SUDAS Revision Submittal Form

<table>
<thead>
<tr>
<th>Status Date:</th>
<th>As of 3/9/2021</th>
<th>Topic:</th>
<th>Tree planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual:</td>
<td>Design</td>
<td>Manual Location:</td>
<td>Chapter 10 and</td>
</tr>
<tr>
<td></td>
<td>Specifications</td>
<td></td>
<td>Section 9030</td>
</tr>
</tbody>
</table>

**Requested Revision:**

*See the attached revised Design Chapter 10 and Spec Section 9030*

**Reason for Revision:** Updated design information on species to plant and specifications requirements based on industry input.

**Comments:** None.

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One committee member asked if half of the burlap should be removed on the tree? The committee also asked if a list of Iowa native trees could be included. *Note - done.*

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One committee member asked if deer rubbing should be considered under tree protection? *Note - done.* Another committee member stated the Tree Council will be submitting more comments regarding stormwater practices.

<table>
<thead>
<tr>
<th>District:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Initial Comments:**
Trees Forever is an advocate for utilizing native Iowa trees. *Note - added a footnote to indicate which trees are native to Iowa.*

**Final Comments:**

<table>
<thead>
<tr>
<th>Action:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deferred</td>
<td>Not Approved</td>
<td>Approved</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>District:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

| Comments: | None. |

Final District Action Summary:

Board of Directors Action:
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 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. Consideration should be given to placement of trees outside of the public right-of-way on private property, which 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. While placement of trees outside of the right-of-way will minimize problems, most communities in Iowa encourage and even require the placement of street trees. Permits may be required prior to planting.

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

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, 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 4 1 1/2 inch diameter for ornamental and 4 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.

