

Summary

The purpose of The University of Alabama in Huntsville (UAH) Tree Care Plan is to ensure that campus trees continue to provide numerous benefits to the community. UAH strives to maintain and enhance the trees on this campus. The university will increase the canopy, longevity, and health of the tree population. This will be done with safeguards and maintenance guidelines for this campus canopy defined by UAH Campus Tree Care Plan. These guidelines regulate the removal of trees and provide a tree replacement plan. The campus canopy will be cared for with maintenance criteria consistent with national and local guidelines, laws, and regulations.

Responsible Authority

The UAH Grounds & Landscape Management unit (UAH GLM) is responsible for the enforcement of the UAH Campus Tree Care Plan.

Campus Tree Advisory Committee

1. The Campus Tree Advisory Committee includes representatives from UAH and the surrounding community and meets annually to accomplish the following:
 - a. Discuss campus tree care program
 - b. Amend list of recommended and prohibited tree species
 - c. Review UAH's tree protection and preservation policies
 - d. Plan annual arbor day event
 - e. Set goals concerning the urban forest at UAH
2. Committee representatives include
 - a. Students
 - i. Any student organization may elect/appoint a representative who will serve for a one-year term, with the option to serve a second one-year term, if desired.
 - ii. The student organization will elect/appoint a replacement at the end of the student's term.
 - b. Non-student representatives will include individuals from UAH Facilities & Operations, UAH faculty, and the Huntsville community
 1. Non-student representatives will have no term limit
 2. Non-student representatives will refer a replacement upon leaving

Campus Tree Care Guidelines

All arboriculture practices must follow the ANSI Z133 and ANSI A300 standards

Pruning

Pruning the campus trees must never occur without defined objectives. Proper pruning is a high-skill practice that requires proper knowledge and training. It must be performed in a manner that takes into consideration the time of year, species, size, condition, and location. An assessment of potential targets must always be performed.

Pruning shall follow specific guidelines. These guidelines must have a defined set of goals for each tree. Pruning will be performed for campus safety, for the health of the tree, and for appearance if needed. If a branch is being removed, the final pruning cut must be outside the bark ridge and branch collar. Heading cuts must only be used if absolutely necessary, as determined by UAH GLM.

If the pruning objective is a crown cleaning, this indicates the need for removal of dead, infected, or damaged limbs. This is an essential practice, especially in large, mature trees, as it reduces the hazards associated with falling limbs. Additionally, it can slow or prevent the spread of disease or decay, as well as improving the aesthetics of the tree's form.

If possible, in a low-risk area, dead trees can be retained to provide habitat for wildlife.

When feasible, certain trees will benefit from thinning. This is a practice in which the overall density of the branches on a tree is reduced. Thinning allows sunlight to penetrate through the canopy and can decrease the wind stress on a tree when done properly. Additionally, thinning can increase visibility.

Raising is a commonly practiced method of pruning trees on campus. It is often a necessary practice for the purpose of providing clearance and visibility. Sometimes a crown raising may be required even if the time of year isn't optimal for pruning; this would be especially true in a situation where safety is compromised. If at all possible, no more than two-thirds of the tree's crown will be taken during any pruning.

A final type of pruning is reduction pruning. This is done to reduce the overall size of a tree. Reduction pruning is usually not recommended unless determined to be absolutely necessary by UAH GLM.

Cultural Practices

Mulching:

Mulching is a highly beneficial practice. It protects the root system, improves the appearance of the landscape, reduces weed competition, and returns organic matter to the soil, thus improving overall soil quality. Mulching shall be applied at a depth of no more than three inches. Mulch must be kept clear of the tree's root collar. Tree drip lines are mulched as needed. Whenever possible, the mulch bed should extend to the drip line of the tree. The only acceptable forms of mulch on campus shall be pine straw or pine bark.

Fertilization:

Fertilizer for trees is generally only applied when determined to be beneficial by a qualified member of UAH GLM. This would most likely be applied if a soil test indicates a nutrient deficiency for the affected tree.

Integrated Pest Management:

Integrated Pest Management (IPM) is an important cultural practice in tree care. IPM does include the use of pesticides by a licensed applicator, but only if determined to be absolutely necessary following field observations, monitoring for the presence of pest organisms, physical removal of pests or items providing harborage for them, etc. IPM and its diagnoses and treatments shall be performed by a qualified member of the UAH GLM.

