



DRAKE CAMPUS TREE CARE PLAN

Purpose of the Campus Tree Care Plan

The purpose of the Drake University Campus Tree Care Plan is to identify policies pertaining to procedures and practices used in establishing, protecting, maintaining, and removing trees on the Drake University campus. The ultimate goal of the plan is to ensure a safe, attractive and sustainable campus urban forest. The specific objectives are as follows:

- Preserve and protect existing and future trees on campus
- Ensure proper species selection and high quality nursery stock acquisition
- Promote species diversity and age structure in the tree population
- Promote tree health and safety by utilizing International Society of Arboriculture best management practices when maintaining campus trees
- Manage the impact of development on campus trees
- Remove hazard trees or limbs
- Provide an adequate replacement program for dead or dying trees
- Ensure industry standards for planting procedures
- Educate the campus and community on the value of trees
- Provide 30% urban tree cover by the year 2026

Responsible authority/department for implementation of the Campus Tree Care Plan

- Facility Services/Grounds Maintenance

Campus Tree Advisory Committee

***See attachment A for a list of current advisory members**

- Committee Members
 - Four students
 - One Community Member
 - Four faculty members
 - Two Facility Services managers
 - Grounds Manager
 - Campus Horticulturist/Arborist

Goals and Targets

- Increase campus tree canopy from 26.5% to 30%
- Have a comprehensive campus tree inventory and appraisal performed by an ISA certified professional company.
- Create and maintain a tree maintenance schedule
- Measure goals with tree assessments
- Survey all Ash Trees on Campus.

Campus Tree Care Policy

- Plant Material
 - Plant species used on Drake University campus will come from a pre-determined list approved by the Campus Tree Advisory Committee
 - All landscape nursery stock shall conform to the standard specification of the American Standard for Nursery Stock
 - All plant shall be grown under climatic conditions similar to the campus
 - The list will contain both native and exotic species that have been screened for adaptability to physical conditions and serviceability, to meeting planting needs based on site orientation, drainage, soil condition, use, etc
 - Where appropriate, the best plant will be selected for a given site, which may or may not be a native
 - Trees to be used on campus must be pre-selected at the nursery for good quality and tagged. Only trees of one and a half inch (1 ½") minimum, caliper to four inch (4") maximum caliper is to be planted, unless moving an existing tree and using a tree spade. If the tree is containerized, the minimum may be three fourths inch (¾")

- **Plant Installation**
 - **Balled and Burlapped Material**
 - The planting hole should be two to three times the width of the root ball, container, or root mass (the poorer the soil, the wider the hole), with sides that slope towards the base of the root ball
 - Planting hole depth should allow the plant to be positioned so the root collar or trunk flare (where first order roots spread from the trunk) is approximately level with, or slightly higher than the surrounding grade
 - If the root ball is sturdy, all burlap, sisal and synthetic twine, and the wire basket can be removed before the plant is placed in the hole, or, once in the hole, but before backfilling begins. If the root ball is not sturdy, one-half (1/2) to one-third (1/3) of the wire basket can be removed from the root ball while in the hole. Remove as much of the burlap as is possible
 - No amendments shall be used as backfill material unless necessary. The soil removed from the planting hole should be used
 - The backfill soil should be tamped firm enough to remove large air pockets, but not too firm as to remove all fine air spaces needed to a well aerate soil
 - Apply water to backfill soil when three-fourths (3/4) completed and again when the backfill matches the surrounding grade
 - Stake the tree only if necessary
 - ◆ Place stakes on opposite sides of the tree and outside the planting hole for maximum support and to avoid damaging the root system
 - ◆ Stakes should be at right angles to the most critical wind direction
 - ◆ The material used to attach the tree to the stake should be broad, smooth and somewhat elastic. The tree should not be totally inhibited from moving
 - ◆ Stakes shall be removed after one year. Move the trunk back and forth to determine if the trunk is rigid at the soil line
 - Mulch shall be uniformly shredded hard wood, mineral (rock) or composted organic material. Mulch shall be between two inches (2") and four inches (4") in depth and shall not touch the trunk of the tree
 - In spring or summer, water trees one (1) to three (3) times each week during the first few months after planting. Provide one (1) to three (3) gallons of water per caliper inch over the root ball. Following the initial few months of frequent irrigation, provide weekly irrigation until plants are full established
 - **Container Grown Material**
 - Use the same techniques as above from planting container-grown or containerized material. However, before backfilling begins, all containers must be removed from the root ball or root mass
 - Container-grown or containerized plants should be planted so the top of the rootball is at, or slightly above grade (depending on drainage and soil characteristics)
 - Make several vertical cuts the length of the root mass to disrupt circling roots
 - **Transplanted Material**
 - Staff shall transplant desirable trees in a development area or other construction sites if the tree caliper is between two inches (2") and four inches (4") where there is an