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

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Genus Name</th>
<th>Growth Habit</th>
<th>Mature Height (feet)</th>
<th>Mature Spread (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maples</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autumn Blaze Maple</td>
<td>Acer x freemanii ‘Jeffersred’</td>
<td>Broad Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Firefall Maple</td>
<td>Acer x freemanii ‘AF#1’</td>
<td>Seedless, Upright Oval</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>Marmo Maple</td>
<td>Acer x freemanii ‘Marmo’</td>
<td>Seedless, Upright Oval</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Sienna Glen Maple</td>
<td>Acer x freemanii ‘Sienna’</td>
<td>Pyramidal</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>State Street Maple</td>
<td>Acer miyabei ‘Morton’</td>
<td>Upright Oval</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>Rugged Ridge Maple</td>
<td>Acer miyabei ‘JFS-KW3AMI’</td>
<td>Upright Oval</td>
<td>55</td>
<td>40</td>
</tr>
<tr>
<td>Greencolumn Maple</td>
<td>Acer nigrum ‘Greencolumn’</td>
<td>Upright Oval</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Armstrong Gold Maple</td>
<td>Acer rubrum ‘JFS-KW78’</td>
<td>Narrow Upright</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>Red Sunset Maple</td>
<td>Acer rubrum ‘Franksred’</td>
<td>Upright Oval</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Redpointe Maple</td>
<td>Acer rubrum ‘Frank Jr.’</td>
<td>Broad Pyramidal</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Apollo Maple</td>
<td>Acer saccharum ‘Barrett Cole’</td>
<td>Narrow Upright</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Fall Fiesta Maple</td>
<td>Acer saccharum ‘Bailsta’</td>
<td>Upright Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Sugar Maple ‘Green Mountain’</td>
<td>Acer saccharum ‘Green Mountain’</td>
<td>Upright Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Three-Flower Maple</td>
<td>Acer triflorum</td>
<td>Broad Oval</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td><strong>Serviceberry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autumn Brilliance Serviceberry (Single Stem Only)</td>
<td>Amelanchier x grandiflora ‘Autumn Brilliance’</td>
<td>Upright Oval</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Robin Hill Serviceberry (Single Stem)</td>
<td>Amelanchier x grandiflora ‘Robin Hill’</td>
<td>Upright Oval</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Cumulus Serviceberry (Single Stem)</td>
<td>Amelanchier laevis ‘Cumulus’</td>
<td>Upright Oval</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td><strong>Hornbeam</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European Hornbeam</td>
<td>Carpinus betulus</td>
<td>Broad Oval</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>American Hornbeam</td>
<td>Carpinus caroliniana</td>
<td>Broad Oval</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td><strong>Hackberry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicagoland Hackberry</td>
<td>Celtis occidentalis ‘Chicagoland’</td>
<td>Upright Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Prairie Pride Hackberry</td>
<td>Celtis occidentalis ‘Prairie Pride’</td>
<td>Upright Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Prairie Sentinel Hackberry</td>
<td>Celtis occidentalis ‘JFS-KSU1’</td>
<td>Upright Oval</td>
<td>45</td>
<td>12</td>
</tr>
<tr>
<td><strong>Yellowwood, Cornelian Cherry and Filbert</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellowwood</td>
<td>Cladrastis kentukea</td>
<td>Upright Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Golden Glory Cornelian Cherry (Single Stem)</td>
<td>Cornus mas ‘Golden Glory’</td>
<td>Broad Oval</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>Saffron Sentinel Cornelian Cherry (Single Stem)</td>
<td>Cornus mas ‘JFS-PN4Legacy’</td>
<td>Columnar</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>Turkish Filbert</td>
<td>Corylus colurna</td>
<td>Pyramidal</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td><strong>Hawthorn</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington Hawthorn</td>
<td>Crataegus phaenopyrum</td>
<td>Broad Oval</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Winter King Green Hawthorn</td>
<td>Crataegus viridis ‘Winter King’</td>
<td>Wide Vase Shaped</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>
### Table 10B-1.01: Selection of Trees (continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Genus Name</th>
<th>Growth Habit</th>
<th>Mature Height (feet)</th>
<th>Mature Spread (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Honeylocust</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street Keeper Honeylocust(^{10})</td>
<td>Gleditsia triacanthos var. inermis ‘Draves’</td>
<td>Narrow Upright</td>
<td>45</td>
<td>20</td>
</tr>
<tr>
<td>Northern Acclaim Honeylocust(^{10})</td>
<td>Gleditsia triacanthos var. inermis ‘Harve’</td>
<td>Broad Pyramid</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Skyline Honeylocust(^{10})</td>
<td>Gleditsia triacanthos var. inermis ‘Skycole’</td>
<td>Broad Pyramid</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Shademaster Honeylocust(^{10})</td>
<td>Gleditsia triacanthos var. inermis ‘Shademaster’</td>
<td>Upright Vase Shape</td>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td><strong>Ginkgo</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autumn Gold Ginkgo (Fruitless, Male)</td>
<td>Ginkgo biloba ‘Autumn Gold’</td>
<td>Broad Conical</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Magyar Ginkgo (Fruitless, Male)</td>
<td>Ginkgo biloba ‘Magyar’</td>
<td>Pyramidal</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Presidential Gold Ginkgo (Fruitless, Male)</td>
<td>Ginkgo biloba ‘The President’</td>
<td>Broad Conical to Oval</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Princeton Sentry Ginkgo (Fruitless, Male)</td>
<td>Ginkgo biloba ‘Princeton Sentry’</td>
<td>Narrow Conical</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td><strong>Kentucky Coffeetree and Osage Orange</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kentucky Coffeetree ‘Espresso’ (Seedless, Male)(^{10})</td>
<td>Gymnocladus dioicus ‘Espresso’</td>
<td>Oval to Vased Shaped</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>White Shield Osage Orange (Fruitless, Thornless)(^{5})</td>
<td>Maclura pomifera ‘White Shield’</td>
<td>Upright Spreading, Rounded</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td><strong>Crabapples</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adirondack Crabapple(^{5})</td>
<td>Malus ‘Adirondack’</td>
<td>Dense Upright</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Ivory Spear Crabapple(^{5})</td>
<td>Malus ‘JFS-KW214MX’</td>
<td>Narrow</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Golden Raindrops Crabapple</td>
<td>Malus ‘Schmidtcutleaf’</td>
<td>Upright, Vase Shaped</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Marilee Crabapple</td>
<td>Malus ‘Jarmin’ PP 14337</td>
<td>Narrow Upright, Vase Shaped</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Purple Prince Crabapple</td>
<td>Malus ‘Purple Prince’</td>
<td>Rounded</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Raspberry Spear Crabapple(^{5})</td>
<td>Malus ‘JFS-KW213MX’</td>
<td>Narrow</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Royal Raindrops Crabapple</td>
<td>Malus ‘JFS-KW5’</td>
<td>Upright, Spreading</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Ruby Dayze Crabapple(^{5})</td>
<td>Malus ‘JFS-KW139MX’</td>
<td>Upright, Oval</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Snow Crystal Crabapple(^{5})</td>
<td>Malus ‘JFS-KW218MX’</td>
<td>Pyramidal, Compact</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Sparkling Sprite Crabapple(^{5})</td>
<td>Malus ‘JFS-KW207’ PP27954</td>
<td>Compact Dense Round</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Black Gum, Ironwood, Planetree and Sargent Cherry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Gum (Black Tupelo)(^{7})</td>
<td>Nyssa sylvatica</td>
<td>Pyramidal</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>American Hophornbeam (Ironwood)(^{2,5})</td>
<td>Ostrya virginiana</td>
<td>Upright Oval</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Excamation Planetree(^{4})</td>
<td>Platanus x acerifolia ‘Morton Circle’</td>
<td>Upright Pyramidal</td>
<td>55</td>
<td>35</td>
</tr>
<tr>
<td><strong>Oak</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Oak(^{10})</td>
<td>Quercus alba</td>
<td>Spreading</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Swamp White Oak(^{1, 7, 10})</td>
<td>Quercus bicolor</td>
<td>Upright Spreading</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Crimson Spire Oak</td>
<td>Quercus x bimundorum ‘Crumschmidt’</td>
<td>Columnar</td>
<td>45</td>
<td>15</td>
</tr>
<tr>
<td>Prairie Stature Oak</td>
<td>Quercus x bimundorum ‘Midwest’</td>
<td>Broad Pyramid</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Scarlet Oak</td>
<td>Quercus coccinea</td>
<td>Round Open</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>
### Table 10B-1.01: Selection of Trees (continued)