Tree Protection During Construction Projects

Tree protection during construction activities is absolutely essential for the health and well-being of the campus urban forest. UAH is the site of frequent construction projects which occur for the foreseeable future. Because protection plans have not been implemented until recently, more tree removal can be expected in the coming years. Few, if any, trees were properly zoned off from construction activities and equipment up to this point. These activities resulted in physical damage to the trees, extensive damage to their root systems (often a fatal blow), severe compaction or depletion of soil, and many other negative consequences.

Due to the overall biology of trees, it can often take years for them to decline and die following construction damage (especially large, mature trees). For the safety of those on campus, removal of decaying or dead trees is often the only practical solution, but their removal can result in a negative impression of UAH GLM or tree care subcontractors by the campus community. Proper protection of campus trees during initial construction phases will increase their survival rate.

One of the most important aspects of tree protection is the establishment of a Tree Protection Zone (TPZ). This follows a system of measurements, where strong fencing (such as chain-link) is installed around the tree based on the trunk diameter. This corresponds to an acceptable percentage of the tree's root system. The area within the TPZ is strictly off limits to all construction personnel and equipment and will be inspected regularly by a qualified member of UAH Facilities & Operations. A third-party arborist may inspect the site and trees if specified in the construction documents.

Tree Planting and Diversity

**Transplanting and tree care standards are conformed to TCIA (Tree Care Industry Association: ANSI A300 standards (Planting, landscaping, maintenance))*

Time of Planting

The best time to transplant a tree is during the season of autumn or spring. Winter and summer are difficult times to plant trees, but successful planting is achievable.

Handling and Transportation of Trees

While transporting trees, ensure the plant is handled by the root ball or the container. Trees should rarely be handled or lifted by the stem or trunk. If the tree is too heavy for crews to move, proper equipment should be used (chains, straps, harnesses, etc.). If spreading branches are too cumbersome upon receiving nursery stock, a reduction of the footprint can be achieved by tying the branches back. A cloth or flow-through tarp is essential for highway travel to reduce the desiccation from the wind as well as abiotic leaf and branch damage.

Time of Planting

Planning ahead will result in easier and more successful planting. Select multiple sites for planting and conduct soil tests for each of these sites. These should include lab-tested soil nutrients, organic matter, and pH levels i.e. (Auburn's or Waypoint's soil labs). An on-site drainage test should also be completed at each site. After these tests have been performed, plan out which varieties of trees will perform best in these areas.

Before planting a tree at any site, a drainage test should be conducted. The test should be done with a 4" diameter auger bit. The drilled hole should go as deep as the root ball of the intended tree. Fill the drilled hole with water and refill the hole to pre-saturate the soil; continue this for one hour to maintain the water level. After twenty-four hours, refill with water to 12" from the bottom of the hole and measure the rate of fall from the water surface. A drainage rate of less than ¼" per hour indicates that it might be necessary to provide drainage from the planting hole. The hole intended for transplanting the tree should be dug on the same day. This will prevent glazing. If it is unavoidable and dozens of holes are needed for a planting event, use hand tools to break up the surfaces that have been glazed. Breaking up the soil will expose the moist surfaces.

Determining the width of the hole requires judgment based on soil quality. If the soil quality is determined to be high, the hole will only need to be a few inches wider than the tree's root ball system. Where a low-quality soil site (compacted clay, rock, or poorly drained soils) should have a wider and gradually sloping sides, the hole should be about two times the width of the root ball.

Preparing the nursery stock is an essential step when it comes to long term tree health. This begins by removing the tree from the container or ¼ of the wire and burlap (remove entirely if possible). The root ball needs to be shaved by removing a thin layer of roots from the sides and bottom of the root ball. When transplanting the tree, proper root depth is very important. Before beginning to plant the tree, the trunk flare needs to be above the soil line. If you cannot initially see the trunk flare, remove the uppermost growing media until you find the top primary root and continue until exposing the bottom most root on the trunk flare.

The soil at the base of the prepared hole should be compact, if it has been disturbed, re-compact the soil. Then place the tree roots in the middle of the prepared hole and support the trunk in a vertical position. This is done by backfilling around the base of the roots and tamping the soil down. Ensure that the root flare is protruding about 2" above the soil grade. Then begin back filling the hole with the loosened soil 6" at a time and lightly tamping the soil at each level, ensuring that the root flare is above soil grade.

Mulching is to be done after the planting process has been completed. The mulch bed for a newly planted tree needs to be six to nine feet in diameter. The mulch layer will be no more than 2" deep after settling. The layer should not cover the base of the tree trunk.

