

Purpose

The purpose of the Sam Houston State University (SHSU) Campus Tree Care Plan is to define the policies and guidelines to establish and maintain a safe, sustainable, healthy, and attractive campus urban forest.

The objectives of this plan are to:

- Set standards for new tree selection and planting procedures
- Define the guidelines for the maintenance and removal of campus trees
- Explain the SHSU tree protection program
- Map the future goals and targets for the campus urban forestry program

Responsible Department

The SHSU Building and Landscape Services Department is responsible for the implementation and enforcement of the Campus Tree Care Plan. The campus arborist is the contact person.

Tree Advisory Committee

The SHSU Tree Advisory Committee will serve as a think-tank for urban forest management at SHSU. The committee will analyze current topics that impact trees on campus, discuss new and existing management techniques, and be a forum for learning. The committee members are:

Scott Dolezal	SHSU-Director of Building and Landscape Services
Evan Anderson	SHSU-Arborist
Sharon Frey	SHSU-Plant and Soil Science
Josh Mizrany	Texas A&M Forest Service
Jordan Herrin	Texas A&M Forest Service-District Forester
David Zeller	City of Huntsville-Parks and Recreation
Gabriela Castaneda	SHSU undergraduate student
Brittnee Lorence	SHSU undergraduate student
Joshua Arnold	SHSU undergraduate student
Courtney Dusek	SHSU undergraduate student
Bryce Najvar	SHSU undergraduate student

Tree Care Practices

New Tree Selection

New trees planted on campus will be coordinated by the campus arborist. Tree species will be selected based on the characteristics of the planting site and the objectives for installing the tree. Nursery stock will be examined for circling/girdling roots, pests/pathogens, vigor, and structure. Any nursery stock with circling/girdling roots, pests/pathogens, reduced tree vigor, or poor structure will be rejected. No multi-stemmed nursery stock will be planted unless authorized by the campus arborist. Any tree damaged during transport or planting activities will not be planted on campus unless approved by the campus arborist.

New Tree Location

The sites for tree planting and the spacing between new trees will be coordinated by the campus arborist. After an assessment by the campus arborist, any site that cannot pass all the requirements can be rejected. These are the requirements for each new tree planting site:

1. The tree cannot be within 3 feet of any curb or sidewalk.
2. The expected tree size cannot impact any above ground utilities, signage, emergency access, or university buildings.
3. Trees cannot be planted within 6 feet of underground infrastructure.
4. The site must provide canopy space and required sunlight for the selected species.
5. The hydrology and soil structure of the site must be adequate for the selected species.
6. A total soil volume of 900 ft³ for large trees, 600 ft³ for medium tree, and 300 ft³ for small trees is recommended. The depth for soil volume calculations is three feet.

Planting Trees

When planting a tree, the hole will be dug no deeper than the depth of the tree's root ball and 2-3 times the diameter of root ball. The root flare will be 1-2 inches above the existing grade of the soil. The sides of the hole will be sloped with unglazed sides and the soil underneath the root ball will be undisturbed or lightly compacted to prevent settling.

Once the tree is removed from its container or protective wrap, the roots will be inspected. Any kinked or circling roots on the sides, interior, or bottom of the root ball will be straightened inside the planting hole or severed. The tree will be placed upright in the bottom of the hole and the root flare will be checked to ensure that it is 1-2 inches above the existing soil grade. Any nursery staking materials and wrapping should be removed from the entire tree and discarded.

The hole will be filled in with the original soil that was removed while digging. Any debris or rocks found in the planting hole will be discarded and any large clumps of clay or compacted soil will be broken up. No fill dirt will be placed on top the root ball. The fill soil surrounding the tree should be lightly packed down as the hole is filled to reduce settling. The tree will be watered after planting and any voids will be filled in with remaining soil.

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After the tree has been planted, 4 inches of coarse organic mulch will be placed on and around the planting hole all the way up to but not touching the trunk of the tree. Tree staking will only be used if the newly planted tree cannot stand upright on its own.

Pruning Objectives

Campus trees will only be pruned to accomplish a predetermined goal. These goals include:

- Safety
- Maintenance of health, structure, and appearance
- Controlling tree size and shape
- Crown restoration

All pruning activities on campus must follow the ANSI A300 standards for tree pruning. A maximum of 25% of the live foliage of a tree should be removed at any one time.

