TCC – Southeast Campus Tree Care Plan Goals

The Southeast Campus Tree Care Plan applies to the 68 acres of land South of E. 81st St. and west of highway 169 in Tulsa, Oklahoma.

1. Obtain a diversity of trees in terms of age and species at the campus.
2. Plant a sufficient number of trees in the next 10 years to eventually increase existing canopy of tree coverage at the campus by 20%.
3. Educate the campus as to the tree inventory through an identification system that the College will make available to faculty, students, staff, and visitors.
4. Maintain and protect campus trees as is prudent from man-made and naturally-occurring hazards.
5. Involve TCC biological sciences students in the care and maintenance of the campus tree inventory.

Tree Inspections

Periodic inspections of each campus's tree resources is critical in providing preventative measures to combat natural and man-made injuries, growth and cultural abnormalities and pest and disease control needs. These inspections identified under the *"Annual Inspections"* tab should be viewed as preventative maintenance and be considered as basic as checking the fluids in a vehicle. Assuming that grounds maintenance personnel who are around the trees all the time will "notice when something is happening" does not replace the fact that a physical inspection of plant resources is needed periodically.

Pest Control Needs: Insect infestations can occur at any time or may be predictable dependent on a particular species or plant vigor. The *"Seasonal Inspections"* section under the *"Annual Inspections"* tab defines the frequency of these inspections to insure that insect infestations do not create adverse impacts on plant resources. Insect infestations that should be noted and a spray plan established for include but may not be limited to the following target pests: borers, beetles, mites, bag worms, web worms, scale, wasps, and bees. Other problems that should be identified include cankers, galls, and weeping plant tissue, all of which may or may not affect the target plant, but may be the host or entry point for other diseases or issues that affect other plant species.

Man-made Injury Repair: Man-made injuries may occur at any time and if left unattended, may lead to significant deterioration of tree resources. The damage to trees may result from construction activities, mowing operations, trimming, or by vehicle operators who do not use caution when parking vehicles in parking lots near trees. Depending on the nature of tree wounds, damage from the careless operation of mowers and weed eaters should be reported to the contract administrator so that an appropriate

action can be taken to insure that the tree is compensated for the damage. Reporting damage should communicate the need for improved performance around tree resources.

Action Requirements: The corrective action required should be recorded and a schedule determined to provide corrective actions. Where appropriate, removal of small trees may be required since the investment of time to attempt corrective actions may outweigh the value of the plant.

Growth/Cultural Practices: A trained eye that recognizes potential growth abnormalities can identify issues which need to be corrected in the early stages of tree development. These corrective actions will pay significant dividends in future years in the prevention of wind and ice damage, rubbing limbs that cause points of injury and decay, and improvement of form and character. Examples of preventative measures include identifying the need to remove co-dominant leaders, crossing limbs, dangling limbs that interfere with mowing and/or parking, dead wood removal, and broken branches.

Improperly Pruned Tree that will Never Heal

Exhibit 3b-1
Trees that are candidates for removal (overgrown space, interfering with site lighting, limbs laying on roof and prone to ice damage)

Guying/Tree Stake Removal: The purpose of the staking and guying process is to provide temporary support until the tree can take over the anchoring process through establishment of a root anchorage system. Although not an exact science, it is important that trees develop their support system soon after transplanting and become reliant on their roots for support. Leaving tree staking/guying systems on trees too long (e.g., longer than six months) can cause irreparable damage from which trees may never fully recover. Again, consideration should be given to the size of the tree (height, caliper, or DBH), tree species (evergreen or deciduous), site conditions (protected vs very windy) and when the tree was planted (dormant or actively growing)

Tree Selection

Tree selection should be viewed from two perspectives. First, as a process to satisfy a particular site or landscape development need and, second, when selecting the tree to purchase in the nursery.

Satisfying a Design Need: The campus Landscape Master Plan should be the source or reference for making a decision on the species of tree to plant. In cases where no landscape master plan exists, a number of factors should be considered before making the final decision on species selection. These factors include: 1) Determining the species based on an approved campus plant palette or plant list that targets specific trees for various design needs; 2) Evaluation of soils, exposure, irrigation potential, functional role or purpose of the tree, i.e., screening, background, reflection control, wind break, shade, softening building lines, reducing building scale, view direction, enframement of view, specimen, seasonal flowering color, seasonal foliage color, fruiting characteristics, bark characteristics, replacement of existing treelike species or a part of an overall site development scheme or theme); and, 3) Evaluation of the environmental impacts of the planting site, i.e., street tree, excessive compaction, excessive vehicular emissions, reflected radiation from building and parking lot surfaces, heat sinks, and poor or improper drainage.