Any pruning to the crown of the tree should be reserved for broken, dead, weak, or diseased branches. Over pruning reduces the overall growth of the tree but may be necessary to prevent development of codominant stems. Reducing the length is a better short-term option with complete removal done the following years.

Support systems are sometimes required with newly planted trees with lightweight root systems. This support is only needed until lateral root anchors begin to develop. Guying increases trip hazards and introduced the risk of trunk girdling and should be avoided unless necessary. If guying is used, the material should be wide, smooth, non-abrasive, and flexible. To prevent tree injury, examine the support system once each season.

Maintenance During Establishment

Each species of tree establishes their root systems at different rates. Typically trees in Alabama will have more than 18" of growth during the growing season. However, soil compaction can limit root growth greatly. Good management of soil moisture and oxygen availability will help stimulate root growth in poor conditions.

Proper watering is essential for a healthy and successful tree. Water needs differ greatly during each season. The best way to ensure water is taken up by the new tree is to water at the root ball. The majority of water uptake for new transplants is done so at the root ball. Monitor the root ball (not the surrounding soil) for moisture levels. The use of a soil probe will give accurate measurements and ensure that both the root ball and backfield are at proper moisture levels. During long periods of drought and excessive heat, a tree will consume up to ten gallons of water per inch of trunk diameter (a 5" caliper tree needs fifty gallons of water per week). In cooler weather that number is reduced by half for a newly planted tree.

Additional measures for tree protection include, but are not limited to, crown and soil protection, the establishment of a single construction access route, additional protection of tree roots when applicable, soil remediation, and regular input and inspections performed by an ISA-Certified Arborist.

Finally, the construction site will be inspected during the design phase to determine which trees will be protected. Also, trees will be ranked by priority for preservation.

Tree Removal

Trees are only removed if they pose a risk to the public, property, or services. UAH GLM shall determine whether a tree is to be removed after proper assessment. It may be necessary to consult a third-party arborist in certain situations.

Before a tree is removed from the property, the diameter of the tree is taken at breast height. Then replacements are taken into consideration. **Fig. 1** is a tool used to decide how many trees will be installed in order to replace the tree and replenish the campus canopy. This will rarely be achieved directly after removal due to the limited space on campus. Ideally in the following years, the diameter of the replacement trees will exceed that of the removed tree.

Diameter of Removed Trees	Diameter of Replacement Trees											
	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
1"	1	1	1	1	1	1	1	1	1	1	1	1
2"	5	1	1	1	1	1	1	1	1	1	1	1
3"	10	1	1	1	1	1	1	1	1	1	1	1
4"	17	5	2	1	1	1	1	1	1	1	1	1
5"	26	7	3	2	1	1	1	1	1	1	1	1
6"	37	10	5	3	2	1	1	1	1	1	1	1
7"	50	13	6	4	2	2	1	1	1	1	1	1
8"	65	17	8	5	3	2	2	1	1	1	1	1
9"	82	21	10	6	4	3	2	2	1	1	1	1
10"	101	26	12	7	5	3	3	2	2	1	1	1
11"	122	31	14	8	5	4	3	2	2	2	1	1
12"	145	37	17	10	6	5	3	3	2	2	2	1
13"	170	43	19	11	7	5	4	3	3	2	2	1
14"	197	50	22	13	8	6	5	4	3	2	2	2
15"	226	57	26	15	10	7	5	4	3	2	2	2
16"	257	65	29	17	11	8	6	5	4	3	3	2
17"	290	73	33	19	12	9	6	5	4	3	3	2
18"	325	82	37	21	13	10	7	6	5	4	3	3
19"	362	91	41	23	15	11	8	6	5	4	3	3
20"	401	101	45	26	17	12	9	7	5	5	4	3
21"	442	11	50	28	18	13	10	7	6	5	4	4
22"	485	122	54	31	20	14	10	8	6	5	5	4
23"	530	133	59	34	22	15	11	9	7	6	5	4
24"	577	145	65	37	24	17	12	10	8	6	5	5
25"	626	157	70	40	26	18	13	10	8	7	6	5

(Figure. 1) The diameter of the tree is measured at breast height (4'-5' from the flare of the trunk). The same is done for the replacement trees. This chart shows the value of one large tree versus smaller counterparts. The value of one larger tree quickly exceeds that of a small to medium tree especially when it comes to sequestering carbon and reducing soil erosion.

If the lab tested soil comes back with poor results it is acceptable to use a slow-release fertilizer, but it is not truly necessary until fine roots are present. The uptake of water is of greater importance than fertilizers.