Pruning Techniques

Crown Cleaning

Crown cleaning involves the removal of dead, dying, diseased, damaged, or weakly attached limbs and branches of a tree.

Crown Thinning

Crown thinning is the selective removal of limbs and branches in a tree's crown. Limbs with weak attachments, included bark, and limbs that are growing too close together or rubbing will be removed.

Crown Raising

Crown raising is the removal of lower limbs to provide clearance for pedestrians, vehicles, buildings, and signage.

Crown Reduction

Crown reduction is used to shorten the limbs of a tree to limit its size, lessen the chance of limb failure, and to rebalance tree crowns.

Tree Removals

The removal of campus trees will be based on safety, tree health, competition with more desirable trees, and conflicts with construction. The decision to remove a tree will be based on an evaluation made by the campus arborist. The campus arborist will complete a tree removal form for each tree or group of trees being removed (Appendix A). If the tree is being removed for safety reasons a tree risk assessment will be completed using the ISA Basic Tree Risk Assessment form (Appendix B). Tree removals that involve specialized skills or equipment may be conducted by an outside contractor.

Pest and Disease Management

Campus trees will be treated for pests and diseases on an as needed basis. Any trees that are showing signs of stress, insect/disease symptoms, or loss of vigor will be thoroughly inspected to determine if any pests or diseases are present. If found, the appropriate treatments will be conducted immediately.

Storm Recovery

The SHSU Landscape Services staff, under the supervision of the campus arborist, will be responsible for the clean-up and restoration of trees impacted by storms. These efforts will be initially focused on the major roads and walkways through campus in order to make them safe for students and university personnel. Once the major traffic areas have been cleared, the hazards in the less frequently occupied areas of campus will be rectified. Each tree damaged in a storm will be evaluated to determine if the tree should be removed or if it can be restored to a safe, healthy state that can provide future benefit to the campus. Outside contractors may be used in situations where specialized skills and equipment are required.

Species Selection

Trees that are native to Texas, particularly the Piney Woods region, will be the primary focus when selecting trees to plant on campus. The 30-20-10 tree diversity plan will be followed when installing new trees on the SHSU campus. This diversity plan protects the campus urban forest from new and existing pests and diseases by having no more than 30% of any tree family, no more than 20% of any tree genus, and no more than 10% of any single tree species in the SHSU urban forest. When individual trees are planted on campus the new trees should come from “under represented” tree families, genera, or species as indicated by the campus arborist.

The recommended and prohibited species list can be seen in Appendix C. This list is not absolute. Other species will be used based on availability, site characteristics, and special circumstances.

Tree Protection

All trees that could be impacted by construction, trenching, or maintenance activities will be subject to the guidelines for tree protection. Before any construction, trenching, or maintenance activities are conducted on campus the campus arborist will review the planned activities and determine if there will be any impact to campus tree limbs, foliage, trunks, or critical root zones (CRZ). Impacts include any disturbance of the roots or soil at any depth, vehicle or foot traffic, materials being stored or discarded, any increase or decrease in the grade of the soil, damage to any part of the tree, and changes in site hydrology.

Any investigations into the existence or non-existence of tree roots in an area will be completed or approved by the campus arborist. Excavation practices that have a lower impact on tree roots,

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such as air excavation, tunneling, and low PSI hydro-vac systems, are the preferred methods for any excavation inside a tree CRZ.

The CRZ of a tree will be defined as a circle radiating from the center of the tree with a radius of 1 foot for every inch of tree diameter at 4.5 feet from the ground (DBH). For example, an elm tree with a DBH of 15 inches will have a CRZ that extends 15 feet from the center of the tree in all directions. The minimum CRZ for any tree is a circle with a 6-foot radius from the trunk. The campus arborist is responsible for establishing the CRZ for each tree.

