

Colorado State University
Campus Arboretum
Collections Management Manual

Compiled by the Campus Arboretum Committee

The Oval

Table of Contents

Foreword	3
History	4
CSU Main Campus.....	4
Heritage Arboretum & Garden	5
Recent Efforts 2008–2020.....	7
Mission Statement and Intent	7
Colorado State University	7
CSU Campus Arboretum & Collections Policy.....	7
Living Collections Policy	9
Curation History	9
Collection Management: Plant Inventory Database.....	9
Collection Preservation	11
Arboretum Responsibilities and Staff	12
Responsible Department	12
Campus Arboretum Committee.....	12
Tree Campus USA Committee.....	12
Collection Responsibilities	13
Campus Tree Care Plan	14
Tree Planting and Maintenance Best Practices	14
Landscaping Standards	14
Tree Removal Policy.....	15
Wood Utilization Policy.....	15
Recommended Species	15
Prohibited Species.....	15
Managing for Catastrophic Events.....	16
Protection and Preservation Policies	16
Goals and Targets.....	17
Emerald Ash Borer – Plan for Treatment of Trees.....	18
Tree Damage Assessment.....	19
Prohibited Practices	19
Definitions of Terminology.....	19
Communication Strategy	20
Appendices	22

Foreword

Colorado State University in Fort Collins, Colorado, manages an urban forest of approximately 10,000 trees distributed over three campuses (Main, South, and Foothills), comprising 2,400 acres of land. The majority of CSU's managed urban forest (9,562 trees) is located on the Main Campus within 220 acres of irrigated landscape.

The Main Campus urban forest is diverse in terms of age, class, and species. The 2020 inventory indicates 294 species ranging in age from newly planted to over 135 years old. The largest trees have up to a 69" diameter at breast height

(DBH), with an average trunk diameter of 10.65 inches. The most common Main Campus tree is honeylocust (9.78 percent), followed by green ash (8.83 percent), blue spruce (7.15 percent), Rocky Mountain Juniper (5.72 percent) and Austrian pine (5.22 percent).



Exochorda serratifolia



The Oval - Four Seasons

History

CSU Main Campus¹

Originally a treeless prairie, the Colorado State University campus has since had a rich and interesting tree history. Much research has been done on the people, buildings and CSU campus itself, but up to now the trees have been omitted. This omission is ironic when one considers that to most alumni the most cherished memory of the campus is the Oval.

The trees growing in the older section of campus are a product of three major tree planting projects. In 1877 the local grange undertook the beautification of the Agricultural Colleges campus. Black walnut cuttings were set out and grew into the large trees at the present site of Danforth Chapel. (These trees stood until 2015, when they succumbed to 1000 canker disease. The wood was then harvested for use in campus buildings.)

The second and most important tree planting occurred in 1881, when 3,000 trees were planted on the campus. The three hackberry to the east of Spruce Hall and the green ash and American elm trees in the open field to the east of the Old Main site are remnants of this planting. Most of the trees were planted as street trees, however, lining the road system that existed in 1881. This was a mixed planting consisting of American elm, green ash, cottonwood, and possibly silver maple. Remnants of this original street tree planting are scattered throughout the older section of campus today, but the most obvious examples are the alley trees in the Oval. Although hard to believe, the allée trees have been in the ground for 113 years.

The perimeter trees were not planted until 40 years later and were part of the third tree planting. In 1922, the west perimeter was planted with 1-inch caliper American elms and the east perimeter followed two years later. The green ash along the west perimeter was a volunteer growing along an irrigation ditch that fed the Oval area and was a mature tree at the time of the third planting. The American elms around the Administration Building were planted in the spring of 1925 and the street trees lining both East and West drives followed in the spring of 1927.

Several separate tree plantings have also occurred. The rock elms were planted in 1892, while the American elms growing on city property along S. College Ave. to the east of the gym were planted in 1920. The trees growing in Sherwood Forest were planted in the late 1940s and the Ohio buckeyes on the Student Center/Morgan Library plaza were planted in 1961 and 1964, respectively. Most other trees planted on the campus were in association with the construction or expansion of buildings. (As of 2017, 62 original elm trees remain.)

