structure. Prefers well draining soils for optimal growth. Good Fall color.
Tartarian maple <i>Acer tartaricum</i>	15' – 25'	20' – 25'	Slow – Moderate	Medium	4'	20'	No	This tree needs drier rooting conditions. Somewhat drought tolerant when established. Yellow and red fall color.
Saskatoon serviceberry <i>Amelanchier alnifolia</i>	15'	10'	Moderate	Deep	4'	10'	No	This is a small multi-stem tree. Limited use as a street tree in boulevards. Use in areas where sight lines are not a concern.
Snow Cloud serviceberry <i>Amelanchier laevis</i>	15' – 25'	15' – 20'	Moderate	Deep	3'	15' – 20'	No	Snow white flowers in late spring. Purple-bronze summer leaf color. <u>Needs developmental pruning.</u> Sometimes questionable under unfavorable growing conditions. All cultivars share these traits.
	'Cumulus'	20' – 25'	15' – 20'					
	'Majestic'	20' – 25'	15' – 20'					
	'Snowcloud'	20' – 25'	15' – 20'					
Constellation dogwood <i>Cornus florida X kousa</i> 'Rutcan'	20' – 25'	20'	Moderate	Deep	4'	20'	No	White flowers in the late Spring. Resistant to dogwood anthracnose. Erect tree with wide branch angles. More vigorous than Korean dogwood.
Stellar Pink dogwood <i>Cornus florida X kousa</i> 'Rutgan'	20	20'	Moderate	Deep	4'	20'	No	Pink flowers in the late Spring. Resistant to dogwood anthracnose. Erect tree with wide branch angles. More vigorous than Korean dogwood.

Class I – Small Stature Trees – Less Than 30 Feet

Common Name Scientific Name	Height	Spread	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Thornless cockspur hawthorn <i>Crataegus crus-galli</i> var. <i>inermis</i>	20' – 30'	20 – 35'	Slow – Medium	Medium	3'	25' – 30'	Yes	Thornless cultivar of hawthorn. <u>Can be used in swales if they drain well, otherwise plant just above the swale bottom.</u> Hawthorns can be subject to many diseases, especially when stressed.
English hawthorn <i>Crataegus laevigata</i>	15' – 20'	15' – 20'	Slow	Medium	3'	15'	Yes	This hawthorn has thorns. <u>Can be used in swales if they drain well.</u> Because of its small size, use only where space is very limited. May be subject to many diseases when stressed.
Snowbird hawthorn <i>Crataegus x mordenensis</i> 'Snowbird'	20' – 25'	20'	Slow	Medium	3'	20'	Yes	<u>This hawthorn has thorns.</u> Can be used if swales drain well. Double petal flowers. May be subject to diseases when stressed.
Washington hawthorn <i>Crataegus phaenopyrum</i>	25' – 30'	20' – 25'	Slow	Medium	4'	20' – 25'	No	Use 'Princeton Sentry' when available, it is nearly thornless. May be subject to diseases when stressed. Very showy fruit.