After the campus arborist has reviewed the proposed activities a decision will be made whether to protect a tree during the activity or have the tree removed. The cost of removing trees due to construction, trenching, or maintenance activities will be done at the cost of the project. Trees that are of an undesirable species, designated as hazard trees, have poor vigor, or are unable to provide future benefits to the site will not be candidates for protection. Desirable species with good health, proper structure, and will provide future benefit to the site will be candidates for protection. When a tree has been chosen for protection a tree protection zone (TPZ) will be established. The following minimum guidelines must be used when establishing a TPZ:

1. At least 50% of the tree's CRZ must be preserved undisturbed and at its original grade.
2. No cuts or fill greater than 4" are permitted within the $\frac{1}{2}$ CRZ.
3. No cuts or fill are permitted within the $\frac{1}{4}$ CRZ.
4. No dumping or waste disposal is permitted within the TPZ.
5. The TPZ must be surrounded by a minimum 4-foot metal fence that cannot be moved or altered by anyone without consent from the campus arborist.
6. Any available space inside the TPZ must be covered with 4" of coarse organic mulch.
7. The tree's trunk, limbs and foliage must be protected from equipment and vehicles.
8. Once the TPZ is established no personnel, materials or equipment can enter the TPZ without approval by the campus arborist.

The campus arborist will perform regular inspections of the work site to ensure that the minimum standards are being followed. If these criteria cannot be followed to the satisfaction of the campus arborist the tree will be a candidate for removal at the cost of the project.

Goals, Targets, and Projects

Tree Inventory

In order to better understand the dynamics and current status of the SHSU campus urban forest a campus tree inventory was completed in 2017. The inventory built upon past campus inventories that were outdated or unusable due to the loss of data. The inventory collected data on tree population, species diversity, characteristics, and health. Each campus tree was allocated a number and location with a GPS unit. A GIS based program is being used to track and manage the campus urban forest. The inventory will be updated by SHSU Landscape Services every 5 years by re-inventorying 20% of the urban forest every year.

Tree Risk Assessment

All trees have the potential to fail and pose different amounts of risk. In order to better understand and manage tree related risk, tree risk assessments will be conducted on campus trees. A Level 1 tree risk assessment will be the initial step in monitoring tree risk. This assessment uses a visual inspection of the tree to identify obvious defects/tree conditions and locate targets. The tree will be given a rating of low, moderate or high risk. Any tree given a moderate or high rating may be subject to further assessments to determine if and how the risks can be mitigated. Each campus tree will get a Level 1 assessment every year.

Campus Tree Nursery

The local tree nurseries used to acquire trees have an extensive species list but there are species needed to diversify the SHSU urban forest that cannot be found. In order to meet this demand, SHSU Landscape Services founded a campus tree nursery. The goal of this nursery is to augment the tree species available to include native tree species that are not represented in local tree nurseries. In addition to growing hard to find species, the nursery will be used as an educational tool to teach students about tree propagation and maintaining a tree nursery.

Zero Waste Initiative

SHSU Landscape Services has set a goal of becoming a zero waste operation. This means that all materials that are removed from campus by Landscape Services will be reused, recycled, or repurposed. The Urban Forestry Program will chip debris from tree operations to be used as mulch and collect leaves to be composted. The mulch and compost will be used on campus trees and shrubs to improved soil structure, increase soil nutrient retention, decrease irrigation use, reduce weed growth, and lessen soil compaction. Any wood material that is too large for processing into mulch will be spilt into fire wood, donated to a local mulch manufacturer, or given away to local craftspeople. No tree waste created by the department will go into landfills.

Campus Wildlife Habitat Initiative

The SHSU urban forest is capable of providing quality habitat for many native and migratory animal species. In 2016 and 2017, 10 bird boxes were installed on campus. Future goals will be monitoring existing campus wildlife, increasing food and water resources, providing additional nesting/rearing sites, managing invasive/feral species, and recruiting student groups to support the project. Tree species with the potential to aid campus wildlife will be a major part of future campus reforestation projects.

Food Waste Composting

SHSU Landscape Services composts organic materials that are removed from the campus landscape. These materials include fallen leaves/pine needles, flowers, weeds, trimmings, wood chips, and greenhouse waste. Starting in summer 2017, SHSU Landscape Services partnered with SHSU Dining Services to implement a plan to divert food waste from the garbage and into

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the existing compost piles on campus. Fruits, vegetables, and some baked goods are stored at the General's Market dining hall then picked up and deposited in the piles 3 times a week. The current operation diverts around a cubic yard of food waste into the compost piles each week of the school year. Future goals include expansion into other food services areas on campus and increasing/streamlining waste capture.

Tree Damage Assessment

All trees damaged by non-natural forces will be assessed by the campus arborist. The findings of this assessment will be submitted in a report to the Building and Landscape Services Department and any other involved parties. The report will give a description of the damaged tree, detail the damage, and give a recommendation on how the damage tree can be managed for the future. This report will then be given to the damaging party along with any requests. Any act of tree vandalism will be reported to the university police department.