acceptable location and during the planting season. Trees of larger caliper shall be contracted out using a large tree spade

- Fertilization
 - Newly planted trees should not receive fertilization during the first growing season. Fertilization in the second season of growth may be administered where a soil test recommends its use
- Pruning
 - Prune only broken or damaged branches at the time of planting
- Maintenance
 - Pruning Schedule
 - The maintenance pruning schedule shall be dictated by tree species, age, function and placement
 - Trees less than seven (7) years old should receive structural pruning on an annual or biennial basis
 - Trees seven (7) to 20 years old should receive structural pruning every two (2) to five (5) years
 - Trees 20 years old and older receive maintenance pruning every five (5) to seven (7) years to clean dead, diseased, dying and defective branches from the crown
 - Trees adjacent to roadways, walkways, signs and street lights are annually inspected for safety and clearance issues and maintenance pruned as necessary
 - Pruning Practices
 - General
 - ◇ Prune for safety, health and aesthetics
 - ◇ Trees will be pruned on a regular maintenance schedule or on an “as needed” basis
 - ◇ Trees will be surveyed periodically and rated based on their needs to determine scheduling priorities
 - ◇ When removing branches, the pruning cut shall not damage the branch bark ridge and branch collar
 - ◇ Internode (heading) cuts should not be used except in storm response and crown restoration procedures
 - ◇ Branch reduction or thinning should be used to achieve pruning objectives rather than making large (>8” diameter) branch removal cuts
 - ◇ Wound dressing is recommended only for pruning wounds made on oak and American elm in the spring and early summer
 - ◇ Deciduous plants can be pruned during the dormant period between leaf fall and the late dormant season (end of winter)
 - ◇ Maple, elm, birch and other trees referred to as “bleeders” may be pruned in summer or early winter to minimize sap flow
 - ◇ Suckers and water sprouts shall be pruned during the summer to minimize excessive growth

- Proper Pruning Cuts
 - ◇ Natural Target Pruning
 - Pruning will mimic and improve upon natural branch shedding
 - Branches should be removed at their base without cutting into the branch collar
 - When removing a living branch, pruning cuts should be made just outside the branch bark ridge, angling away from the trunk outward as close to the branch collar as possible

 - ◇ Training Young Trees
 - Remove broken, diseased, dying or dead branches
 - Select a leader and remove competing leaders
 - Select scaffold branches and eliminate competing branches
 - Select temporary branches below the lowest permanent branch to be retained for up to five years
 - Remove no more than 25% of a young tree's canopy in a one year period

 - ◇ Pruning Mature Trees
 - Crown reduction is not recommended. Crown reduction shall be used to reduce the size of a tree, shorten branches that extend beyond the edge of the new, smaller canopy. The longest portions of main branches shall be cut back to existing, smaller, lateral branches that are large enough to assume the role of the branch
 - Crown cleaning shall be used for the removal of dead, dying, diseased, damaged, rubbing, broken and out-of-place branches and water sprouts
 - Crown thinning shall be used to remove lateral and parallel branches, especially from the end portions of limbs. It is used to reduce limb weight on mature trees in order to reduce stress and strain on branches with structural defects
 - Crown raising shall be used for the removal of lower branches of a tree to provide clearance. Raising is best done gradually over a period of years
 - Crown restoration shall be used to improve the health and structural strength of the tree. Sprouts that grow from headed scaffolds shall be thinned to two (2) or three (3) on each scaffold