Green hawthorn <i>Crataegus viridis</i> 'Winter King'	20' – 35'	25' – 35'	Medium	Medium	4'	20' – 25'		Silver bark and few thorns. Less susceptible to cedar-hawthorn rust
Prairifire crabapple <i>Malus</i> 'Prairifire'	20'	20'	Moderate	Medium	5'	20'	Yes	One of the best crabapple cultivars. Resistant to all typical crabapple diseases. Can sucker if apple rootstock is used. <u>Swales must drain well.</u>
Robinson crabapple <i>Malus</i> 'Robinson'	25'	25'	Moderate	Medium	5'	20' – 25'	Yes	Small ornamental tree for restricted areas. Disease resistant. Birds eat the fruit. Yellow-red fall color. Can sucker if apple rootstock is used. <u>Swales must drain well.</u>
Spring Snow crabapple <i>Malus</i> 'Spring Snow'	20' – 25'	15' - 20'	Moderate	Medium	5'	20'	Yes	Small ornamental tree for restricted areas. Highly susceptible to apple scab. Very little fruit. Yellow-red fall color. Can sucker if apple rootstock is used. <u>Swales must drain well.</u>
Sugar Tyme crabapple <i>Malus</i> 'Sugar Tyme'	15' – 20'	15'	Moderate	Medium	5'	15'	Yes	Small ornamental tree for restricted areas. Due to its small size, use only where space is very limited. Disease resistant. Birds eat the fruit. Yellow-red fall color. Can sucker if apple rootstock is used. <u>Swales must drain well.</u>

Class I – Small Stature Trees – Less Than 30 Feet

Common Name Scientific Name	Height	Spread	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Thunderchild crabapple <i>Malus</i> 'Thunderchild'	20'	20'	Moderate	Medium	5'	15' – 20'	Yes	Small ornamental tree for restricted areas. Susceptible to apple scab. Dark red, ½" fruit. Deep purple leaf color. Can sucker if apple rootstock is used. <u>Swales must drain well</u>
Accolade Cherry <i>Prunus sargentii</i> 'Accolade'	20' – 25'	20' – 30'	Moderate	Medium	5'	25'	No	Semi-double deep rose pink blossoms. Smaller cultivar of parent for use under power lines. Needs well draining soil.
Chokecherry <i>Prunus virginiana</i>	25'	20'	Fast	Medium	5'	20'	No	Short lived multi-stem tree. Select single trunk standards for street trees. Needs well draining soil. Produces large quantities of 3/8" fruit with red fleshy skin. Susceptible to black knot.
Canada red chokecherry <i>Prunus virginiana</i> 'Canada Red'	30'	20' – 25'	Moderate - Fast	Medium	5'	25'	No	Burgundy colored leaves during the growing season. Needs well draining soil. May produce some fruit. Susceptible to black knot
Red Cascade mountainash <i>Sorbus americana</i> 'Dwarfcrown'	15' – 20'	20'	Slow	Shallow – Medium	4'	25'	Yes	Small ornamental tree for restricted areas. Due to its small size, use only where space is very limited. Needs training to maintain a central leader. Well draining swales are best for this tree.
Japanese Tree Lilac <i>Syringa reticulata</i>	20' – 30'	15' – 25'	Moderate	Shallow – Medium	4'	20'	No	Small tree. Best in more acidic soils. Prefers cooler planting locations. Many insect pests. Flowers have a somewhat offensive odor.
'Ivory Silk'	20' – 25'	15'				15'		One of the best forms. Dense form with deep green leaves.
'Regent' (PNI 5723)	20' – 25'	10'				10'		Vigorous upright growth.
'Summer Snow'	20'	15'				15'		Flowers fragrant. Cherry like bark.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Sub-alpine fir <i>Abies lasiocarpa</i>	50' – 70'	25' – 30'	50 SF	Very Slow	Shallow – Medium	6'	25'	No	Evergreen conifer. This tree grows very slowly. The typical height over many years is approximately 50' in our area. Under ideal conditions, this tree can grow over 100' tall.
Hedge maple <i>Acer campestre</i>	30' – 45'	30' – 35'	154 SF	Slow	Medium	6'	25' – 35'	No	A relatively disease and pest free tree. It tolerates poor soil conditions. Developmental pruning is required to maintain good form.
Freeman maple <i>Acer X freemanii</i>	40' – 60'			Moderate – Fast	Shallow – Medium	8'		Yes	This tree is a cross between red maple (<i>Acer rubrum</i>) and silver maple (<i>Acer saccharinum</i>). Growth rate is faster than red maple. Structure is better than silver maple. Developmental pruning is a must when the tree is young. While it tolerates wet soils, this hybrid does better in soils that drain.
