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General Information

A. Concept

Trees along our streets, in our parks, in other public spaces, and on private property provide a wide range of benefits. They improve the air we breathe, beautify the environment, reduce energy consumption, and make communities more pleasant places to live and work. A street tree is any tree with a trunk located 50% or more within the land lying between property lines on either side of public streets, boulevards, and alleys, including public easements. With narrower rights-of-way and the increasing use of underground utilities, the available space within a public right-of-way to plant trees is diminishing. Consideration should be given to placement of trees outside of the public right-of-way on private property, which will still maintain the aesthetic and environmental advantages of trees. In addition, the placement outside of the public right-of-way will prevent future complications of sight distance, utility conflicts, and construction conflicts.

If trees are placed in the public right-of-way, the principal considerations in design of the placement of street trees are their relation to horizontal and vertical clear zones. No street tree should be placed in the horizontal clear zone or triangular sight distance as described in Chapter 5. The minimum vertical clearance for mature trees should be 14 feet above the street grade, 10 feet above recreational trails, and 8 feet above sidewalks. Special considerations must be given to clearances to overhead utility lines, driveways, traffic signs, and underground utilities. Permits may be required prior to planting.

B. Conditions

1. **Design Standards:**

   a. SUDAS Design Manual

   b. Recognized design publications for street trees

   c. In case of a conflict between the above design standards, the Jurisdictional Engineer should be contacted for clarification

2. **Construction Standards:** Use the most recent edition of the SUDAS Standard Specifications together with the latest contract supplementary information.

3. **Project Submittals:** If street trees are allowed by the Jurisdiction and if project submittals are required, a street tree planting layout showing the quantity, species/cultivar, and location of all trees must be submitted for review. This plan is to be approved by the Jurisdiction prior to the tree planting and a permit issued if the proposed trees are within the public right-of-way.

4. **Ownership:** If the tree is located in the public right-of-way or publicly owned property, Section 364.12 of the Iowa Code requires the Jurisdiction to remove deadwood or diseased trees. If the street tree(s) are located outside of public property or right-of-way, the responsibility and ownership is that of the landowner.

5. **Establishment and Warranty Periods:** The establishment period is 1 year after the installation has been accepted by the Engineer. Care and maintenance of all plants will be the responsibility of the Contractor during that time. The Engineer has the option to include an additional year, which is called the warranty period. If specified, the warranty period begins immediately after the establishment period and continues for another year. Check with the Jurisdiction for their requirements.

Street Tree Design

A. Area Requirement per Tree

At least 9 square feet of ground is required for each tree and the trunk of street trees should be no closer than 2.5 feet from impervious surface material.

B. Spacing

For planning purposes, the ideal spacing should be based on species and cultivar of tree selected. Trees should not be spaced closer than the size of their mature horizontal spread.

C. Location within Public Right-of-way

The following criteria are for the location of street trees that are located in the street right-of-way. Jurisdictions may require additional street right-of-way to provide clearances to underground or overhead utilities. The mature tree trunk size should be taken into account when placing the tree. The criterion does not include street trees located within medians. Special designs that meet the required clear zone must be used when locating trees within medians.

1. Minimum distance of 5 linear feet from water service stop boxes.

2. Minimum distance from the edge of the traveled way according to Chapter 5.

3. Minimum distance of 10 linear feet from hydrants, poles, transformers, telephone junction boxes, manholes, and driveway approaches.

4. Minimum distance from street lights of 25 linear feet or the width of spread of the mature tree, whichever is greater.

5. In central business districts where traffic speeds are low, a minimum distance of 3 feet from the back of curb should be used for street trees if a minimum distance of 8 feet exists for right-of-way from the back of curb.

6. No trees should be in the horizontal clear zone or triangular sight distance area. (See Chapter 5).

7. Do not plant street trees in any public right-of-way that has less than 12 feet from back of curb or edge of pavement to the property line on each side of the street.

8. All underground utilities or any other improvements, either private or public, will be located before excavation is done. Information on contacting Iowa One Call will be included in the contract documents. The Iowa One Call phone number is 811 or use iowaonecall.com for online ticketing.