 - ◇ Pruning Coniferous Trees
 - Pruning evergreen trees that produce side buds (lateral buds) on shoots and branches, such as spruce and fir, shall be pruned by cutting the tips back to the desired length in late winter when buds are dormant
 - Pines shall be pruned in early June to early July when the new growth is in the "candle" stage. Cut or snip off one-half (1/2) to two thirds (2/3) of the candle

- Arborvitaes, yews and junipers shall be pruned before new growth begins in the late dormant season and again in June. Avoid fall and winter pruning
 - Unwanted lower branches on all conifers shall be removed in the late dormant season

- Landscaping
 - All landscaping, new and old shall use the list of acceptable trees provided by the Campus Tree Advisory Committee
 - A list of recommended and prohibited trees will be established and updated every two years to maintain a healthy urban forest

- Cultural Practices
 - Mulching
 - Tree mulch will be replaced every two years, or as needed, for trees up to approximately six inches (6"). Periodically, drip lines of larger trees and tree groupings shall be mulched extensively
 - Mulch shall be spread the same diameter as the branch spread, or large enough to cover the prepared planting hole
 - Mulch shall be maintained at a depth between two (2) to four (4) inches
 - Hardwood bark mulch, composted organic material or mineral (rock) mulch may be used

 - Fertilization
 - There is no regular tree fertilization beyond treatment received as a result of lawn fertilization
 - Specimen or high-value trees may receive prescription fertilization when severe nutrient deficiencies are diagnosed

 - Plant Health Care
 - Control of insect and disease problems will be accomplished through a program of integrated pest management (IPM)
 - Species and cultivars will be chosen for resistance to insect and disease problems
 - Monitoring reports shall be used to maintain effective and evolving plant health care programs
 - To determine the need for intervention, monitors shall use a plant health continuum and classification outline
 - ◇ **Class 1**—Normal appearance for the plant
Recommended action—No action needed
 - ◇ **Class 2**—Minimal (less than 5%) visible plant injury detected or anticipated. The plant injury may take the form of discolored or wilted leaves, defoliation, or twig dieback among many other symptoms
Recommended action—Classify problem as a true threat to health of the plant or simply aesthetic injury

- ◇ **Class 3**—Plant injury between 5% and 10% is detected or anticipated
Recommended action—Make a record injury or stressor is observed. Treatments may be warranted to maintain plant health
- ◇ **Class 4**—Plant vitality or structure is significantly compromised by stressor(s)
Recommended action—Intense multiple treatments are essential
- ◇ **Class 5**—Plant is in severe decline or a major structural failure has occurred
Recommended action—Remove portion of or entire plant

- **Removal of Campus Trees**

- **General**

- Live trees shall be removed only when required to protect public safety, is detracting from the quality of the landscape or requires a tree to be removed because it is dead.
- Whenever trees are removed Drake shall follow the City of Des Moines Tree Removal and Mitigation policy.

Tree mitigation standards below;

| DBH of removed tree in inches | Ration of replacement trees to removed tree |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------|
| At least 12 and less than 18 | 1 : 1 |
| At least 18 and less than 24 | 2 : 1 |
| For each increment of 6 inches of DBH above 24 inches, one additional replacement tree shall be provided. | |

- **Construction**

- Whenever trees are removed due to construction, Drake and/or the contractor and/or the architect shall follow the City of Des Moines Tree Removal and Mitigation policy.

Tree mitigation standards below;

| DBH of removed tree in inches | Ration of replacement trees to removed tree |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------|
| At least 12 and less than 18 | 1 : 1 |
| At least 18 and less than 24 | 2 : 1 |
| For each increment of 6 inches of DBH above 24 inches, one additional replacement tree shall be provided. | |

- **Fallen Limb Removal**

- When fallen limbs are observed on campus, members of the campus community may call in or make a service request
- Every attempt will be made to clean up the debris the same day, depending on the severity of the damage

- **Emergency Tree Removal**

- In a crisis, the first priority is to remove tree debris that blocks campus thoroughfares, disrupts campus operations or poses hazards to the campus community
- A prioritized plan will be implemented once these critical needs are addressed
- Unsalvageable trees will be removed systematically based on possible targets and salvageable trees shall be pruned to restore their health and structure