Selecting Nursery Stock: Knowing the nurseries you deal with is a very important aspect of tree or plant selection. A key phase of making plant selections is insuring that plants in the nursery have been grown and developed in accordance with the American Standard for Nursery Stock, ANSI Z60.1 (latest edition). This standard defines trunk caliper, container size, tree height and crown development and many other characteristics which are critical in selecting an appropriately developed plant. Not all trees are grown equally and not all nursery operations satisfy this standard.

Planting Conditions: Deciding on the size of the tree and its ''planting condition" are important considerations. There are four different classes of trees normally available in nurseries for purchase. Balled and Burlapped (B&B), Container Grown (CG), Balled and Burlapped Plants Containerized (CN) and Bare Root (BR). Many nurseries grow some of their own trees in containers that are installed in the ground (container grown - CG) while others grow their trees in fields then prepare the trees for transport (balled and burlapped - B & B) when they reach marketable size.

Many nurseries combine their marketing of trees by buying a portion of their inventory from large wholesale suppliers. Knowing the frequency of root pruning for field grown trees is important since more frequent root pruning can increase the root mass in the final root ball with the tree you are considering. Containerized (CN) trees are generally bare root (BR) trees that have had the soil removed from the root system and transported to a nursery. The bare root trees are subsequently put into containers for resale. Trees that have not been containerized long enough will not have a substantial root system and the planting media may fall away from the tree when removing the container prior to planting. Just the opposite may be true for containerized and container grown trees in the nursery as they may be left or grown in their containers too long resulting in a mass of roots circling just inside the container and on the bottom of the container. This condition can signal a tree that will struggle after planting and should be avoided when purchasing trees. Again, purchasers should check ANSI Z60.I for appropriate size relationships, i.e., trunk: diameter vs tree height vs container/ ball size vs crown spread. Note: *Trees that are provided in containers with bamboo splints alongside of the tree stem should be suspect for purchase since they are relying on the bamboo to keep the trunk upright and when the bamboo is removed they will fall over.*

Tree Planning

These tree planting recommendations assume there has been a thorough analysis completed concerning where the trees are being planted, the soils environment, exposure issues, Genus/Species selection, and the physical site characteristics. Having made these assumptions, the planting crew can never assume there are no utilities that will be impacted by the planting operations, therefore, every effort shall be expended to determine if there are no site utilities that will be impacted by the digging operation or by the tree's existence on a particular site. OKIE I-CALL shall be utilized and other college resources exhausted before beginning the planting process. Utility maps shall be reviewed and all campus utility locate capabilities shall be exhausted prior to digging. Failure to investigate the potential for impacts on underground utilities may result in injury or death to planting crews that disturb utility lines.

Planting principles: There are numerous publications which highlight the processes and accepted practices for planting trees.

Approved Trees

Recommended Yard Trees

Large Trees:

Common Name	Botanical Name
Cypress, Bald	Taxodium disticum
Ginko (male)	Ginko biloba
Hackberry, Common	Celtis occidentalis
Oak, Black	Quercus veluntina
Oak, Bur	Quercus macrocarpa
Oak, Northern Red	Quercus rubra
Oak, Shumard	Quercus shumardi
Oak, Southern Red	Quercus falcate
Oak, Swamp White	Quercus bicolor
Oak, Water	Quercus nigra
Oak, White	Quercus alba
Pine, Loblolly	Pinus taeda
Planetree, London	Platanus x acerifolia
Sycamore, American	Platanus occidentalis
Tulip Tree	Liriodendron tulipfera
Sweetgum (male)	Liquidambar styraciflua

Medium Trees:

Chittimwood	Bumelia lanuginose
Coffeetree, Kentucky (male)	Gymnocladus dioica
Elm, Lacebark	Ulmus parvifloia
Elm, Cedar	Ulmus crassifolia
Goldenrain Tree (Panicled)	Koelreuteria paniculata
Hophornbeam, Eastern	Ostrya virginiana
Locust, Thornless Honey	Gleditsia triacanthos