D. Tree Size

Street trees should be a minimum of 1 1/2 inch diameter for ornamental and shade trees or as specified and measured at 6 inches above grade after planting unless smaller trees are allowed.

E. Selection of Trees

When selecting trees, care must be taken to consider site conditions; including above and below ground spatial and environmental conditions. It is also important to consider how selection(s) complement existing plant material to ensure a diverse, functional, and attractive tree canopy can be developed.

Some of these trees produce fruit or seed pods that can increase maintenance needs along walkways. Others need additional pruning to ensure proper clearance and a healthy leader or have shallow root systems. Consideration should be taken in the maintenance needs, site conditions, and diversity of trees selected. Consulting a licensed landscape architect or certified arborist prior to selecting trees is recommended.

Planting under overhead utility lines is not always feasible and make sure it is allowed by the local jurisdiction. When planting under overhead utility lines, proceed with caution and careful consideration to local jurisdiction requirements and mature tree height impacts.

Table 10B-1.01 offers tree species and cultivar selections for use as street trees along neighborhood and municipal streets. This table is not all-inclusive; other species or different varieties of the listed species may be used with approval of the jurisdiction. Not all these trees will work in every situation; it is important to take local site constraints into consideration. This table should be considered a starting point for individuals looking for well-adapted and pest resistant trees for Iowa communities. It is important to check with each jurisdiction since certain species listed may not be allowed or have quantity restrictions to increase local tree diversity. Monoculture planting of one species can have disease and pest impacts and should be avoided; some jurisdictions have specific guidelines for increasing tree diversity in their communities.

Table 10B-1.01: Selection of Trees

Common Name	Genus Name	Mature Shape	Mature Height (feet)	Mature Spread (feet)
Maples[3]				
Autumn Blaze Maple	Acer x freemanii 'Jeffersred'	Broad Oval	50	40
Firefall Maple	Acer x freemanii 'AF#1'	Seedless, Upright Oval	50	35
Marmo Maple	Acer x freemanii 'Marmo'	Seedless, Upright Oval	55	45
Sienna Glen Maple	Acer x freemanii 'Sienna'	Pyramidal	50	35
State Street Maple	Acer miyabei 'Morton'	Upright Oval	50	35
Rugged Ridge Maple	Acer miyabei 'JFS-KW3AMI'	Upright Oval	55	40
Greencolumn Maple[10]	Acer nigrum 'Greencolumn'	Upright Oval	60	25
Armstrong Gold Maple[4]	Acer rubrum 'JFS-KW78'	Narrow Upright	40	12
Red Sunset Maple[4]	Acer rubrum 'Franksred'	Upright Oval	45	35
Redpointe Maple[4]	Acer rubrum 'Frank Jr.'	Broad Pyramidal	35	30
Apollo Maple[10]	Acer saccharum 'Barrett Cole'	Narrow Upright	30	10
Fall Fiesta Maple[10]	Acer saccharum 'Bailsta'	Broad Oval	50	40
Sugar Maple 'Green Mountain'[10]	Acer saccharum 'Green Mountain'	Broad Oval	50	40
Three-Flower Maple[5]	Acer triflorum	Broad Oval	25	20
Serviceberry				
Autumn Brilliance Serviceberry (Single Stem Only)	Amelanchier x grandiflora 'Autumn Brilliance'	Upright Oval	25	15
Robin Hill Serviceberry (Single Stem)	Amelanchier x grandiflora 'Robin Hill'	Upright Oval	25	15
Cumulus Serviceberry (Single Stem)	Amelanchier laevis 'Cumulus'	Upright Oval	25	15
Hornbeam				
European Hornbeam[2, 5]	Carpinus betulus	Broad Oval	35	25
American Hornbeam[2, 5, 10]	Carpinus caroliniana	Broad Oval	25	20
Hackberry				
Chicagoland Hackberry[10]	Celtis occidentalis 'Chicagoland'	Upright Oval	50	40
Prairie Pride Hackberry[10]	Celtis occidentalis 'Prairie Pride'	Upright Oval	50	40
Prairie Sentinel Hackberry[10]	Celtis occidentalis 'JFS-KSU1'	Upright Oval	45	12
Yellowood, Cornelian Cherry and Filbert				
Yellowood[5,6]	Cladrastis kentukea	Upright Oval	50	40
Golden Glory Cornelian Cherry (Single Stem)	Cornus mas 'Golden Glory'	Broad Oval	22	18
Saffron Sentinel Cornelian Cherry[5] (Single Stem)	Cornus mas 'JFS-PN4Legacy'	Columnar	22	12
Turkish Filbert[5, 8, 9]	Corylus colurna	Pyramidal	40	25
Hawthorn				
Washington Hawthorn[5]	Crataegus phaenopyrum	Broad Oval	25	20
Winter King Green Hawthorn	Crataegus viridis 'Winter King'	Wide Vase Shaped	20	25