¹ This history of trees on campus is from a 1994 Tree Management Plan prepared by Kathleen Alexander for Colorado State University Facilities Management. Alexander is currently the City Forester for the City of Boulder, Colorado.



Photos from the Heritage Arboretum (from top left, clockwise): *Berberis x AKA Emerald Carousel* in snow; *Forsythia x intermedia AKA Golden Belle*; *Malus x Silver Drift*; *Acer tataricum AKA GarAnn*

Heritage Arboretum & Garden²

The main objectives of the Heritage Arboretum and demonstration garden are to determine which woody plants are best suited for growing in the Rocky Mountain area and to display these plants for public and teaching purposes.

The arboretum at CSU has the largest collections of woody plants in the region with over 1,100 different taxa represented. Presently, a computerized method for collection, storage, and retrieval of information on plant performance has been implemented for all the woody plants in the arboretum. New plants are continually being added and evaluated in the collection. In 2017, 79 different woody plants were donated from eight different nurseries, arboreta, USDA, and other state experiment stations for evaluation. All new bare root woody plants were containerized after arrival. Shrub and tree species obtained this year are growing in our lath house and/or greenhouse and eventually will be planted in the various collections.

Due to construction of Canvas Stadium and the new practice field adjacent to the arboretum, many areas of the old Plant Environmental Research Center (PERC) were relocated in 2015 and 2016 but the

²The following information is sourced from the Arboretum/Woody Plant Demonstration/Research Area webpage at <http://landscapeplants.agsci.colostate.edu/arboretum/>.

arboretum was kept at the original site and even had upgrades made to it. Improvements to the arboretum include pathways, sitting areas throughout the existing area and a new entrance on Lake Street with a space for a small outdoor classroom and educational signage about the arboretum. The new entrance has also been combined with a new Heritage Garden, which showcases the agricultural heritage from six major regions in Colorado.

The woody plant section is designed on a grid pattern, and exact permanent locations of plant material have been determined and recorded. Most plants in the arboretum are labeled, and each plant label has a trial selection number, along with scientific and common names listed on it. Display labels with scientific and common names have been placed on one replication of each taxa throughout the arboretum this year on the north side of the plant.

In the southeast corner of the arboretum, a Plant Select® demonstration garden is planted. In this planting current and future woody and herbaceous Plant Select® endorsements, introductions or original plants are planted. Plant Select® is a joint plant introduction program between Colorado State University, Denver Botanic Gardens and the Green Industry of Colorado.

The woody plant demonstration/research area is under the direction of Dr. James E. Klett. David Staats (Research Associate) is in charge of record keeping for this area in 2018.

In the spring of 2003, approximately 1.5 acres of the arboretum was lost for the construction of a new dormitory on campus. The approximately 120 taxa of plants located in this area were tree spaded to a new arboretum site off of Center Avenue, north of Spring Creek and adjacent to the City of Fort Collins horticulture center known as the Gardens at Spring Creek. These trees are planted in rows by genus at the new site. In the Spring of 2005 seventeen different Elm cultivars were planted in order to find varieties that may be more resistant to Dutch Elm Disease. This is one site in the National Elm Trial program.



SOURCE photo of the Perennial Garden UCA

Recent Efforts 2008–2020

Over the last decade, CSU has been part of a building boom that has included investment of 1.5 billion dollars in new buildings. While this construction activity has resulted in the loss of many mature trees on campus, it has also provided the opportunity for the university to increase tree diversity and goals of being a more sustainable campus. Trees removed on campus have been replaced in an exceeding 2 for 1 basis. New tree plantings have been selected for increasing species diversity; to provide passive cooling for buildings and hardscapes; resistance to known disease and insect problems; adaptability to the harsh local environment; and for the overall aesthetic of campus. These efforts have been managed by the University Landscape Architect and the Outdoor Services manager. Over 2,000 trees have been planted during this decade with a focus on increasing tree diversity. CSU gained ArbNet arboretum status in 2019 and has participated in the Tree Campus Higher Education program (formerly Tree Campus USA) for approximately a decade.

Mission Statement and Intent

Colorado State University

“Inspired by its land-grant heritage, Colorado State University is committed to excellence, setting the standard for public research universities in teaching, research, service and extension for the benefit of the citizens of Colorado, the United States and the world.”