Maple, Shantung	Acer truncatum
Maple, Sugar (Caddo or Legacy)	Acer saccharum
Mulberry, White (male)	Morus alba 'Fruitless'
Oak, Chinquapin	Quercus muehlenbergi
Oak, English	Quercus robur
Oak, Sawtooth	Quercus acutissima
Pear, Callary (Cleveland Select)	Pyrus calleryana var
Pistache, Chinese	Pistacia chinensis
Zelkova, Japanese	Zelkova serrata

Small Trees:

Cherry, Japanese	Prunus serrulata
Crabapple, Flowering	Malus spp
Crapemyrtle (standard)	Lagerstomia indica
Hawthorn, Washington	Crataegus phaenoyprum
Holly, Deciduous	Ilex deciduas
Mockorange, Sweet	Philadelphis coronaries
Redbud, Eastern	Cercis canadensis
Redbud, Oklahoma	Cercis Canadensis 'Okla'
Chinese, Fringetree	Chionanthus retusus
Smoketree, Common	Cotinus coggygria

Tree size and spacing:

- **Large –** Trees mature over 60 feet in height and spacing of at least 35 feet.
- **Medium –** Trees with a mature size from 30 – 60 feet and need a spacing of at least 35 feet.
- **Small –** Trees with a mature size of less than 30 feet and need a spacing of at least 15 feet.

Tree Mulching

The mulching of trees has numerous beneficial outcomes that reach beyond the initial planting process. Mulching trees helps to conserve water around the initial root zone, reduces soil temperature, encourages earthworm usage, increases the potential for aeration, reduces compaction, encourages air movement to and from roots, reduces runoff, reduces competition with weeds and grasses, and - the list goes on. However, mulching trees is not a one-time job with the supplemental benefits from mulching being realized through a program of mulch replenishment. Tree mulching should be kept to the standard of 2" to 4" in thickness and with no mulch immediately around the flare roots. In cases where trees have been severely impacted by construction operations or other activities, spreading mulch over the ground may play a significant role in allowing the tree to rejuvenate or redevelop its vigor.

Tree Establishment

Tree establishment is often related to a one-year period that is in construction contracts and that at the end of this time period all tree needs expire - far from this myth are the real facts. Transplant shock may last for a number of years or the unrecognized defects in tree development that are not mitigated

at the time of planting may continue on for many years. Tree establishment is the process of a tree re-establishing its vigor and vitality in a completely different and sometimes very hostile environment - one with reflected radiation, hot scorching winds off asphalt pavements, carbon emissions from vehicles, in an environment where any real soils have been either totally mixed up and/or destroyed and where major soil compaction rules. If lucky, trees have an overseer or nurturer who has an understanding of the relationships with soil, water and air and the eco-system the tree is trying to become a part of. Each campus Lead Groundskeeper is the vital link between the tree's pulse and ongoing needs that can only be provided through an ongoing day-to-day observation of the tree's needs.

Tree Establishment Practices: The first three years following planting of trees are the most critical and require the most effort to maintain trees in a healthy growing state. These practices are: 1) Tree watering - weekly during the hot dry months of the year; 2) Keeping competing vegetation away from tree trunks - spraying with non-selective contact herbicides; 3) Adjusting the tree staking/guying systems; 4) Inspection for pest or disease infestations or indications - applying pesticides as required to provide control of target pest; 5) Replenishment of mulch to keep the minimum 2" to 4" over root ball areas.

Tree Guying, Staking and Wrapping

The guying and/or staking of trees following planting is extremely important to keep the root ball from being fragmented and loosened on the tree stem, working back and forth in the wind. In other Instances, the root mass is not substantial enough to keep trees upright during periods of heavy precipitation, and the result may be trees falling over or leaning significantly.

Installation of Stakes/Guys. There are five distinctly different approaches to staking and/or guying trees, depending on the size of the tree and the planting environment. Please refer to the typical tree planting details in Appendix "G" for detailed installation requirements.