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

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 that Should Not be Planted in Public Right-of-way

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

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>
<thead>
<tr>
<th>Siberian Elm*</th>
<th>Box Elder</th>
<th>Cotton-Bearing Cottonwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese Elm*</td>
<td>European Mountain Ash</td>
<td>White Poplar</td>
</tr>
<tr>
<td>Silver Maple*</td>
<td>Catalpa</td>
<td>Willows</td>
</tr>
<tr>
<td>Russian Olive</td>
<td>Tree of Heaven</td>
<td>Austrian Pine</td>
</tr>
<tr>
<td>Bolleiana Poplar</td>
<td>Weeping Birch</td>
<td>Lombardy Poplar</td>
</tr>
<tr>
<td>Black Locust*</td>
<td>Autumn Olive</td>
<td>Ash</td>
</tr>
<tr>
<td>Mulberry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Caliper (inches)</th>
<th>Average Height (feet)</th>
<th>Minimum Rootball Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 to 10</td>
<td>16</td>
</tr>
<tr>
<td>1 1/2</td>
<td>10 to 12</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>12 to 14</td>
<td>24</td>
</tr>
<tr>
<td>2 1/2</td>
<td>12 to 14</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>14 to 16</td>
<td>32</td>
</tr>
<tr>
<td>3 1/2</td>
<td>14 to 16</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>16 to 18</td>
<td>42</td>
</tr>
</tbody>
</table>

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
PLANT MATERIAL AND PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Plant Material and Planting
B. Tree Drainage Wells
C. Warranty for Plant Material

1.02 DESCRIPTION OF WORK

A. Furnishing and installing plant material.
B. Constructing tree drainage wells.
C. Maintaining and replacing plants for completed planting work.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

A. Submit copy of current certification that the Supplier is an Iowa Department of Agriculture and Land Stewardship Certified Nursery Dealer or Grower prior to starting work.
B. Prior to final acceptance, submit written maintenance instructions recommending procedures for maintenance of all plant material types, including watering, insect and disease control, fertilizing, pruning, tree wrapping protection, and staking.
C. When requested, provide certification stating container-grown material has been grown in the container for no less than 1 year.
D. Provide a sample of the proposed mulch for approval by the Engineer.
E. When requested, submit a schedule of unit prices for each size and variety of tree, shrub, and ground cover plant specified in the contract documents.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Where evidence is submitted that a specified plant cannot be obtained, substitution may be made upon approval of the Engineer.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants, as well as the following:

A. Protect plant root systems during transportation and storage, as necessary, with wet straw, moss, or other suitable material that will ensure root systems are maintained in a moist, healthy condition.
B. Protect all plants with a tarpaulin when being transported in an open vehicle.
C. When approved by the Engineer, temporary storage of plants on the project site may be allowed. When temporary on-site storage is not approved, provide such facilities and location at no additional cost to the Contracting Authority.
1.05 DELIVERY, STORAGE, AND HANDLING (Continued)

D. During temporary storage, heel-in plants and maintain them by providing moist straw, moss, or other suitable material to protect root systems; watering; and protecting from excessive sun, wind, and inclement weather conditions. This will provide a healthy, vigorous plant when planted.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Comply with the optimum planting dates specified in Section 9030, 3.01.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT

A. Plants, By Count:

1. Measurement: Each tree, shrub, or ground cover plant accepted in place will be counted.

2. Payment: Payment will be at the unit price for each tree, shrub, or ground cover plant. Payment will be made in increments according to the following schedule:
   a. 70% of unit price at acceptance.
   b. 30% of unit price at end of 1-year establishment period, upon installation of replacements.

3. Includes: Unit price includes, but is not limited to, delivery; excavation; installation; watering; placing backfill material; mulching; wrapping, tree protection; staking or guying; pre-emergent herbicide, if specified; maintenance during the establishment period; and replacements.