'Autumn Fantasy' ('DTR 102')	40' – 50'	40'	452 SF				40'		Better than 'Autumn Blaze', but with wider branch angles. Fast grower with a broad canopy. Developmental pruning is needed to minimize included bark. Susceptible to freeze damage on young twigs in cold pockets..
'Celebration' ('Celzam')	45'	20' – 25'	79 SF				25'		Similar to Armstrong, but with wider branch angles. Shorter than most cultivars. Use in areas of limited canopy space. Developmental pruning is required to maintain good form.
'Morgan' ('Indian Summer')	45' – 50'	40'	491 SF				40'		Good branch angle attachment. Brilliant fall color. Very fast growing. Due to its rapid growth, developmental pruning is critical to establishing good structure.
'Scarlet Sentinel' ('Scarsen')	45'	25' – 30'	154 SF				25'		Broadly columnar canopy. Good branch angles. Use in areas of limited canopy space. Developmental pruning is important to maintaining good form.
Red maple <i>Acer rubrum</i>	40' – 60'	35' – 45'		Moderate – Fast	Shallow – Medium	8'		Yes	A broadly pyramidal tree, with several cultivars. As a species, red maples will tolerate wet soils, but prefers adequate drained soils. Use only the cultivars listed below, as cultivars developed in the southern end of the range are not cold hardy here. Developmental training is a must when the tree is young.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
'Northwood'		35'	452 SF				35'		Good cold tolerance. Better branch structure. Developmental pruning needed to maintain a good branch structure. Excellent Fall color.
Red Sunset ('Franksred')	45' – 50'	35' – 40'	706 SF				35'		Good cold tolerance. Good branch structure. Excellent Fall coloration. Can show manganese deficiencies, which causes Summer leaf scorching.
'Schlesingeri'	60' – 70'	35' – 50'	615 SF			10'	40'		One of the oldest, and largest, red maple cultivars. Earliest of the Fall coloring maples.
Pacific Sunset maple <i>Acer truncatum X plantanoides</i> 'Warrensred'	30'	25'	115 SF	Slow – Moderate	Medium	6'	25'	Yes	Similar to Norwegian Sunset maple. However, the wider branch structure makes this the better of the two cultivars. This tree can be used under taller power lines.
Red horsechestnut <i>Aesculus X carnea</i> 'Briotii'	30' – 40'	30' – 35'	176 SF	Slow – Moderate	Medium	6'	30'	No	A good substitute for common horsechestnut. Less susceptible to leaf scorch and mildew. Brilliant red flowers in the Spring.
River birch <i>Betula nigra</i>	40' – 70'	30' – 50'	706 SF	Fast – Moderate	Shallow – Medium	10'	30' – 35'	Yes	This species is resistant to bronze birch borer. While river birch tolerates wet conditions, they also tolerate dry Summer conditions. Very interesting bark. Aphids can be a problem at times. Like black alder, the wood can be brittle, requiring periodic pruning to maintain canopy structure.
'Dura-Heat' ('BNMTF')	35' – 50'		615 SF				35'		Best cultivar for high heat conditions. Cold tolerant. Moderate aphid resistance.
'Heritage' ('Cully')	40' – 60'		706 SF				40'		Consistent salmon bark coloration. Cold tolerant. Heat tolerant.
European hornbeam <i>Carpinus betulus</i>	40' – 60'	30' – 40'	491 SF	Slow – Moderate	Medium	8'	35'	No	This species will tolerate wet soil if they drain well, otherwise drier soils are preferred. Developmental pruning will aid in developing a good branch structure. For maximum shade, <u>do not</u> use the common cultivar 'Fastigiata'.
Prairie Pride Hackberry <i>Celtis occidentalis</i> 'Prairie Pride'	40' – 60'	40' – 50'	452 SF	Moderate	Medium	8' – 10'	40'	Yes	Tolerates drought and alkaline soils. Tolerates wet draining soils. Lighter fruit crops. Susceptible to nipple gall, powdery mildew and leaf spots.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Magnifica hackberry <i>Celtis occidentalis X laevigata</i> 'Magnifica'	50'	40'	706 SF	Moderate	Shallow – Medium	10'	35'	Yes	This hybrid species is better adapted to street tree use than its parents, common hackberry (<i>Celtis occidentalis</i>) and sugarberry (<i>Celtis laevigata</i>). It can be used in swales. Salt tolerant.