Table 10B-1.01: Selection of Trees (continued)

Common Name	Genus Name	Mature Shape	Mature Height (feet)	Mature Spread (feet)
Honeylocust				
Street Keeper Honeylocust[10]	Gleditsia triacanthos var. inermis 'Draves'	Narrow Upright	45	20
Northern Acclaim Honeylocust[10]	Gleditsia triacanthos var. inermis 'Harve'	Broad Pyramid	45	35
Skyline Honeylocust[10]	Gleditsia triacanthos var. inermis 'Skycole'	Broad Pyramid	45	35
Shademaster Honeylocust[10]	Gleditsia triacanthos var. inermis 'Shademaster'	Upright Vase Shape	50	35
Ginkgo				
Autumn Gold Ginkgo (Fruitless, Male)	Ginkgo biloba 'Autumn Gold'	Broad Conical	45	35
Magyar Ginkgo (Fruitless, Male)	Ginkgo biloba 'Magyar'	Pyramidal	50	30
Presidential Gold Ginkgo (Fruitless, Male)	Ginkgo biloba 'The President'	Broad Conical to Oval	50	40
Princeton Sentry Ginkgo (Fruitless, Male)	Ginkgo biloba 'Princeton Sentry'	Narrow Conical	45	25
Kentucky Coffeetree and Osage Orange				
Kentucky Coffeetree 'Espresso' (Seedless, Male)[10]	Gymnocladus dioicus 'Espresso'	Oval to Vase Shaped	60	40
White Shield Osage Orange (Fruitless, Thornless)[5]	Maclura pomifera 'White Shield'	Upright Spreading, Rounded	35	35
Crabapples				
Adirondack Crabapple[5]	Malus 'Adirondack'	Dense Upright	18	10
Ivory Spear Crabapple[5]	Malus 'JFS-KW214MX'	Narrow	18	7
Golden Raindrops Crabapple	Malus 'Schmidtcutleaf'	Upright, Vase Shaped	20	15
Marilee Crabapple	Malus 'Jarmin' PP 14337	Narrow Upright, Vase Shaped	24	10
Purple Prince Crabapple	Malus 'Purple Prince'	Rounded	20	20
Raspberry Spear Crabapple[5]	Malus 'JFS-KW213MX'	Narrow	20	8
Royal Raindrops Crabapple	Malus 'JFS-KW5'	Upright, Spreading	20	15
Ruby Dayze Crabapple[5]	Malus 'JFS-KW139MX'	Upright, Oval	22	16
Snow Crystal Crabapple[5]	Malus 'JFS KW218MX'	Pyramidal, Compact	15	12
Sparkling Sprite Crabapple[5]	Malus 'JFS-KW207' PP27954	Compact Dense Round	12	12
Black Gum, Ironwood, Planetree and Sargent Cherry				
Black Gum (Black Tupelo)[7]	Nyssa sylvatica	Pyramidal	35	20
American Hophornbeam (Ironwood)[2,5]	Ostrya virginiana	Upright Oval	22	16
Excamation Planetree[4]	Platanus x acerifolia 'Morton Circle'	Upright Pyramidal	55	35
Oak[4, 9]				
White Oak[10]	Quercus alba	Spreading	50	50
Swamp White Oak[1, 7, 10]	Quercus bicolor	Upright Spreading	75	60
Crimson Spire Oak	Quercus x bimundorum 'Crumschmidt'	Columnar	45	15
Prairie Stature Oak	Quercus x bimundorum 'Midwest'	Broad Pyramid	50	40
Scarlet Oak	Quercus coccinea	Round Open	50	40