B. Plants, By Count, With Warranty:

1. Measurement: Each tree, shrub, or ground cover plant accepted in place will be counted.

2. Payment: Payment will be at the unit price for each tree, shrub, or ground cover plant. Payment will be made in increments according to the following schedule:
   a. 70% of unit price at acceptance.
   b. 15% of unit price at end of 1-year establishment period, upon installation of replacements.
   c. 15% of unit price at end of 2-year warranty period, upon installation of replacements.

3. Includes: Unit price includes, but is not limited to, delivery; excavation; installation; watering; placing backfill material; mulching; wrapping, tree protection; staking or guying; pre-emergent herbicide, if specified; maintenance during the establishment and warranty periods; and replacements.
1.08 MEASUREMENT AND PAYMENT (Continued)

C. Plants, Lump Sum:

1. Measurement: Lump sum item; no measurement will be made.

2. Payment: Payment will be at the lump sum price for plants. Payment will be made in increments according to the following schedule:
   a. 70% of lump sum price at acceptance.
   b. 30% of lump sum price at end of 1 year establishment period, upon installation of replacements.

3. Includes: Unit price includes, but is not limited to, delivery; excavation; installation; watering; placing backfill material; mulching; wrapping; tree protection; staking or guying; pre-emergent herbicide, if specified; maintenance during the establishment period; and replacements.

D. Plants, Lump Sum, With Warranty:

1. Measurement: Lump sum item; no measurement will be made.

2. Payment: Payment will be at the lump sum price for plants. Payment will be made in increments according to the following schedule:
   a. 70% of lump sum price at acceptance.
   b. 15% of lump sum price at end of 1 year establishment period, upon installation of replacements.
   c. 15% of lump sum price at end of 2 year warranty period, upon installation of replacements.

3. Includes: Unit price includes, but is not limited to, delivery; excavation; installation; watering; placing backfill material; mulching; wrapping; tree protection; staking or guying; pre-emergent herbicide, if specified; maintenance during the establishment and warranty period; and replacements.

E. Tree Drainage Wells:

1. Measurement: Each tree drainage well will be counted.

2. Payment: Payment will be at the unit price for each tree drainage well.

3. Includes: Unit price includes, but is not limited to, excavation, furnishing and placing rock, engineering fabric, and placing backfill material.
PART 2 - PRODUCTS

2.01 PLANT MATERIALS

A. General:

1. Ensure plant material meets the minimum requirements of size and grade as stated in the latest edition of American Standard for Nursery Stock, ANSI Z60.1.

2. Provide all plants true to name and tagged legibly as to name according to nursery standards of practice as recommended by the American Nursery and Landscape Association. Plant names indicated comply with the latest edition of “Standardized Plant Names” as adopted by the American Joint Committee of Horticultural Nomenclature.

3. Plants larger than those specified in the plant list with corresponding root system may be used upon approval of the Engineer.

4. Match plants planted in rows in form and size, unless otherwise specified in the contract documents.

B. Plant Material Quality:

1. Provide nursery grown plants suitable to and grown in the same climatic zone USDA Plant Hardiness Zone as the project location.

2. One-sided branching plants from tightly planted nursery rows will be rejected.

3. Provide healthy specimens without objectionable deformities, voids, and open spaces, with well-developed branch and root systems. Ensure specimens are true to height, shape, and character of growth of the species or varieties. Provide plants showing appearance of good health and vigor.

4. Provide plants free of the following:
   a. Harmful insects, insect eggs, borers, and all forms of infestation
   b. Plant diseases and moldy or dried roots
   c. Damage to trunk, bark, branches, leaders, root systems, or cut-leaders
   d. Defects, disfiguring knots, sunscald injuries, and frost cracks
   e. Rodent damage to bark and buds

5. Plants with broken or cut back terminal leaders or with circling roots may be rejected.

C. Balled and Burlapped Plants:

1. Provide firm, moist, unbroken root balls of the specified size.

2. Broken or loose root balls will be rejected.

3. No manufactured or artificially produced or mudded-in root balls will be accepted.

4. A container grown plant, in lieu of a balled and burlapped root ball, will be accepted provided it meets the specified size, species, complies with American Standard for Nursery Stock, ANSI Z60.1, and meets criteria for container grown plants.

D. Container Grown Plants:

1. Grow plants in sufficiently sized container for a minimum of 1 year, with a root system developed to hold its soil together, firm, whole, and moist when taken from the container.
2.01 PLANT MATERIALS (Continued)

2. No loose root systems in the container, root-bound, or circling of the root system will be accepted (ANSI Z60.1).

3. Containers with holes, shaping, or made of fabric as a means of preventing root growth from reaching the sides of the container, or pruning, or training roots to grow laterally rather than encircling the container are acceptable (ANSI Z60.1).