Katsura tree <i>Cercidiphyllum japonicum</i>	40' – 60'	25' – 45'	706 SF	Moderate – Fast	Shallow – Medium	10'	35'	Yes	Will tolerate periodic flooding, provided the soil eventually drains. Tree needs supplemental watering when young. <u>Requires developmental pruning to establish a good form, and periodic pruning to maintain good form.</u> Do not over-thin the canopy – it will sunburn.
Yellowwood <i>Cladrastus kentukea (lutea)</i>	30' – 50'	40' – 55'	452 SF	Moderate	Medium	8'	35' – 40'	No	Can tolerate moist, well-drained soils. <u>Requires developmental pruning to establish a good form.</u> Otherwise, the tree is prone to splitting. <u>Prune only in the Summer – this tree is a profuse bleeder!</u>
Turkish Filbert <i>Corylus colurna</i>	40' – 50'	35' – 40'	452 SF	Moderate	Medium	8'	35'	No	Cold and heat tolerate tree. Supplemental water needed the first few summers to reestablish the root system. After that, it is drought tolerant. Soils may be moist, must drain. Developmental pruning needed when young.
European beech <i>Fagus sylvatica</i>	50' – 60'	35' – 45'		Slow – Moderate	Shallow	10' – 12'	35'	No	Species will not tolerate wet, low oxygen soils. Will not tolerate salt. Makes a fine, strong canopied tree. Prune tree in the late summer to avoid bleeding.
'Purple' ('Riversii')	45' – 55'	35' – 45'	254 SF				35'		Very deep purple color in Spring. Developmental pruning needed to establish a good branch structure. Spring, changing to purple-green in the Summer.
Ginkgo <i>Ginkgo biloba</i>	50' – 80'	30' – 50'		Slow – Moderate	Medium	8'		No	This species is an ancient, living transition tree between conifers and hardwoods. It is classified with conifers, such as pines, but it grows like a hardwood. NEVER plant field seedlings! It could be a female with rancid smelling fruit. ALWAYS <u>select a named male cultivar!</u>
'Autumn Gold'	50'	30' – 35'	254 SF				30' – 35'		Brilliant yellow Fall color, almost iridescent. Needs developmental pruning to prevent narrow branch angles and included bark.
'Fairmount'	45' – 60'	30'	176 SF				30'		Narrow canopy tree with good branch angles. Good Fall coloration. The tree can grow tall.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
'Halka'	45' – 50'	40'	314 SF				35' – 40'		Broader canopy than most ginkgo cultivars, and will produce large amounts of shade with age.
'Princeton Sentry' ('PNI 2720')	45' – 60'	25'	113 SF				20' – 25'		Very narrow canopy for constricted areas. Good branch angles for such a narrow tree. Developmental pruning will prevent included bark.
'Saratoga'	40' – 45'	30'	176 SF				30'		Smaller scale ginkgo with very distinctive foliage, and a distinct central leader.
Thornless Honeylocust <i>Gleditsia triacanthos inermis</i>	30' – 70'	30' – 70'		Fast	Medium	8'		Yes	Extremely variable in height and width. Very salt tolerant. The species and cultivars tolerate wet conditions. Use named cultivars. Species and cultivars are susceptible to pod gall midge.
'Halka' ('Christie')	40' – 45'	40' – 45'	452 SF				35' – 40'		Broad oval canopy with good branching. Developmental pruning will ensure good branch structure. May periodically produce sterile seed pods.
'Moraine'	40' – 50'	40' – 45'	452 SF				35' – 40'		One of the earliest and best thornless cultivars. Larger canopy for good shade. Developmental pruning needed to establish good branch structure.