- As the tree planting budget permits, lost trees shall be strategically replace to restore the structure and function of the campus urban forest in a reasonable time frame
- During a storm response and recovery, trees requiring specialized equipment not available in-house are addressed by an outside contractor
- Hazard Tree Inspection/Removal
 - Trees will be evaluated on a regular schedule to determine the health of the tree population
 - ◇ Tree inspection may be carried out during the dormant season
 - ◇ Inspections shall be conducted following construction the vicinity of trees or after severe storms
 - ◇ A tree may be deemed a hazard if it is near a target (park bench, building, sidewalk, bike rack, etc.)
- Stump Grinding
 - After trees are removed the stumps shall be scheduled for grinding, provided there is adequate access to the site
 - Grindings are to be raked and removed
 - Soil will be used to fill the void left by the stump
- Recommended Tree Species and Prohibited Tree Species
 - See attachment B

Protection and Preservation Policies and Procedures

Management of trees during site planning, site development, and construction practices shall refer to the ANSI A300 (Part5) -2012 American National Standard for Tree Care Operations-

- See attachment D
- Tree Protection Zones
 - Tree protection zones shall be established and maintained for all trees to be preserved in a construction site. A tree protection barrier may consist of an orange plastic snow fence, chain link fence or wood barrier
 - A tree protection zone must be large enough to protect the soil from compaction and the tree from limb and root damage, and it must be explained by a sign:
Warning! This fence shall not be relocated or removed without written authorization from Facilities Manager
 - The size of the tree protection zone may be calculated in three ways
 - Measure the diameter of the tree trunk at four and a half feet (4 ½') above the ground (diameter at breast height or DBH). For every inch of trunk diameter, allow at least one (1) to one-and-a-half feet (1 ½') of space away from the trunk (radius distance). A minimum root protection distance should always be at least six feet (6'), regardless of trunk diameter
 - Measure the length of the branch that extends horizontally the farthest from the tree. This drip-line distance, in feet, multiplied by 1.5 yields the distance (in feet) away from the trunk to be protected

- Estimate the expected diameter (DBH) of a tree 10 years in the future. The number of feet (radius) of tree protection distance is calculated by multiplying the expected diameter (in inches) by 2.25
 - If erecting plastic fence to limit activity within sensitive tree protection zones becomes impractical, alternative methods for protecting roots can be used including:
 - Spreading several inches (4"- 6") of wood chips/mulch over the root zone
 - Bridging root areas with plates of steel or low wooden bridges
 - Pumping concrete from trucks through conveyor pipes instead of driving over root systems
 - Heavy equipment access, material storage, chemical or cement rinsing, vehicular parking for contractors and subcontractors, and site office locations will be limited to non-tree areas
 - No root raking shall be allowed within a tree protection zone at any time during clearing, grading or construction of a project
 - All site work shall be planned and conducted in a manner that will minimize damage to protected trees from environmental changes such as altered site drainage or any other land disturbance within or immediately adjacent to the critical root zone of the tree
- Grade Changes
 - If the grade must be lowered in the vicinity of a tree, retaining walls shall be used to keep significant portions of the root system at their existing grade, while allowing the grade to be lowered beyond the wall. The wall should be built as far away from the tree as possible to conserve the maximum amount of soil for root growth
 - If the grade must be raised in the vicinity of a tree, vertical aeration tiles or chimneys shall be spaced over the root system and connected to a layer of gravel placed over the original soil surface. Topsoil will then be back filled over the gravel to the desired grade. However, it is best to avoid grade changes whenever possible
- Utility Installation
 - Trenching should be completed in early spring or late summer if at all possible
 - Keep the backfilled trench sufficiently irrigated to encourage the establishment of new roots
 - Trenches shall be one foot for each inch at DBH from the trunk if at all possible

Tree Damage Assessment

- Assessment
 - Assessment on low profile trees is performed via the Facility Services Department using the designated tree evaluation form (see attachment C) Results from the evaluation determines whether the tree should be removed, pruned or receive treatment such as fertilization, and insect/disease control
 - Higher profile trees are assessed by an outside consultant
 - Removed trees shall be updated on the tree inventory list