E. Bare Root Plants (BR):

1. Only use where specified in the contract documents or as approved by Engineer.

2. Ensure plants have substantially all of the root system intact, with clean cuts on roots. Root system is to be packed in moisture-retaining material and bagged to protect the root system from drying out.

3. Prior to planting, properly prune and sweat according to the nursery source instructions.

4. Ensure plants are dormant or breaking bud if sweated at the time of planting.

5. Do not plant later than May 15.

2.02 MULCH

Provide hardwood or softwood mulch complying with the following:

A. Shredded bark and shredded wood mixture containing no more than 50% wood chips.

B. Produced by a mechanical debarker and chipping machine.

C. Reasonably free from leaves, twigs, dust, toxic substances, and any other foreign material.

D. Not in an excessively wet or decomposed condition.

2.03 BACKFILL MATERIAL

A. Acquire Retain backfill material for plantings from soil excavated from the planting pit.

B. Ensure backfill material is loose, friable, and free of clods, sod, vegetation, and rocks 2 inches in diameter or larger. Do not use frozen or muddy soil as backfill material.

2.04 STAKING MATERIAL

A. Stakes: Comply with Iowa DOT Article 4154.09. Minimum length of 6 feet.

B. Hose Trunk Support Strapping:

1. Reinforced garden hose no less than 1/2 inch inside diameter or fabric straps. Breathable, flexible strap material or arbor tie or other material approved by the Engineer.

2. Provide hose strapping material of adequate length to prevent restriction of trunk, branches, or stems and contact of staking or guyng wire with tree trunk.

C. Wire: Provide minimum 17 gauge, rust inhibitive wire of sufficient gauge to resist breaking during high winds and natural weathering conditions.
2.04 STAKING MATERIAL (Continued)

D. Manufactured Staking System: Upon approval of the Engineer, manufactured staking systems may be used in lieu of stakes, wire, and hose trunk support strapping.

2.05 GUYING MATERIAL

A. Earth Anchors:
   1. Steel auger type with looped end; minimum 3/4 inch diameter, 36 inch long anchor Shank, with 5 inch minimum diameter anchor disk.
   2. Driven style earth anchors with a minimum 1,000 pound capacity in normal soils.

B. Hose Trunk Support Strapping: Comply with Section 9030, 2.04, B.

C. Cable: 1/8 inch galvanized wire rope or equivalent cable with a minimum 1,500 pound capacity. Provide cable with ends clean and unfrayed.

D. Cable Clamps: Match size and strength of cable. Provide two for each end of cable.

E. Flagging Material: Brightly colored, minimum 12 square inches.

2.06 TREE WRAPPING MATERIAL FOR WINTER PROTECTION

- 4 inch wide bituminous impregnated tape, install a correctly fitted mesh (corrugated or vinyl plastic) or corrugated or crepe paper, specifically manufactured for tree trunk wrapping protection, having qualities to resist insect infestation and to allow free air flow to trunk tissues, or similar material approved by the Engineer.

2.07 WATER

Provide water and watering equipment such as hoses, tanks, reels, bags or bladders, mobile equipment, nozzles, and sprinklers for the purpose of regular watering activities during the establishment period. Provide water free of substances harmful to plant growth. No fertilizers, pesticides, or growth regulators will be used in the water.

2.08 TREE DRAINAGE WELLS

A. Porous Backfill Material: Comply with Iowa DOT Section 4131.

B. Engineering Fabric: Comply with Iowa DOT Article 4196.01.

2.09 HERBICIDE

Provide a granular pre-emergent herbicide as approved by the Engineer.
3.01 ALLOWABLE PLANTING DATES

Install plant material during the following times:

A. Evergreen Plants: September 1 to October 15 September 1 to September 30 and prior to June 1 March 1 to April 30, but not after candles exceed 1 inch.

B. Deciduous Plants (Balled and Burlapped and Container): August 15 to November 15 October 1 to November 30 and in the spring prior to June 1 March 1 to May 15.

C. Deciduous Plants (Bare Root): In the spring prior to May 15.

D. Weather Restrictions: Planting may be conducted under unseasonable conditions, except in weather below 32°F or above 90°F. No variance from plant warranty or other requirements will be given for plants installed outside the specified periods.

3.02 PREPARATION

A. Provide notice to the Engineer 3 days prior to planting.

B. All plants will be inspected by the Engineer prior to planting. Plants may be inspected and approved at the place of growth by the Engineer for compliance with the specifications for quality, size, and variety. Such approval does not waive the right to reject any plant material after it has been delivered to the site and/or installed.

C. Provide barriers or fencing as approved by Engineer to protect the public from injury when planting installation is within the right-of-way.

3.03 LOCATION OF PLANTS

A. Mark the location of all plants with flags or lathe according to the contract documents. Mark trees individually. Stake the outline of bedded plants or shrub groups for the quantity on the plans without marking individual plants. The Engineer will approve the locations marked prior to excavation of planting pits and tree drainage wells.