Wood-boring insects will often attack newly transplanted trees most commonly, cherries and maples. It is best to treat newly planted trees of these varieties with an insecticide mixed with a tree bark surfactant before the times when these boring pests are in their crawling stage.

Funguses are another common issue with newly planted trees. The most common problem is cankers usually due to freshly wounded tissues. Treat the wounded area with a fungicide and practice proper watering techniques to prevent cankers and other fungal issues.

Pruning to Improve Structure

All pruning cuts are to be made outside the branch collar using the three-cut procedure.

It is best to begin structural pruning on trees at a young age. This is because lateral branches can exhibit rapid growth and compete with the central leader of large growing trees. This can result in the development of weak branch attachments and limb failure years down the road. As a preventive step, those lateral branches should be headed-back, reduced, or removed at a young age.

Permanent branches should be widely spaced and have an even distribution around the trunk. This should be performed over the course of the tree's life and should not be attempted in one pruning.

Jobsite Completion Checklist

During transplanting phase:

1. Is the prepared hole the proper width and depth?
2. Have injured or misshapen roots been removed?
3. Has the upper portion of the root ball wrappings been removed?
4. Is the root flare exposed?

Final Inspection:

1. Is the tree planted at the right depth?
2. Is the trunk vertical?
3. Is a raised ring of soil necessary to hold water over the root ball?
4. Have diseased, broken, dying, or dead branches been removed?
5. Have unnecessary sprouts been removed from the roots?
6. Was the root ball and backfill watered properly?
7. Has extra soil, root ball wrappings, pruned branches, and other debris been removed from the site?
8. If crucial, have the support systems been correctly installed?

List of Trees on Campus

Large Trees			
Acer rubrum	Dogwoods	Pines	Sycamore
Acer saccharinum	Eastern Red Cedar	Pinus spp.	Taxodium distichum
Acer saccharum	English Oak	Pistacia Chinese	Tsuga canadensis
Acer spp.	Fagus grandifolia	Plantanus occidentalis	Tulip Tree
Aesculus glabra	Fagus spp.	Post Oak	Ulmus americana
Allee Elm	Fraxinus Pennsylvania	Quercus acutissima	Ulmus parvifloria
American Beech	Ginko	Quercus alba	Ulmus parvifloria 'Allee'
American Elm	Ginko biloba	Quercus falcata	Walnut
Ash	Hackberry	Quercus lyrata	Water Oak
Bald Cypress	Hemlock	Quercus muehlenbergii	Weeping Willow
Beech	Hop Hornbeam	Quercus nigra	Willow Oak
Betula nigra	Juglans spp.	Quercus nuttallii	Zelkova serrata
Betula papyrifera	Junipererus virginiana	Quercus phellos	
Big Leaf Magnolia	Koelreuteria paniculata	Quercus robur	
Black Gum	Leyland Cypress	Quercus stellata	
Blue Atlas Cedar	Liquidambar styraciflua	Quercus virginiana	
Buckeye	Liriodendron tulipifera	Red Maple	
Carya illinoensis	Live Oak	Red Oak	
Carya ovata	Magnolia grandiflora spp.	Redwood	
Cedrus atlantica	Magnolia macrophylla	River Birch	
Cedrus deodara	Magnolia spp.	Salix spp.	
Celtis occidentalis	Magnolia virginiana	Sassafras	
Chinese Pistache	Maples	Sassafras albidum	
Chinkapin Oak	Metasequoia glyptostrobides	Sawtooth Oak	
Cornus spp.	Nuttall Oak	Sequoia sempervirens	
Cryptomeria	Nyssa sylvatica	Shagbark Hickory	
Cryptomeria japonica	Ostrya virginiana	Silver Maple	
Cupressus x leylandii	Overcup Oak	Sugar Maple	
Dawn Redwood	Paper Birch	Sweetbay Mognolia	
Deodar Cedar	Pecan	Sweetgum	