'Shademaster'	40' – 45'	40' – 45'	452 SF				35' – 40'		Like 'Moraine', but with ascending branches. Developmental pruning is needed to establish a good branch structure.
'Skyline' ('Skycole')	40' – 45'	30' – 35'	314 SF				30' – 35'		Pyramidal form. Best resistance to pod gall midge. Developmental pruning needed.
'True Shade'	40'	35'	314 SF				30' – 35'		Broad oval canopy with 45 degree branch angles. Fast growing shade tree. Developmental pruning will be necessary to establish good branch structure.
Espresso Kentucky Coffeetree <i>Gymnocladus dioicus</i> 'Espresso'	45' – 55'	30' – 35'	254 SF	Slow – Moderate	Medium	8'	30' – 35'	No	Vase shaped canopy like American elm. Seedless cultivar. Prune in Winter. Wood can be brittle. Developmental pruning needed to establish and maintain a good branch structure. Cold tolerant.
American hophornbeam <i>Ostrya virginiana</i>	25' – 40'	25' – 30'	176 SF	Slow	Medium – Deep	6'	25'	No	Transplant this tree in the Spring or early Summer. Graceful, lacey branch form. Few pest problems. Soils can be moist, but must drain.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Macho Amur corktree <i>Phellodendron amurense</i> ‘Macho’	30’ – 45’	35’ 45’	452 SF	Moderate	Shallow	10’ – 12’	35’	No	Male cultivar. <u>DO NOT plant female trees.</u> Better branch structure than species. Tends to have a shallow fibrous root system. Dark green feathery leaves.
White spruce <i>Picea glauca</i>	40’ – 60’	20’	113 SF	Moderate	Shallow – Medium	10’ – 12’	15’ – 20’	No	Narrow canopied conifer for restricted sites. However, the root system needs adequate space. Needles are a whitish-gray color. Low branches can cause visibility problems. Susceptible to root rots in wet soils.
Scotch pine <i>Pinus sylvestris</i>	30’ – 60’	30’ – 40’	314 SF	Moderate	Shallow – Medium	10’ – 12’	25’ – 30’	No	While this tree has its benefits, it is susceptible to a number of pest problems. Roots will rot in wet soils. Use only on dry sites.
Sargent cherry <i>Prunus sargentii</i>	40’ – 50’	35’ – 45’	452 SF	Moderate	Shallow – Medium	10’ – 12’	35’	No	Beautiful Spring blossoms, followed by small purple drupe in early Summer. Developmental pruning needed to establish a good branch structure. Use where the drupe fruit will not cause problems. Will not tolerate wet soils.
Callery pear <i>Pyrus calleryana</i>	30’ – 60’	35’ – 45’		Very Fast	Medium	8’ – 10’		Yes	The species is a very fast growing tree, but is not readily available. DO NOT plant the cultivar ‘Bradford’, it self destructs after about 15 years.
‘Trinity’	30’ – 35’	25’ – 30’	254 SF				25’		Broad oval canopy, with a flatter branch structure. Developmental pruning is still needed. Heavy blossom production. Very little fruit.
Prairie Gem pear <i>Pyrus ussuriensis</i> ‘Mordak’	35’ – 45’	35’ – 45’	452 SF	Moderate	Medium	8’	30’ – 35’	Yes	Very cold tolerant. Resistant to fire blight. Produces 1-1/2” fruit if cross pollinated. Developmental pruning needed.
English oak <i>Quercus robur</i>	40’ – 60’	40’ – 60’	314 SF	Slow – Moderate	Medium	8’	35’ – 40’	No	The species is susceptible to powdery mildew. Large stature in the landscape. Prefers well drained soils. Does produce acorns.
‘Regal Prince Oak’ (‘Long’)		10’ – 15’				8’ – 10’	10’ – 15’	No	Very narrow cultivar, producing very little shade. Resistant to powdery mildew.