B. Make field adjustments in plant locations where underground or overhead obstruction is encountered, or where changes have been made as approved by the Engineer.

3.04 EXCAVATION OF PLANTING PIT

A. Excavate the plant pit, centered at the location marks, cylindrical in shape with a diameter 1 1/2 to 2 times larger than ball or root condition, with vertical sloped sides and flat or saucer-shaped bottom. Excavate plant pit to a depth to match the nursery grade of the root crown root flare for all balled and container root systems with well-draining soils. Do not over excavate the pit for container or balled and burlapped plants. Excavate plant pit to a depth 6 inches deeper for bare-rooted systems.

B. Scarify sides of excavated pit.

C. If specified, following excavation of planting pit for all trees, fill the pit full of water; allow to stand (without adding water) for an 18 hour period to determine porosity of the soil.

D. If the Engineer determines the soils are too impervious, provide a planting tree drainage well or plant 2 to 3 inches above the surrounding grade, per Figure 9030.103, as directed by the Engineer.
3.05 TREE DRAINAGE WELLS

Install drainage wells when specified in the contract documents or when directed by the Engineer due to the presence of impervious soils.

A. Locate the drainage well at the edge of the excavated planting pit.

B. Auger an 8 inch to 12 inch diameter hole to existing pervious soil or to a maximum depth of 10 feet. If pervious soil is encountered, extend hole a minimum of 12 inches into the pervious layer.

C. Fill the excavated hole with porous backfill material and cover the aggregate with engineering fabric.

D. Following completion of drainage well, fill the pit full of water; allow to stand for an 18 hour period to verify sufficient drainage exists. The Engineer will determine if the drainage is sufficient.

3.06 PLANTING

A. Bare Root Plants:

1. Remove all ties, ribbons, wrap, and other items except plant identification from the branch system.

2. Remove all root packing and prune broken roots to sound wood with clean cuts.

3. Place a minimum of 6 inches of backfill material in the bottom of the planting pit. Build a firm cone-shaped mound of soil in the middle of the planting pit.

4. Place the plant centered, upright, plumb, and with desired orientation in the planting pit, with the root crown root flare matching existing grade.

5. Spread and arrange roots in their natural position laterally away from the central trunk to prevent kinking or circling. Do not fold, crimp, or mat roots together.

6. Carefully place and compact backfill material in layers, filling all voids and avoiding injury to the root system until two thirds of the planting pit is complete; fill the pit with water and allow the soil to settle.

7. Continue placing backfill material and form a 3 inch deep saucer around the plant up to grade level. Water in the tree. Allow water to completely soak into soil.

8. Water the plant and surrounding area until thoroughly moist.

B. Ballled and Burlapped and Container Plants:

1. Ensure root systems are moist at the time of planting.

2. Remove all ties and wrap from branch system, except plant identification.

3. Container Plants:
   a. Remove plant root system carefully from container prior to planting without disturbance to root systems.
   b. Inspect root system and cut any circled (girdled) roots.
   c. Place plants centered, upright, plumb, and with desired orientation in planting pit with the root crown flare matching existing grade.
3.06 PLANTING (Continued)

4. Balled and Burlapped Plants:
   a. Place plants centered, upright, plumb, and with desired orientation in planting pit with the root crown matching flare at or slightly above existing grade or 2 to 3 inches above grade if in compacted clay or poorly drained soils.
   b. After plant placement, cut and remove the top 1/2 of the wire, burlap, and twine from root ball.

5. Carefully place and lightly tamp compact a small amount of backfill material in layers, filling all voids until two thirds of plant pit is complete; fill pit with water and allow soil to settle around the root ball base to stabilize the root ball.

6. Lightly compact the settled topsoil. Place loose excavated soil 2/3 of the depth of the planting pit. Water in the tree. Allow water to completely soak into soil.

7. Continue placing backfill material and form a 3 inch deep saucer around plant up to grade level. Lightly tamp but do not compact the soil around the plant. Water in a second time.

8. Water plant and surrounding area until thoroughly moist. If specified, rototill soil in a 4 foot radius around the planting pit to break up compacted soil.

C. Planting on Slopes:

1. Place the top of the root crown flare at or slightly above the finished grade at the center of the planting pit.

2. For all plants planted on significant slope, form a saucer as a dam or shoulder on the downhill side to catch and hold water and to discourage erosion.

3.07 WATERING

A. Water each plant immediately after planting.

B. Water plants a minimum of 10 to 15 gallons per plant per week when less than 1 inch of precipitation is received in the immediate location. Apply sufficient water to soak the plant’s root zone. Follow this watering procedure throughout the establishment period.