- Enforcement
 - Enforcement of protection measures is to be handled by project managers, on-site engineers and Facility Services
 - Whenever it is determined that violation of this procedure has occurred, the Facilities representative or designee shall immediately issue written and oral notice to the person or company or department in violation identifying the nature and location of the violation and specifying that remedial action is necessary to bring the violation into compliance.
 - The person or company or department in violation shall immediately, conditions permitting, commence remedial action and shall have seven (7) working days after the receipt of the notice, or such longer times as may be specified in the notice, to complete the remedial actions required to bring the activity into compliance with this policy
- Penalties
 - Penalties will be assessed based on the value of the damaged tree(s) according to the ISA's "Guide for Plant Appraisal, 9th Edition"

Prohibited Practices

- Under no condition shall a tree be planted on Drake University campus for dedication without pre-approval from Facility Services Management
- Under no condition shall bicycles be allowed to park at campus trees. All bicycles must be parked only at bicycle racks
- Bicycles found parked and or locked in areas other than those allowed may be impounded or immobilized by Campus Security. The person responsible for the bike will receive a bicycle parking citation
- Under no condition shall a tree be vandalized with paint. Persons found applying paint to trees will be issued a citation

Definitions of Terminology

- **Branch collar-** *A combination of parent stem (trunk) tissue and branch tissue generated around the base of a branch through coordinated growth*
- **Branch bark ridge-** *Rough, typically darkened, raised bark that forms in the angle at the union of a branch and the trunk, and extends down from both sides of the union.*
- **Branch protection zone-** *A zone that forms within the branch base made of chemicals from stored energy that resists the spread of decay-causing pathogens from the branch into the trunk*
- **Caliper-** *The diameter or thickness of the main stem of a young tree or sapling as measured at six inches above ground level.*
- **Callus-** *Undifferentiated, non-lignified tissue initially formed by the cambium at the wound margin*
- **Canopy trees-** *A tree that will grow to a mature height of at least 40 feet with a spread of at least 30 feet*
- **Codominant stems-** *Stems that grow from multiple apical buds located at the same tip. They are similar to branches, but have no branch collars or branch protection zones*
- **Critical Root Zone-** *The minimum area surrounding a tree that is considered essential to support the viability of the tree and is equal to a radius of one foot per inch of trunk diameter (DBH)*

- **Decurrent growth habit**-*A round-headed or spreading growth habit with no main leader to the top of the plant. Lateral branches grow almost as fast as the terminal shoot or may even outgrow it so that the central leader becomes lost among the other branches*
- **Development**- *The act, process or state of erection buildings or structures, or making improvements to a parcel or tract of land*
- **DBH (Diameter, Breast Height)**- *The diameter or width of the main stem of a tree as measured 4.5 feet above the natural grade at its base. Whenever a branch, limb, defect or abnormal swelling of the trunk occurs at this height, the DBH shall be measured at the nearest point above or below 4.5 feet at which a normal diameter occurs*
- **Dripline**- *The area defined by the outermost circumference of a tree canopy*
- **Excurrent growth habit**- *A cone-shaped crown with a well-defined central leader that outgrows and subdues lateral branches*
- **Flush cut**- *A pruning cut made inside the branch collar and branch bark ridge*
- **Included bark**- *Bark tissues that fold inward between the branch and trunk*
- **Fertilizer**- *Any substance used to fertilize the soil, esp. a commercial or chemical manure*
- **Injection**- *A technique employed to introduce chemicals directly into the xylem of trees*
- **Native tree**- *Any tree species which occurs naturally and is indigenous within the region*
- **Nutrient**- *A chemical constituent that is involved in the metabolism of the tree or that is necessary for the tree to complete its life cycle*
- **Scaffold Branches**- *Branches selected for good attachment, appropriate size and desirable spacing in relation to other branches*
- **Tree protection zone**- *The area surrounding a preserved or planted tree that is essential to the tree's health and survival, and is protected within the guidelines of these regulations*
- **Woundwood**- *When lignified callus tissue differentiates to form transport cells. When pruning has been properly accomplished, a ring of Woundwood forms completely around the wound the first growing season after the cut*