‘Rosehill Oak’ (‘Asjes’)		20’ – 25’	78 SF			8’ – 10’	20’ – 25’	No	Wider branched cultivar producing some shade. Resistant to powdery mildew.
Westminster Globe oak ‘Michround’	40’ – 55’	40’ – 50’	254 SF	Slow – Moderate	Medium	10’ – 12’	35’ – 40’	No	Smaller sized oak is a cultivar of English oak. Very cold tolerant. May have problems with mildew. Produces an acorn crop every other year. Needs good

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
									draining soil. Needs developmental pruning.
Korean mountainash <i>Sorbus alnifolia</i>	40' – 50'	20' – 40'	452 SF	Moderate – Fast	Shallow – Medium	10' – 12'	30' – 35'	No	Adaptable to many soil types. Simple leaves. The tree does produce clusters of fruit. Though more tolerant of pests than European mountainash, it is still susceptible to many. Maintain plant health to minimize pest problems. Do not over prune.
Oak-leaf mountainash <i>Sorbus X hybrida (thuringiaca)</i>	25' – 35'	20' – 30'	176 SF	Moderate – Fast	Shallow – Medium	10' – 20'	25'	No	Leaves look like oak leaves. Keep tree healthy to minimize pest problems. Developmental pruning needed. Do not over prune.
American linden <i>Tilia americana</i>	60' – 80'	35' – 45'	706 SF	Moderate	Medium	8' – 10'	40'	No	The species is a very large headed tree. Can tolerate moist soils if drained well. Large leaves. Cultivars are better suited for urban use. Can have problems with aphids.
'American Sentry'	45' – 55'	20' – 25'	78 SF	Moderate	Medium	8' – 10'	25'	No	Narrow canopy. Developmental pruning needed to minimize included bark. Medium green Summer foliage.
'Legend'	40' – 55'	30' – 40'	314 SF	Moderate	Medium	8'	35'	No	Broadly pyramidal with a distinct central leader. Leaves hold green color all Summer. Developmental pruning needed to maintain the central leader.
'Redmond'	40' – 60'	25' – 30'	254 SF	Slow – Moderate	Medium	8'	25' – 30'	No	Pyramidal canopy with a distinct central leader. Developmental pruning needed to maintain the central leader.
Greenspire littleleaf linden <i>Tilia cordata</i> 'Greenspire'	40' – 50'	30' – 35'	254 SF	Slow – Moderate	Medium	8'	35'	No	Broadly pyramidal with a distinct central leader. Leaves hold green color all Summer. Developmental pruning needed to maintain the central leader. Tougher than American linden. Can have aphid problems.
Silver linden <i>Tilia tomentosa</i>	50' – 70'	30' – 45'	452 SF	Moderate	Medium	8' – 10'	40'	No	Large headed shade tree. Tolerates moist soil, if it drains. Silver underside of leaves shimmer in the wind.
'Green Mountain' ('PNI 6051')	45' – 60'	40'	706 SF	Moderate – Fast		8' – 10'	40'	No	Faster growing cultivar for rapid shade. Maintains a central leader. Developmental pruning needed to maintain good branch structure. Tolerates heat and drought.
'Sterling'	50'	40'	452 SF	Moderate		8' – 10'	40'	No	Similar to Green Mountain, but slower growing. Yellow Fall color.

Class II - Medium Stature Trees – 30 to 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Crimean linden <i>Tilia X euchlora</i>	40' – 60'	20' – 30'	176 SF	Moderate	Medium	8' – 10'	25'	No	Hybrid with yellow Fall color. More resistant to aphids. Tolerates hot, dry conditions. Developmental pruning needed to maintain good branch structure.
Frontier elm <i>Ulmus 'Frontier'</i>	40' – 50'	30' – 35'	452 SF	Fast	Shallow – Medium	10'	30' – 35'	No	Vase shaped hybrid with red fall color. Moderate resistance to elm leaf beetle. Prefers moist soil. Developmental pruning needed to maintain a good branch structure. The vase shape may be a problem under heavy snow or ice loads.