3.078 MULCHING

A. Dig edges of mulched areas to ensure the top of the mulch at the edge of the planting area matches the existing ground surface.

B. Place mulch 3 inches deep in the planting saucer within 2 calendar days of planting.

C. Mulch an 18 inch radius area around tree trunks and shrub branch lines a minimum of 6 inches larger than the tree canopy.

D. Provide a continuous mulch area around plant groupings.

E. Following mulch placement, pull mulch back 4 to 6 inches from the base of all trees and shrubs to allow air circulation.

F. Thoroughly water mulched areas. Rake to a smooth finished surface.
3.089 WRAPPING TREE PROTECTION

A. When specified in the contract documents, or when directed by the Engineer, wrap the trunk of deciduous trees in the fall of the year in which the tree is planted.

B. Inspect the trunk for injuries and evidence of insect infestation prior to wrapping.

C. Wrap trunks spirally from ground line by overlapping one-half of the tree wrapping material and completely cover. Protect trunk from the ground line to the height of the first branch. If plant has multiple stems, cover each stem separately.

D. If necessary, secure wrapping material with twine or paper tape wound spirally downward in opposite direction, with ties around tree in at least three places in addition to top and bottom.

E. Remove wrapping material by April 1 of the next spring.

3.0910 STAKING AND GUYING

A. General:

1. Maintain all plants in an upright and plumb condition.

2. Complete staking or guyng by the end of the day in which they were installed for all single stem plants over 1 inch diameter.

3. Do not stake clump form plants and plants in paved pedestrian areas unless approved by the Engineer.

B. Staking:

1. Provide two stakes for each tree for trees 2 1/2 inches in diameter and smaller. Place one of the stakes on the southwest side of the tree, or as directed by the Engineer, and place the second stake directly opposite the first.

2. Provide three stakes for each tree for trees 2 1/2 to 4 inches in diameter. Locate one stake on the southwest side of the tree with remaining stakes equally spaced around the tree.

3. Locate stakes uniformly from the trunk of the tree at a distance equal to 1/4 to 1/3 of the height of the tree, or 2 feet minimum. Place stakes outside of the planting pit and within the mulch area.

4. Set posts vertically into unexcavated soil at a minimum 2 foot depth or until firm, providing a required post height above grade.

5. Attach wire to with hose protector to trunk at a minimum of 4 feet above grade or between one half and two thirds distance from finished grade to the top of the tree with slight slack in wire to allow for tree movement.

6. Secure wire to stakes at 6 inches from the top of the stake; mark all wire with flagging material.

7. Install manufactured staking system according to manufacturer’s published recommendations.
3.09 STAKING AND GUYING (Continued)

C. Guying:

1. Provide three earth anchors and cables for evergreen trees 10 feet and taller and deciduous trees over 4 inches in diameter. Locate one anchor on the southwest side of the tree with remaining anchors equally spaced.

2. Locate the anchor a distance from the trunk equal to 1/3 of the tree height.

3. Attach the cable with a hose protector to the trunk between 1/3 and 1/2 of the tree height, or near the lowest main branches for deciduous trees.

4. Screw an auger style anchor into unexcavated soil until only the looped top is exposed. Install driven style anchors a minimum of 2 1/2 feet into the soil.

5. Secure cable to anchor with slight slack in cable; mark all anchor cables with flagging material.

6. Install manufactured staking system according to the manufacturer’s published recommendations.

D. Removal: Remove all staking and anchoring materials from all plants at the end of the 1 year establishment period and remove from site.

3.10 PRUNING

A. General:

1. Provide proper and sharp pruning tools to provide a clean cut without injuring the branch collar.

2. Prune in such a manner as to retain the natural shape of the plant. Do not prune the terminal leader of a plant. Leave no protruding stubs, and prune to the closest outward growing bud.

3. Plant materials incorrectly pruned will be rejected.

B. Deciduous Trees:

1. Prune broken, damaged, or otherwise defective branches. Remove all branches that may not develop properly. Also, eliminate narrow crotches or competing leaders.

2. Prune to develop an upright leader that will promote the symmetry of the tree. Prune flowering or specimen trees to develop their natural form.

3. Prune all trees in Class A sidewalks or other paved pedestrian areas to provide a 7 foot height clearance, unless otherwise directed by the Engineer.

C. Evergreen Trees and Shrubs: Remove dead and broken branches.

D. Deciduous Shrubs: Remove dead or irregular branches. Prune to develop their natural form.
3.11  CLEAN UP

A. Perform cleaning during installation and upon completion of work.

B. Remove all excess materials, trimmings, branches, soils, debris, and equipment from the site.

C. Repair any damage resulting from planting operations.

D. Clean all paved areas with a broom.

E. Remove all tags and labels from plants following acceptance by the Engineer.

3.12  ESTABLISHMENT AND WARRANTY PERIODS AND ACCEPTANCE

A. Establishment Period: The plant establishment period is 1 year after the installation is accepted by the Engineer. A plant inspection will be made by the Engineer prior to the expiration of the establishment period.