Table 10B-1.01: Selection of Trees (continued)

Common Name	Genus Name	Mature Shape	Mature Height (feet)	Mature Spread (feet)
Shingle Oak[10]	Quercus imbricaria	Broad Oval	50	40
Burr Oak[10]	Quercus macrocarpa	Broad Open	55	45
Urban Pinnacle Oak[10]	Quercus macrocarpa 'JFS-KW3'	Narrow Pyramid	55	25
Chinkapin Oak	Quercus muehlenbergii	Round Open	45	45
Heritage Oak[5]	Quercus robur x macrocarpa	Broad Pyramid, Oval	60	40
Northern Red Oak[10]	Quercus rubra	Pyramidal to Round Open	60	60
Kindred Spirit Oak	Quercus x warei 'Nadler'	Tightly Columnar	30	6
Regal Prince Oak	Quercus x warei 'Long'	Narrow Oval	45	18
Tree Lilacs				
Ivory Silk Japanese Tree Lilac	Syringa reticulate 'Ivory Silk'	Oval, Rounded	25	20
Beijing Gold Peking Lilac	Syringa reticulate subsp. Pekinensis 'Zhang Zhiming'	Oval, Rounded	20	15
China Snow Peking Lilac	Syringa subsp. Pekinensis 'Morton'	Rounded	25	20
Great Wall Peking Lilac	Syringa subsp. Pekinensis 'WFH2'	Upright, Oval Habit	20	12
Summer Charm Peking Lilac	Syringa subsp. Pekinensis 'DTR 124'	Oval, Rounded	20	15
Bald-cypress				
Bald-cypress[7]	Taxodium distichum	Pyramidal	55	30
Linden				
Boulevard Linden[2, 3, 5, 10]	Tilia americana 'Boulevard'	Narrow Pyramid	50	25
American Sentry Linden[2, 3, 5, 10]	Tilia americana 'McKSentry'	Pyramidal	45	30
Redmond Linden[2, 3, 5, 10]	Tilia Americana 'Redmond'	Pyramidal	50	35
Harvest Gold Linden[2, 3, 5]	Tilia cordata x mongolica 'Harvest Gold'	Pyramidal	40	30
Glenleven Linden[2, 3, 5]	Tilia x flavescens 'Glenleven'	Pyramidal	50	30
Silver Linden[3, 5]	Tilia tomentosa	Pyramidal	45	35
Elms				
Jefferson Elm[10]	Ulmus americana 'Jefferson'	Vase-shaped	70	59
Princeton Elm[10]	Ulmus americana 'Princeton'	Vase-shaped	60	40
Prairie Expedition Elm[10]	Ulmus americana 'Lewis & Clark'	Broad Rounded	55	60
Accolade Elm	Ulmus 'Morton'	Vase-shaped	70	60
Triumph Elm	Ulmus 'Morton Glossy'	Upright Oval	55	45
New Horizon Elm	Ulmus 'New Horizon'	Upright Oval	55	40
Prospector Elm	Ulmus ' Prospector'	Vase-shaped	40	30
Discovery Elm	Ulmus 'Discovery'	Vase-shaped	50	40

[1] High PH sensitive.
[2] Salt intolerant.
[3] Restrictions of use may exist due to over planting or pests. Check with the local jurisdiction.
[4] Spring dig only. Fall quantities may be limited.
[5] May be limited quantities available.
[6] Susceptible to wind damage.
[7] Tolerant of wet soils.
[8] Not suitable for heavy clay sites.
[9] Fruit or nut litter may be a concern.
[10] Tree native to Iowa.

F. Trees NOT Recommended for Planting in the Public Right-of-Way

The species of trees listed in Table 10B-1.02 are not recommended for street tree use. Species may be used with approval of the jurisdiction. Conifers are generally inappropriate for use along city streets and therefore are not included in Table 10B-1.01. Table 10B-1.02 is a summary of species considered to be undesirable or invasive by many jurisdictions.