Prohibited Practices

- No trees will be planted or removed without approval by the campus arborist.
- No cuts or incisions will be made on any campus tree without the approval of the campus arborist.
- Campus trees will not be used in art, leisure, or advertising activities. This includes implanting or attaching anything to tree trunks, limbs, roots, or foliage.
- Trees will not be used to lock bikes or mopeds.
- The use of any chemicals or substances near or on tree trunks, limbs, roots, or foliage must be approved by the campus arborist.

Communication Strategy

The SHSU Campus Tree Care Plan is available to all university contractors, students, faculty, staff, and administrators on the SHSU Urban Forestry website. The website also includes information about Tree Campus USA, our Arbor Day events, and the services we provide. The SHSU newspaper *The Houstonian*, the local newspaper *Huntsville Item*, the SHSU website, university emails, and the #shsutrees Instagram page will be used as outlets to inform faculty, staff, students, and the community about the SHSU Urban Forestry Program. The campus arborist will also provide information during events such as Texas Arbor Day, SH Arbor Day, guest speaking appearances in the community, and as a guest speaker for university courses. Any questions, comments, or issues with the plan will be directed to the campus arborist.

Glossary of Terms

½ CRZ - A circle radiating from the tree trunk with a radius that equals ½ foot for every inch in tree DBH.

¼ CRZ - A circle radiating from the tree trunk with a radius that equals ¼ foot for every inch in tree DBH.

Circular/girdling root - A tree root that encircles all or part of a tree trunk or other roots.

Critical root zones (CRZ) - A circle radiating from the tree trunk with a radius that equals 1 foot for every inch in tree DBH

Glazed sides - A feature that occurs when the sides of hole become smoothed and compacted creating a barrier that roots and water have difficulty passing through.

Hazard trees - A tree that has been identified as a source of harm.

Included bark - Bark that has become imbedded in the union between stems or branches. This weakens the structure of the union.

Radius - A straight line from the center to the circumference of a circle.

Root flare - The area at the base of the trunk that naturally widens above the roots.

Target - People, property or activities that could be injured, damaged or disrupted by a tree.

Tree risk assessment - The systematic process of identifying, evaluating and analyzing tree risk.

Vigor - The capacity for natural growth and survival.

Visual inspection - Evaluating the structural integrity of a tree by inspecting external symptoms of stress and defects.



CAMPUS TREE REMOVAL FORM

DATE:

TREE #:

INSPECTED BY:

TREE SPECIES:

TREE STATUS:

TREE DBH (Dia. @ 4.5 ft):

TREE HEIGHT (est.):

TREE LOCATION:

REASON FOR REMOVAL:

IMAGES:

- Attach completed ISA Basic Tree Risk Assessment Form (if needed)
- Attach contractor bids (if applicable)

Appendix B

ISA Basic Tree Risk Assessment Form

Client _____ Date _____ Time _____
 Address/Tree location _____ Tree no. _____ Sheet _____ of _____
 Tree species _____ dbh _____ Height _____ Crown spread dia. _____
 Assessor(s) _____ Time frame _____ Tools used _____

Target Assessment						
Target number	Target description	Target zone			Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?
		Target within drip line	Target within 1x Ht.	Target within 1.5x Ht.		
1						
2						
3						
4						

Site Factors
 History of failures _____ Topography Flat ☐ Slope ☐ _____ % Aspect _____
 Site changes None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe _____
 Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ _____ % Describe _____
 Prevailing wind direction _____ Common weather Strong winds ☐ Ice ☐ Snow ☐ Heavy rain ☐ Describe _____

Tree Health and Species Profile
 Vigor Low ☐ Normal ☐ High ☐ Foliage None (seasonal) ☐ None (dead) ☐ Normal _____ % Chlorotic _____ % Necrotic _____ %
 Pests _____ Abiotic _____
 Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe _____

Load Factors
 Wind exposure Protected ☐ Partial ☐ Full ☐ Wind funneling ☐ _____ Relative crown size Small ☐ Medium ☐ Large ☐
 Crown density Sparse ☐ Normal ☐ Dense ☐ Interior branches Few ☐ Normal ☐ Dense ☐ Vines/Mistletoe/Moss ☐ _____
 Recent or planned change in load factors _____