Method 1 - Using one stake such as a piece of W' rebar driven vertically alongside the tree stem or trunk. An alternative method of using one stake is to drive a sharpened 2" X 2" stake diagonally with the top facing the prevailing wind;

Method 2 - Use two stakes (steel "T" posts or 2" X 2" wood stakes) driven vertically on each side of the tree approximately two feet from the base of the tree - tethering the tree to each stake with a wire and chaffing guard;

Method 3 - Using three guy wires equally spaced around the tree and securing them to stakes driven into the ground at 60 degrees to the tree trunk. Chaffi guards are required around the wires at the point of attachment to the tree. Orient two of the three guys so they split the distance between them towards the prevailing wind direction-typically southwest;

Method 4 - Using four guy wires equally spaced around the tree and securing them as in Method 3. Again orientation of the guys should allow two of the four guys to spit the distance between them towards the prevailing wind direction as in Method 3;

Method 5 - Using a "duckbill anchor system" or some type of a driven anchor system which anchors the root ball below ground level without any exposed parts. This type of an anchoring system is often used in streetscape applications where trees are planted in sidewalks or plazas where tree anchors could pose a safety risk to passersby but may be applied in any location where tree guying systems are considered a visual nuisance or where the systems present a maintenance problem.

Trunk Wrapping: Trunk wrapping is a practice by which arborists work to protect thinned bark trees such as Acer species (maples) during the winter months. The warm southern tree exposures become active (increased movement of water from roots to stems and back) and then freeze overnight. This freezing action will pop the bark off the tree and result in a significant injury that may affect the tree vigor for years to come and potentially lead to decay and tree mortality. Trunk wrapping decreases cellular activity and reduces the potential of injury. Typically, thinned barked trees should be wrapped in late November through March and then have the trunk wrapping removed. Failure to remove the wrapping may provide an environment for pests to hide and may keep the bark excessively damp, encouraging other forms of disease or fungal attacks.

Tree Irrigation

Providing supplemental water to trees during periods of drought or reduced rainfall and during the tree establishment period (usually three years) is critical to tree survival. It should be understood that trees which compete with turf for water requirements will struggle to obtain adequate water resources with turf irrigation cycles. This competition is compounded in situations where there is no turf irrigation system as the tree and grass roots occupy the same soil zone.

Hand Watering: Hand watering provides an alternative to no watering when automated systems are not available. Although hand watering does not provide a practical solution for supplemental water needs of mature trees, under some circumstances it may be the only solution for watering small trees during the plant establishment period. Weekly watering of newly planted trees should provide 35 to 50 gallons of water per tree. Deep watering less frequently is preferred to more frequent shallow watering.

Automated Tree Irrigation Systems: The supplemental water needs of trees is best provided with automated irrigation systems which apply small amounts of water over extended periods of time. Drip emitters on spaghetti lines off multiple-orifice emitters or drip line systems can provide appropriate levels of supplemental water without runoff, and provide both newly planted trees and more mature trees with optimum soil moisture. These low-pressure systems are highly efficient and provide water-conserving techniques.

Tree Fertilization

Trees with established turf areas around them compete for nutrients at least eight months of the year. In addition, if the established turf is being irrigated, salts will build up in the soil and potentially make

micro-nutrients unavailable to the tree. One means of compensating for the competition with turfed areas is to establish a tree fertilization program. The effective management of this program will provide supplemental nutrients every three years to all campus landscape trees or as a minimum, targeted trees that can best benefit from applied nutrients. The most beneficial way of applying macronutrients to trees is through drilling 2" holes in the soil on concentric circles around the tree with the holes every two feet apart and between 8" to 12" deep. The concentric circles should start four feet from the base of the tree and be spaced four feet apart. This practice as a minimum should continue until the drip line is reached. Apply 2 to 4 pounds of organic slow-release actual nitrogen (N) per 1000 square feet of area within the drip line. Divide up the total amount and apply the fertilizer in equal amounts in each of the drilled holes. Fill in holes with organic material such as compost or fine mulch. Determination of the actual amount should be based on size of the tree, maturity, soil type and growing condition. For sandy soils, use a slow-release fertilizer with a high
Water-insoluble nitrogen (WIN) content.

Tree Pruning

Tree pruning is an essential ingredient of any grounds maintenance program having a significant population of landscape trees. Diseases, pests, weather phenomenon, aging and other natural processes all contribute to the eventual need for tree pruning. Tree pruning may be required to satisfy other needs such as limbs obscuring signs or windows, limbs growing into buildings or onto roofs or just over-growing a particular space. Many pruning needs result from the wrong tree planted in an inappropriate space. Regardless of the pruning needs, the "Tree Inspection IJ Section above and the "*Annual Inspection*" tab addresses the inspection and related pruning maintenance needs which can be applied to the overall topic of "Tree Work". Failure to routinely address tree pruning needs through a comprehensive "*Tree Risk Assessment"* will eventually lead to the gradual overall decline of the campus tree resources.