Table 10B-1.02: Trees Not Recommended

Siberian Elm*	Box Elder	Cotton-Bearing Cottonwood
Chinese Elm*	European Mountain Ash	White Poplar
Silver Maple*	Catalpa	Willows
Russian Olive	Tree of Heaven	Austrian Pine
Bolleana Poplar	Weeping Birch	Lombardy Poplar
Black Locust*	Autumn Olive	Ash
Mulberry		

* Some cultivars and hybrid varieties accepted; however, use caution and confirm it is acceptable with the local jurisdiction.

G. Guideline for Selection of Nursery Trees

If inspecting nursery stock prior to delivery to the project site, use the following criteria and the requirements of SUDAS Specifications Section 9030, 2.01 to evaluate the plant materials.

1. There should be no roots greater than 1/10 the trunk diameter circling more than one-third the way around in the top half of the root ball. Roots larger than this may be cut provided they are smaller than one-third the trunk diameter. There should be no kinked roots greater than 1/5 the trunk diameter. Roots larger than this can be cut provided they are less than one-third the trunk diameter.

2. Plants should be in a healthy, vigorous condition and essentially free of dead or broken branches, scars that are not completely healed, frost cracks, disfiguring knots, broken or abraded bark, redundant leaders or branches, rubbing branches or aberrations of any kind. Plants should not have multiple leaders, unless that is their natural form.

3. Ensure trees are rooted into the root ball so that soil or media remains intact and trunk and root ball move as one when lifted. The trunk should bend when gently pushed, not pivot at or below soil line.

4. The point where the top-most root in the root ball emerges from the trunk, called the root flare, should be visible at the soil surface.

5. Comply with ANSI Z60.1 for the relationship between caliper, height, and root ball size, as shown in Table 10B-1.02.

6. There should be one dominant leader more-or-less straight to the top of the tree with the largest branches spaced at least 6 inches apart. There can be a double leader in the top 10% of the tree.

7. The tree canopy should be symmetrical, free of large voids, and typical of the species or cultivar. Live crown ratio (distance from bottom of canopy to tree top/tree height) should be at least 60%.

8. Branches should be less than 2/3 the trunk diameter, free of bark inclusions, and more-or-less radially distributed around the trunk.

9. Trees greater than 1 1/2 inches caliper should be able to stand erect without a supporting stake.

10. Ensure the trunk and main branches are free of wounds (except for properly-made pruning wounds), damaged areas, conks, bleeding, and signs of insects or disease.

11. In areas near overhead utility lines, the mature height of the tree should be a minimum of 10 feet lower than the overhead lines.

12. If any of the above conditions are not met, trees may be rejected.

Table 10B-1.02: Caliper/Rootball/Height Relationship

Caliper (inches)	Average Height (feet)	Minimum Rootball Diameter (inches)
1	8 to 10	16
1 1/2	10 to 12	20
2	12 to 14	24
2 1/2	12 to 14	28
3	14 to 16	32
3 1/2	14 to 16	38
4	16 to 18	42

Source: American Standard for Nursery Stock (ANSI Z60.1), 2014

H. Staking of Trees

Depending on the size of the trees identified to be planted, the jurisdictional engineer should designate if staking is required. Generally, if plant stock is delivered with well developed root balls, and if properly planted, it will not require staking. In areas where damage due to deer is of a concern, trees can be protected by placing sturdy wood stakes or fence posts at 18 inch intervals around the tree. In some jurisdictions, staking of trees in the public right-of-way is not allowed.

References

The following references can be found from ISU Extension:

1. Shade Trees for Iowa - Ash Alternatives
2. Small-stature Trees for Iowa - Ash Alternatives
3. Establishing a Community Tree Program - Community Trees
4. Conifer Species for Iowa - Community Trees
5. Tips for Proper Planting of Containerized Trees
6. Care of Newly Planted Trees
7. Pruning Trees: Shade, Flowering, and Conifer - Sustainable Urban Landscapes
8. Trees and Construction
9. Yard and Garden: Planting Bare-root Trees
10. Community Tree Planting and Care Guide