Class III - Large Stature Trees – Over 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Freeman maple <i>Acer X freemanii</i>	40' – 60'			Moderate – Fast	Shallow – Medium	8' – 10'		Yes	This tree is a cross between red maple (<i>Acer rubrum</i>) and silver maple (<i>Acer saccharine</i>). Growth rate is faster than red maple. Structure is better than silver maple. Developmental pruning is a must when the tree is young. While it tolerates wet soils, this hybrid does better in soils that drain.
'Marmo'	60' – 70'	35' – 40'	491 SF				35'		Broadly columnar canopy. Branches angles are wider than 'Armstrong'. Developmental pruning is needed to ensure a good branch structure.
Sugar maple <i>Acer saccharum</i>	60' – 70'	40' – 55'		Slow – Moderate	Medium	8' – 10'		No	Susceptible to salt damage. Does not like small planting spaces or restricted root zones. Prefers fertile, well draining soil.
'Bonfire'	50' – 65'	40' – 50'	615 SF	Moderate – Fast			35' – 40'		More tolerant of heat. Irregular branching pattern needs developmental pruning. Fall color listed at brilliant red.
'Majesty' ('Flax Mill Majesty')	60' – 80'	40' – 50'	615 SF	Fast			40'		Fast growing with egg-shaped canopy. Resists frost cracking and sunscald. Very cold tolerant. Very thick branching habit. Developmental pruning is needed to establish good branch spacing.
'Green Mountain'	65' – 75'	40' – 50'	452 SF	Moderate			35' – 40'		This cultivar is listed for use in hot dry areas. Slower growth with leathery leaves.
'Wright Brothers'	50' – 75'	35' – 40'	491 SF	Rapid			40'		Fast growing with cone-shaped canopy. Resists frost cracking and sunscald. Very cold tolerant. Very thick branching habit. Developmental pruning is needed to establish good branch spacing.
Western Larch <i>Larix occidentalis</i>	90' – 120'	25' – 40'	254 SF	Moderate – Fast	Medium	10' – 12'	30'	No	Not tolerant of west soils. Prefers well draining soils. Very cold tolerant. This is a large tree; plant only where there is space!
Cucumbertree magnolia <i>Magnolia acuminata</i>	50' – 80'	50' – 60'	706 SF	Fast	Shallow – Medium	10' – 12'	35' – 40'	No	Prefers deep, well draining soils. Plant in the early Spring. Can produce fruit on some trees. Prune after blossom.
Black Spruce <i>Picea mariana</i>	40' – 65'	10' – 20'	78 SF	Moderate	Medium	10' – 12'	10 – 20'	Yes	Prefers moist soil. Grows at the edge of streams, bogs and lakes. Will tolerate stagnant water, but prefers soils that drain. Use at the upper edge of a swale. The root system is typically very shallow.

Class III - Large Stature Trees – Over 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Serbian Spruce <i>Picea omorika</i>	50' – 60'	20' – 25'	78 SF	Slow – Moderate	Medium	8' – 10'	20'	Yes	Tolerates moist soils that eventually drain. Cold tolerant. Subject to aphids and budworms.
Ponderosa Pine <i>Pinus ponderosa</i>	60' – 100'	25' – 35'	113 SF	Moderate	Medium	10' – 12'	30'	No	Drought tolerant native. Prefers deep, well drained soils. Can be attacked by a number of pests if growing conditions are poor. Some tolerance to salts. Three-needle pine with a coarse appearance. Produces large cones!
Southwestern White Pine <i>Pinus strobiformis</i>	60' – 100'	25' – 35'	113 SF	Moderate	Medium	10' – 12'	30'	No	Drought tolerant species from New Mexico. Prefers deep, well drained soils. Blister rust can be a problem. Five-needle pine with a fine appearance. Produces large cones.