B. Warranty Period: If a plant warranty is specified in the contract documents, the 1 year warranty period begins immediately after the expiration of the 1 year establishment period. Inspection of plants will be made by Engineer at the end of the 1 year establishment period and again prior to the expiration of the warranty period.

C. Maintenance: Care for all plants during the establishment or warranty period as required to keep plants in a live, healthy growing condition.

1. Prune plants to maintain a desirable shape and to remove any dead or broken limbs.

2. Remove weeds and grasses from planting beds and mulch areas. Apply a pre-emergent herbicide to control weed growth when directed by the Engineer.

3. Water as required to enhance early root growth and maintain a moist soil.

4. Adjust stakes and ties to maintain plant in an upright and plumb condition.

5. Re-settled plants to proper grades and position. Restore planting saucer and mulch; add backfill material and mulch as may be required.

6. Apply appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

D. Plant Condition: Ensure all plants are in a live, healthy, and growing condition both at the date of acceptance of the installation by the Engineer, at the end of the plant establishment period, and at the end of the warranty period.

E. Replacement: Replace all plants not found to be in a live, healthy, and growing condition during inspection at the 1 year establishment period and again at the warranty period (if specified) at no additional cost to the Contracting Authority.

1. Upon notice from Engineer, remove rejected plants from the site and replace with plant material of the same species and size as originally specified. Install replacement plants complying with the contract documents.

2. Plants damaged due to fire or flooding beyond the contractors control or ice storms, hail, tornados, or acts of vandalism do not require replacement.

END OF SECTION
Required as Depth (Bare Root Plants)

**PLANTING PIT**

- **1** Spread root system in natural position with soil excavated from pit.
- **2** Build a firm cone-shaped mound of soil in the middle of the planting pit.
- **3** Install with root flare at or slightly above grade. Do not place mulch within 6 inches of trunk.
- **4** Install root flare 2 to 3 inches above grade. Do not place mulch within 6 inches of trunk.

Form 3" deep saucer.

Mound finished grade to cover portion of rootball above grade.

3" Deep Mulch

Scarify sides of pit.

3 Times Root System

Depth as Required

PLANTING PIT

(Bare Root Plants)

PLANTING PIT

(Bare Root Plants on Poorly Drained Soils)

Existing Grade

Finished Grade

3" Deep Mulch

Mound finished grade to cover portion of rootball above grade.
PLANTING PIT
(Balled and Burlapped Plants)

3 Times Root Ball Diameter

Depth of Root Ball or Container Root System

Place rootball on undisturbed soil.

3" Deep Mulch

Existing Grade

Mound finished grade to cover portion of rootball above grade.

Scarify sides of pit.

PLANTING PIT
(On Slopes)

3 Times Root Ball Diameter

Depth of Root Ball or Container Root System

Place root ball on undisturbed soil.

3" Deep Mulch

Scarify sides of pit.

PLANTING PIT
(Balled and Burlapped Plants on Poorly Drained Soils)

3 Install with root flare at or slightly above grade. Do not place mulch within 6 inches of trunk.

4 Install root flare 2 to 3 inches above grade. Do not place mulch within 6 inches of trunk.

5 Begin transition at edge of root ball.

6 Cut and completely remove top 1/2 of twine, burlap, and wire baskets from root ball prior to placing backfill material.

Do not place mulch within 6 inches of trunk.

Place rootball on undisturbed soil.

Form 3" deep saucer.

3" Deep Mulch

Finished Grade

Depth of Root Ball or Container Root System

Place rootball on undisturbed soil.

Form 3" deep saucer.

Scarify sides of pit.

Existing Grade

Mound finished grade to cover portion of rootball above grade.

Scarify sides of pit.

3" Deep Mulch

Original Grade

Finished Grade

Depth of Root Ball or Container Root System

Place root ball on undisturbed soil.
STAKING PLAN
(Trees larger than 2 1/2 inch diameter)

STAKING PLAN
(Trees 2 1/2 inch diameter or smaller)

Protect trunk from ground line to first branch when specified in the contract documents.

Place one stake to southwest.

Place one stake to southwest.
Trunk Support Strapping

Cable or Manufactured
Restraint System

Flagging Material

1/3 to 1/2 Tree Height

1/3 Tree Height

Earth Anchor

Planting Pit per Figure 9030.101

1

GUYING PLAN

Protect trunk from ground line to first branch when specified in the contract documents.

Place one anchor to the southwest.
If pervious soil is encountered at a depth less than 6 feet, the drainage well may be terminated when the well extends a minimum of 12 inches into the pervious soil layer.