Small Trees	
Acer palmatum	Lagerstromia faurei
Amalanchier x 'Autumn Brilliance'	Lagerstromia indica
American Fringe Tree	Ligustrum
Arborvitae	Ligustrum japonicum
Autumn Brilliance Serviceberry	Magnolia stellata
Autumn Cherry	Magnolia x soulangiana
Cercis canadensis	Malus spp.
Cherry	Myrica cerifera
Chinese Fringe Tree	Nellie R. Stevens Holly
Chionanthus retusus	Pinus sylvestris
Chionanthus virginiana	Possomhaw
Cornus spp.	Prunus subhirtella 'Autumnails'
Crabapple	Prunus yedoensis
Crapemyrtle	Psuedolarix
Crataegus phaenopytum	Saucer Magnolia
Dogwoods	Scotch Pine
Eastern Red Cedar	Sizzler Holly
Eastern Redbud	Southern wax myrtle
Foster Holly hybrids	Star Magnolia
Ilex cornuta 'Sizzler'	Thuja occidentalis spp.
Ilex 'Nellie R. Stevens'	Viburnum spp.
Ilex veticillata	Virburnum
Ilex vomitoria	Vitex
Ilex vomitoria 'Pendula'	Vitex agnus-castus
Ilex x attenuata	Weeping Yaupon
Ilex x koehneana 'Wirt L. Winn'	Winterking Hawthorne
Japanese Maples	Wirt L.Wynn Holly
Juniperous virginiana spp.	Yaupon

Protection and Preservation Policies

All campus trees are under the supervision and protection of UAH GLM. No tree will be removed or pruned without the approval of UAH GLM. Trees will be assessed for removal/pruning by UAH GLM or the university's contracted tree service with final authority and decision making by UAH GLM.

Goals and Targets

UAH GLM strives to provide students, faculty, and staff with excellent spaces that unlock inspiration using these goals and targets:

- UAH has a massive inventory of trees and currently has an outdated catalog of the trees on the maintained campus area. UAH GLM shall update this catalog and expand the current canopy by the end of 2023. This will include a designated priority list which will have certain trees ranked by priority of preservation.
- UAH GLM aspires to have a full-time arborist on staff. The university has years' worth of tree work that needs to be tended. This new staff member is imperative to reduce the current and future cost of tree maintenance. UAH has exhibited rapid growth, and the campus is experiencing constant construction. The arborist will be responsible for establishing TPZ and enforcing them at construction sites around campus. They would also be vital in tree safety assessments, cataloging, and overall prescriptions for tree work.
- The Mayor's Award is awarded to participating groups in the Huntsville community. The UAH GLM is taking strides to obtain this award in the next three to five years. Having a foundational pruning plan scheduled will aid our campus in having a formal and stately aesthetic.
- The PGMS Green Star Award is a national award that has a rigorous ranking system. The UAH GLM will start competing for this award in 2023. Getting a solid and sustainable campus tree plan in place will increase the likelihood of UAH placing in this competition

Communication Strategy

The Tree Care Plan will be communicated campus-wide through the OMC Announcements and across social media platforms. It will also be available on the UAH Grounds Management webpage as well as the UAH Sustainability webpage. Additionally, it will be included in the Facility and Operations Newsletter.

Prohibited Practices

- Performing tree work on campus grounds that has not been approved by UAH GLM is prohibited. These tasks will be assigned by the director, operations manager, or grounds supervisor.
- Topping of trees will be done exclusively for public safety purposes (streetlights, signs, and security cameras).
- Doing general tree work alone is a prohibited practice.
- The transplanting of trees on the prohibited planting list is a prohibited act unless otherwise stated in writing or moved from another location on campus.

Worker Safety

- ANSI Z133 standards are followed for safety protocols.
- Working in pairs for any tree work or tree assessment is a UAH requirement.
- All appropriate personal protective equipment (PPE) is to be worn at all times during tree work or tree assessments.
- Chainsaw training is mandatory prior to operating the machine.
- Equipment is to be maintained and checked before each use. Equipment that is functioning improperly will be red tagged and will be out of commission until repairs are completed.

Keyword Definitions

Branch bark ridge- raised strips of bark at the top of a branch union, where the growth and expansion of the trunk out parent stem and adjoining branch push the bark into a ridge

Branch collar- area where a branch joins another branch or trunk that is created by the overlapping vascular tissue from both the branch and the trunk. Typically enlarged at the base of the branch.

Heading cut- cutting a shoot back to a bud or cutting branches back to a buds, stubs, or lateral branches not large enough to assume apical dominance. Cutting older branches or stems back to a stun in order to meet structural objectives

Mulching- covering the surface of soil with a layer of organic or inorganic material.

Pruning- to trim by cutting away dead or overgrown branches or stems, especially to increase fruitfulness and growth.

Tree crown- the top part of the tree, which features branches that grow out from the main trunk and support the various leaves used for [photosynthesis

Tree protective zone (TPZ)- defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction or development.

Three cut method- pruning that consist of an undercut, leading over cut, and a through cut pass the branch collar.