Vanderwolf Pine <i>Pinus flexilis</i> 'Vanderwolf'	30' – 55'	15' – 35'	113 SF	Moderate	Medium	8' – 10'	25'	No	Faster growth rate than species. Fine textured five-needle pine with twisting, blue-green foliage. Blister rust can be a problem.
Sycamore <i>Platanus occidentalis</i>	50' – 85'	35' – 50'	491 SF	Moderate	Medium	10' – 12'	40'	Yes	Tolerates wet conditions and salty run-off. Well draining soils needed. Anthracnose can be a problem. Debris can be a problem. Fuzz on leaves can make people sneeze.
Doug-Fir <i>Pseudotsuga menzeisii</i>	70' – 100'	25' – 35'	113 SF	Moderate – Fast	Medium	10' – 12'	30'	No	Drought tolerant native. Does not like wet soils. Doug-fir will grow faster in the Inland Empire with periodic deep watering. Produces heavy cone crops.
White Oak <i>Quercus alba</i>	50' – 80'	40' – 70'	452 SF	Slow – Moderate	Medium – Deep	10' – 12'	40'	No	Hardy oak species. Does not like to have its root system disturbed once established. Does not tolerate compacted soils. Prefers deep, well draining soils. Subject to aphid infestations. Produces a cyclical acorn crop.
Swamp white oak <i>Quercus bicolor</i>	50' – 60'	50' – 60'	491 SF	Slow – Moderate	Shallow – Medium	10' – 12'	35' – 45'	Yes	Very tolerant of wet soils, especially if they eventually drain. Needs an acid soil. Very broad canopy with horizontal limbs.
Scarlet Oak <i>Quercus coccinea</i>	70' – 75'	40' – 50'	706 SF	Moderate	Medium	10' – 12'	40'	No	Best Fall color of all oaks. Leaves persist through the Winter as a juvenile tree. Prefers sandy soils. Produces an acorn crop every other year. Subject to aphid infestations. Developmental pruning is required to establish a good branch structure.
Bur Oak <i>Quercus macrocarpa</i>	70' – 80'	70' – 80'	314 SF	Slow – Moderate	Medium	10' – 12'	40'	No	Very large oak tolerant of most urban conditions. Will tolerate wet soils in the Spring if they eventually drain. Produces an acorn crop every year. Acorns can be up to 1-inch in diameter and 1-1/2 inch long. Needs developmental pruning.

Class III - Large Stature Trees – Over 60 Feet

Common Name Scientific Name	Height	Spread	Shade Area at 15 Years	Growth Rate	Rooting Depth	Minimum Planter Width	Optimum Spacing	Swale Suitable	Description
Valley Forge American Elm <i>Ulmus americana</i> 'Valley Forge'	60' – 80'	60' – 80'	706 SF	Moderate – Fast	Shallow – Medium	10' – 12'	40' – 45'	Yes	Dutch elm Disease resistant cultivar. Tolerates wet soils, or soil under periodic flooding. Salt tolerant. Distinct V-shaped canopy. Developmental pruning needed to establish a good branch structure. Elm leaf beetle may be a problem.
Accolade elm <i>Ulmus japonica X wilsoniana</i> 'Morton'	65' – 75'	55' – 65'	706 SF	Moderate – Fast	Shallow – Medium	10' – 12'	40' – 45'	No	Dutch elm disease resistant hybrid. Resistant to elm leaf beetle feeding. Distinct V-shaped canopy. Developmental pruning needed to establish a good branch structure. Prefers well draining soils.
Sapporo Autumn Gold Elm <i>Ulmus</i> 'Sapporo Autumn Gold'	60' – 60'	40' – 45'	452 SF	Moderate	Shallow – Medium	10' – 12'	35' – 40'	No	High resistance to Dutch elm disease. Resistant to elm leaf beetle feeding. Distinct V-shaped canopy. Developmental pruning needed to establish a good branch structure. Prefers well-draining soils.