Limbs laying on roof

Tree Pest Control

Trees are subject to insect and fungi infestations such as bag worms, web worms, borers, aphids, galls, rust, blights, and other plant pests. In many cases, target tree species are subject to a specific pest problem whereas, some pest problems may impact all tree species. It is important to note that some tree species are the host in the life cycle of a pest and do little to no damage to a specific species (i.e., Juniperus sps which hosts the fruiting bodies of cedar apple rust) and thus there may be no need to attempt treatment (in this example, if there are no Malus sps which are susceptible to cedar apple rust). It is important to identify the pest control needs of trees early so that mitigation practices can be put into place before the damage occurs. Knowing the stages of pest development is critical to detection and treatment. When the campus staff is not trained to identify problems, samples can be taken to the Oklahoma State University Extension Service Master Gardener office for identification of the problem and treatment options. Unfortunately, many times when observers notice a problem, it may be too late to provide treatment actions to control the problem in the current growing cycle.

Pre-emergent Weed Control: The practice of applying pre-emergent herbicides as a weed control agent in mass tree plantings reduces undesirable plant germination and works to keep planter beds free of weeds. Weeds compete for soil moisture and rob trees of available water. Clean and neatly maintained beds present a very positive visual impression. Coupled with spot treatments with post-emergent herbicides, pre-emergent herbicides are a cost effective solution for weed control in landscape tree plantings.

Post-emergent Weed Control: The post-emergent control of broadleaf and grassy weeds around trees is a practice which can improve the kept appearance of the landscape, will reduce the incidence of weed eater and mower damage and when coupled with two inches of mulch, will reduce watering needs for newly planted trees. A contact herbicide, such as Roundup, applied every two to three months as a band around each tree will significantly increase plant survival. Care shall be exercised to not spray any leaves or shoot growth.

Tree and Tree Stump Removal

The practice of letting dead trees stand until resources are available to provide removal results in a maintenance ethic that gives bad first impressions and places campus users at significant risk from falling tree parts. The urgency of removing a tree in an unimproved grounds area cannot be compared with a tree standing next to a building or near a walkway. Campus grounds managers should assess all risks and proceed to mitigate any safety concern.

Dead Tree Waiting Removal

Contractor Tree Removal: When college resources are not adequate or the staff's lack knowledge or experience in tree removal operations dictates, a contractor with arborist certification shall be utilized for tree removal work. ANSI Z133.1 (latest edition) shall be incorporated into the contract documents or purchase order and individuals responsible for contract administration will insure that procedural and safety requirements are enforced.

Contractor Tree Stump Removal: Tree stumps resulting from tree removals may be left un-removed for a year or until a number of stumps can be accumulate. When it is economically feasible a contracted effort can be schedule for removing all stumps under one contractual action. The stumps should be flush cut with the ground so they do not pose tripping hazards or trimming or mowing concerns to any grounds maintenance work. Where possible, there should be a coordinated effort among all campuses to develop a once-a-year contracted effort for removal of all college stumps. Where tree replacement is determined to be a critical resource, a stump removal evaluation should be completed to determine whether stump grinding or stump excavation is the preferred practice.

TCC Tree Care Plan – Responsibility Statement

The responsibility of the Tree Campus USA Tree Care Plan rests with the TCC Facilities Department, and with the TCC Tree Campus USA Planning Committee.

TCC Tree Campus USA Planning Committee Members

Mike Limas, Ph.D., Director, Academic and Campus Services (Chair)

Robert Katz, Ph.D., Associate Professor, Music and Humanities

George Black, Director, Academic and Campus Services

Steven Cox, Director, Physical Facilities

Ronnie Sink, Facilities Maintenance Manager

Mike Logan, Facilities Maintenance Manager

Rhonda Davis, Assistant Professor, Art

Mike Perkins, Director of Operations, Up With Trees

Ron Walker, Board Member, Up With Trees

Steve Grantham, Executive Director, Up With Trees

Yuki Clarke, Student

Kenda Morgan, Fitness Center Specialist

John Kahre, Adjunct Faculty

Kent Smith, Lead Groundskeeper

Cindy Shanks, Dean, Engaged Learning (WC)

Roles of Committee Representatives

Tree Campus USA committee members agree to serve for a period of one to three years with a renewal option.