CSU Campus Arboretum & Collections Policy

The Living Collections Policy guides the development and enhancement of CSU’s living collections of trees and woody plants. The CSU Campus Arboretum now comprises approximately 10,000 trees representing 294 tree species. Inherent to the concept of a living collection is the inevitable occurrence of the growth and death of individual trees or that of entire species populations.

The CSU Campus Arboretum received official ArbNet status in 2019, and embodies CSU’s land-grant heritage and mission by offering an engaging learning laboratory environment for students, employees, and community visitors. The arboretum experience generates opportunities for the campus to learn through interaction with tree diversity, interpretive signage, and improved campus habitat. The Campus Arboretum upholds CSU’s Campus Tree Care Plan, which sets guidelines to protect, maintain, and grow CSU’s urban forest through best management practices in tree care; to reduce risks to public safety related to hazardous trees; and to ensure a sustainable campus urban forest through species diversity and compliance with the Campus Master Plan framework.

The Campus Arboretum leverages the investments of our historical and diverse urban forest, the Heritage Garden, PERC Arboretum, CSU Horticulture Research Center, Annual Flower Trial Gardens, and the Perennial Garden at the UCA. On their own, each are great accomplishments by individual faculty



Tree Campus USA Arbor Day Planting 2018

members, departments, colleges, and the University. However, tied together as an arboretum and botanical garden, these successes positively and more fully express the story of CSU’s land-grant heritage and commitment to excellence. The CSU Campus Arboretum is an exceptional asset for the community, advancing individual programs and efforts around research and teaching through the overarching structure and prominence of the arboretum, while solidifying a legacy that preserves our urban forest for future generations.

Planning and Design

Many campus construction projects impact the landscape. The landscape component of all campus improvements will enhance or contribute to plant collections and the arboretum mission.

Academic Programs

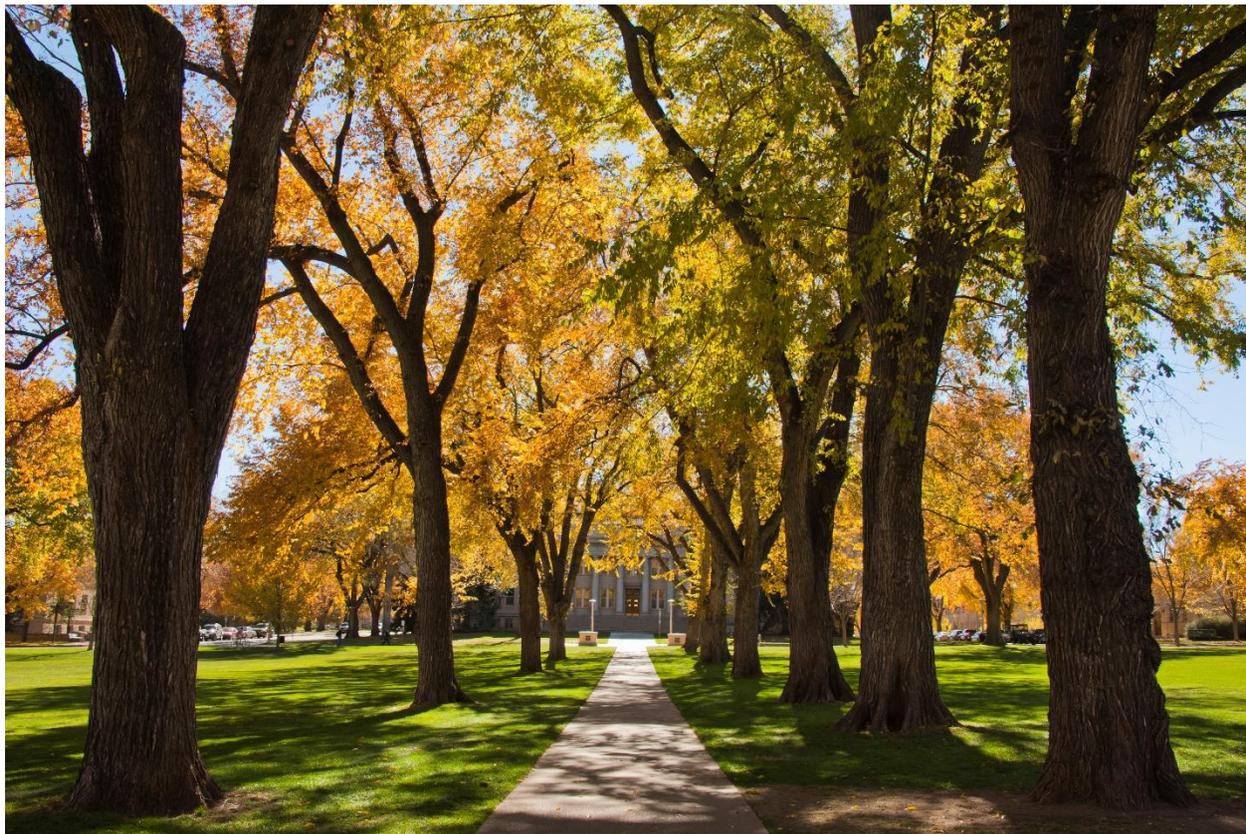
Establish collections of woody plants and landscape systems to support teaching, research, and collaboration with other institutions.

