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## General Information

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### A. Concept

A street tree is any tree with a trunk located 50% or more within the land lying between property lines on either side of all 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. Placement of trees outside of the public right-of-way on private property will still maintain all of 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. Thus it is recommended that new trees not be placed in the public right-of-way.

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. If at all possible, street trees should not be placed over buried utilities (public or private).

### 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

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### 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 50 feet apart or no closer than the distance of their full spread from the next tree in the parking. Spacing as close as 30 feet may be allowed by the Jurisdiction for species/cultivars or ornamental trees that have appropriate mature branch spreads.

### 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 - Roadway Design.
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 - Roadway Design).
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.

### D. Tree Size

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

All underground utilities or any other improvements, either private or public, will be located before excavation is done. Information concerning contacting Iowa One Call will be included in the contract documents. The Iowa One Call phone number is 811 or 800-292-8989.

## E. Selection of Trees

The species of trees listed are recommended for street tree use. Note: Where it is not recommended that any trees be planted under overhead utility lines, some jurisdictions may allow plantings of low growing trees. Other species, or different varieties of the listed species, may be used with approval of the Jurisdiction. Certain species listed may not be allowed by all Jurisdictions.

**Table 10B-1.01: Selection of Trees\***

Common Name	Genus Name	Minimum Spacing (feet)	Mature Height (feet)	Mature Spread (feet)
European Hornbeam**	<i>Carpinus betulus</i>	40	40	30
Hackberry	<i>Celtis occidentalis</i>	40	75	50
Ginkgo (male only)	<i>Ginkgo biloba</i>	50	60	35
Sycamore	<i>Platanus occidentalis</i>	40	100	50
Callery Pear	<i>Pyrus calleryana</i>	35	60	60
American Hophornbeam** (Ironwood)	<i>Ostrya virginiana</i>	25	40	20
<b>Maple</b>				
Freeman Maple	<i>Acer X freemanii</i>	30	50	45
Norway Maple	<i>Acer platanoides</i>	65	15	30
Black Maple	<i>Acer nigrum</i>	40	65	60
Sugar Maple	<i>Acer saccharum</i>	45	80	50
Greencolumn Maple	<i>Acer nigrum</i> 'Greencolumn'	25	50	20
<b>Honeylocust</b>				
Honeylocust, Thornless Skyline Honeylocust	<i>Gleditsia triacanthos</i> i. cv.	30	60	30
Moraine Honeylocust	<i>Gleditsia triacanthos</i> i. cv.		60	40
Imperial Honeylocust	<i>Gleditsia Triacanthos</i> var. <i>inermis</i> 'Imperial'	30	25	30
Shademaster Honeylocust	<i>Gleditsia Triacanthos</i> var. <i>inermis</i> 'Shademaster'	40	45	40
<b>Oak</b>				
Swamp White Oak** (High PH sensitive)	<i>Quercus bicolor</i>	50	75	60
Northern Red Oak	<i>Quercus rubra</i>	50	75	70
Burr Oak	<i>Quercus macrocappa</i>	40	75	50
English Oak	<i>Quercus robur</i>	55	75	50
Scarlet Oak** (High PH sensitive)	<i>Quercus coccinea</i>	50	60	50
<b>Linden</b>				
American**	<i>Tilia americana</i>	35	70	45
Littleleaf**	<i>Tilia cordata</i>	30	50	35
Silver	<i>Tilia tomentosa</i>	50	50	40
American	<i>Tilia americana</i> 'Fastigiata'	30	50	30
Greenspire	<i>Tilia cordata</i> 'Greenspire'	30	45	30
Crimean	<i>Tilia x euchlora</i>	35	30	60

\* Monoculture plantings may result in insect problems

\*\* Salt Sensitive

**Table 10B-1.01:** Selection of Trees (Continued)

Common Name	Genus Name	Minimum Spacing (feet)	Mature Height (feet)	Mature Spread (feet)
<b>Crabapple***</b>				
Adams	Malus 'Adams'	25	20	20
Adirondack	Malus Adirondack	20	18	10
Pink Spires	Malus 'Pink Spires'	15	12	10
Snowdrift	Malus 'Snow Drift'	20	20	15
Spring Snow	Malus 'Spring Snow'	20	20	15
White Candle	Malus 'White Candle'	12	18	8

\*\*\*Dwarf species

**F. Trees that Should Not be Planted in Public Right-of-way**

- |                 |                       |                           |
|-----------------|-----------------------|---------------------------|
| American Elm    | Box Elder             | Cotton-Bearing Cottonwood |
| Mulberry        | European Mountain Ash | White Poplar              |
| Black Locust    | Catalpa               | Willows                   |
| Russian Olive   | Tree of Heaven        | Austrian Pine             |
| Bolleana Poplar | Weeping Birch         | Lombardy Poplar           |
| Conifers        | White Ash             | Green Ash                 |
| Silver Maple    |                       |                           |

**G. Guideline for Selection of Nursery Trees**

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 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  $\frac{2}{3}$  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

<b>Caliper (inches)</b>	<b>Average Height (feet)</b>	<b>Minimum Rootball Diameter (inches)</b>
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)

## 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.



## References

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The following references can be found from ISU Extension ([www.extension.iastate.edu](http://www.extension.iastate.edu)):

1. [Guidelines for Selecting Trees](#)
2. [Street Trees for Iowa](#)
3. [Low-Growing Trees for Urban and Rural Iowa](#)

The following references can be found from ISU Forestry Extension ([www.extension.iastate.edu/forestry/publications/list.html](http://www.extension.iastate.edu/forestry/publications/list.html)):

1. [Identification of Conifer Trees in Iowa](#)
2. [Soils and Trees](#)
3. [Tips for Proper Planting of Containerized Trees](#)
4. [Transplanting Trees and Shrubs](#)
5. [Watering Newly-Planted Trees](#)
6. [Preventing Construction Damage to Trees](#)