Communication Strategy

- After the adoption of the Campus Tree Care Plan and Policies by the Campus Tree Advisory Committee and Drake University Administration approval, an article on Drake University's participation in the Tree Campus USA shall be placed in the student's newspaper "The Times Delphic". Also, the adoptions shall be sent to the Drake University community via electronic mail distribution system and placed on Drake University Facilities Website. Additionally, a press release shall be made to the local media through the office of Drake University Marketing and Communications
- Tree protection guidelines will be communicated to project managers for inclusion in project specifications

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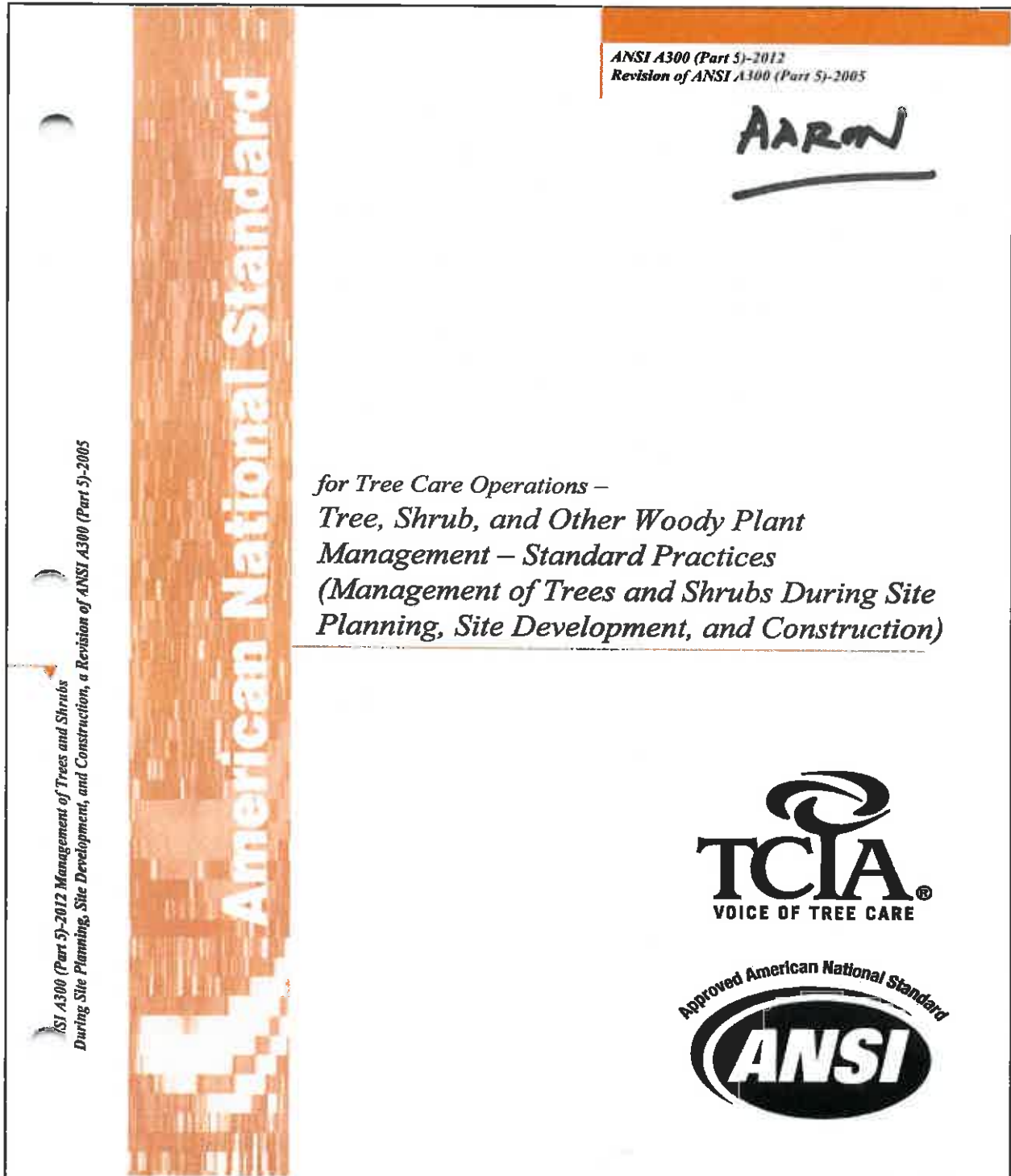
Rev: 10/09/2015

12/02/2015

Attachment D

ANSI A300 (Part 5) -2012 American National Standard for Tree Care Operations-

- o Copy kept in the Campus Arborist office.