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR _____ %
 Dead twigs/branches ☐ _____ % overall Max. dia. _____
 Broken/Hangers Number _____ Max. dia. _____
 Over-extended branches ☐
Pruning history
 Crown cleaned ☐ Thinned ☐ Raised ☐
 Reduced ☐ Topped ☐ Lion-tailed ☐
 Flush cuts ☐ Other _____
 Main concern(s) _____
 Cracks ☐ _____ Lightning damage ☐
 Codominant ☐ _____ Included bark ☐
 Weak attachments ☐ _____ Cavity/Nest hole _____ % circ.
 Previous branch failures ☐ _____ Similar branches present ☐
 Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
 Conks ☐ Heartwood decay ☐
 Response growth _____
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
 Codominant stems ☐ Included bark ☐ Cracks ☐
 Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
 Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
 Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐
 Lean _____ ° Corrected? _____
 Response growth _____
 Main concern(s) _____
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐
 Dead ☐ Decay ☐ Conks/Mushrooms ☐
 Ooze ☐ Cavity ☐ _____ % circ.
 Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____
 Root plate lifting ☐ Soil weakness ☐
 Response growth _____
 Main concern(s) _____
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Appendix B continued

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Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Notes, explanations, descriptions _____

Mitigation options	Residual risk
	Residual risk
	Residual risk
	Residual risk

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐ Work priority 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ Recommended inspection interval _____

Data ☐ Final ☐ Preliminary Advanced assessment needed ☐ No ☐ Yes-Type/Reason _____

Inspection limitations ☐ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

Appendix C

Recommended Species	Prohibited Species
American elm (<i>Ulmus americana</i>)	box-elder (<i>Acer negundo</i>)
American holly (<i>Ilex opaca</i>)	chinaberry tree (<i>Melia azedarach</i>)
bald-cypress (<i>Taxodium distichum</i>)	Chinese tallow tree (<i>Triadica sebifera</i>)
black hickory (<i>Carya texana</i>)	laurel oak (<i>Quercus laurifolia</i>)
black walnut (<i>Juglans nigra</i>)	mimosa (<i>Albizia julibrissin</i>)
blackgum (<i>Nyssa sylvatica</i>)	shumard oak (<i>Quercus shumardii</i>)
catalpa (<i>Catalpa bignonioides</i>)	silver maple (<i>Acer saccharinum</i>)
cedar elm (<i>Ulmus crassifolia</i>)	sugarberry (<i>Celtis laevigata</i>)
cherrybark oak (<i>Quercus pagoda</i>)	water oak (<i>Quercus nigra</i>)
eastern hophornbeam (<i>Ostrya virginiana</i>)	willow oak (<i>Quercus phellos</i>)
eastern red bud (<i>Cercis canadensis</i>)	
eastern red-cedar (<i>Juniperus virginiana</i>)	
flowering dogwood (<i>Cornus florida</i>)	
fringe tree (<i>Chionanthus virginicus</i>)	
live oak (<i>Quercus virginiana</i>)	
loblolly pine (<i>Pinus taeda</i>)	
longleaf pine (<i>Pinus palustris</i>)	
overcup oak (<i>Quercus lyrata</i>)	
pawpaw (<i>Asimina triloba</i>)	
pecan (<i>Carya illinoensis</i>)	
post oak (<i>Quercus stellata</i>)	
red maple (<i>Acer rubrum</i>)	
river birch (<i>Betula nigra</i>)	
sassafras (<i>Sassafras albidum</i>)	
shagbark hickory (<i>Carya ovata</i>)	
shortleaf pine (<i>Pinus echinata</i>)	
southern magnolia (<i>Magnolia grandiflora</i>)	
southern red oak (<i>Quercus falcata</i>)	
southern sugar maple (<i>Acer floridanum</i>)	
swamp chestnut oak (<i>Quercus michauxii</i>)	
sweet bay (<i>Magnolia virginiana</i>)	
sweetgum (<i>Liquidambar styraciflua</i>)	
sycamore (<i>Platanus occidentalis</i>)	
thornless honey locust (<i>Gleditsia triacanthos</i> var. <i>inermis</i>)	
two-winged silver bell (<i>Halesia diptera</i>)	
white oak (<i>Quercus alba</i>)	