Attachment A

- **Committee Members 2015**
 - **Mark Chambers, Director of Facility Services**
 - **John Selin, Assistant Director of Facility Services**
 - **Jeff Bosworth, Grounds Manager**
 - **Aaron Harpold, Campus Horticulturist/Arborist**
 - **Keith Summerville, Faculty**
 - **David Courard-Hauri, Faculty**
 - **Nanci Ross, Faculty**
 - **Emma Bruemmer, State Urban Forester, Iowa DNR**
 - **Bryce Dorff, Student**
 - **Madi Johansen, Student**
 - **Anna Chott, Student**

Attachment B

List of Suggested Trees, Drake University

Deciduous

Acer miyabei 'Morton'

State Street Maple
Yellow fall color
30' by 30'

Acer rubrum 'October Glory'

October Glory Red Maple
Brilliant orange to red fall color
40' by 30'

Acer saccharum 'Ballsta'

Fall Fiesta Sugar Maple
Good fall color – more orange than red
60' by 40'

Acer truncatum

Shangtung Maple
Smaller species of maple; good fall color – yellow and orange with purples
and reds mixed in
20' by 20'

Betula nigra 'Heritage'

Heritage River Birch
Ornamental feature: beautiful peeling bark
60' by 45'

Carpinus caroliniana

American Hornbeam
North American native; attractive, low-maintenance understory tree
25' by 25'

Cercis canadensis 'Alba'

White Flowering Eastern Redbud
We recently lost the only specimen, from the Fine Arts Quad
20' by 20'

Cledastrus kentukea

Yellowwood
North American native, excellent low-maintenance shade tree
40' by 40'

Cornus mas 'Golden Glory'
Cornelian Cherry Dogwood
Early spring bloom, beautiful yellow flowers.
20' by 20'

Ginkgo biloba 'Princeton Sentry'
Princeton Sentry Ginkgo
Excellent large shade tree.
40' by 30'

Heptacodium miconioides
Seven Son Flower
We have one on campus in Helmick Commons; beautiful late summer/early fall flowers
20' by 20'

Koelreuteria paniculata
Golden Rain Tree
Yellow summer flowering shade tree
30' by 30'

Liriodendron tulipifera
Tulip Poplar
Large North American shade tree
60' by 40'

Magnolia stellata
Star Magnolia
One of the earliest flowering spring trees, white blooms.
15' by 15'

Nyssa sylvatica
Black Gum Tree
North American native, large ornamental shade tree; tolerates wet soil conditions
40' by 30'

Parrotia persica
Persian Ironwood
Excellent small lawn tree
30' by 30'

Quercus bicolor
Swamp White Oak
We have many on campus; nice large shade tree specimen
50' by 50'

Quercus imbricaria

Shingle Oak

Unique oak variety; there are two in front of Old Main, but they are in poor condition.

40' by 40'

Quercus muelenbergii

Chinkapin Oak

Nice oak variety.

50' by 50'

Syringa pekinensis 'China Snow'

China Snow Tree Lilac

Beautiful flowering understory tree; ornamental peeling bark

15' by 15'

Ulmus Americana 'Princeton'

Princeton Elm

Disease-resistant elm; nicely shaped.

50' by 50'

Evergreens

Abies koreana 'Silberlocke'

Silver Lock Korean Fir

Unique, smaller species of fir; brilliant white underside to needles, red cones

10-15' by 10-15'

Picea abies 'Cupressiana'

Columnar Norway Spruce

Bluer than a common Norway spruce, tight branching habit makes it less susceptible to snowload

20' by 10'

Picea glauca 'Densata'

Black Hills Spruce

Nice symmetrical spruce, bright green needles mature to a bluish-green

20' by 20'

Pinus flexilis 'Northern Blue'

Northern Blue Limber Pine

Long, silvery blue-green needles

25' by 15'

Attachment C

- Form found in Guide for Plant Appraisal, 9th Edition
 - Copy kept in the Campus Arborist office.