Stewardship and Sustainability

Work with all campus stakeholders to promote sustainable practices for long term success of arboretum and landscape investments. This includes a strategy to anticipate altered precipitation and temperatures along the Front Range.

Urban Forest

Provide an educational setting that promotes the relationship between people and their environment. The arboretum will provide spaces for memorable and enriching experiences for students, faculty, staff, and visitors, and will enhance the overall campus landscape.



The Oval in autumn

Living Collections Policy

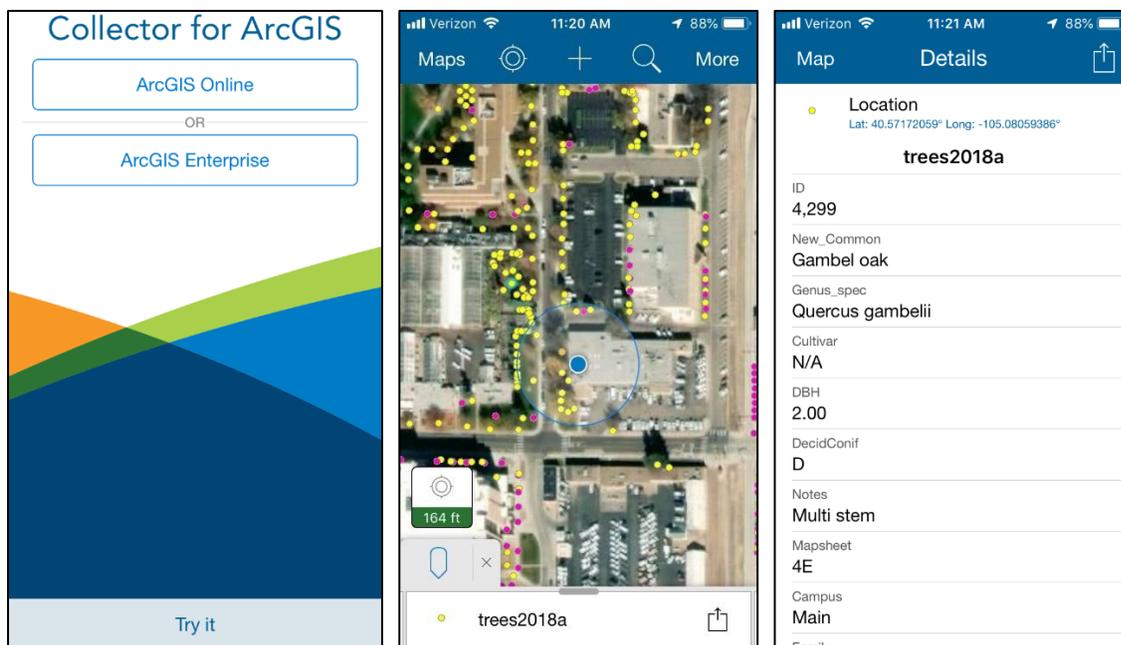
Curation History

Documentation has evolved from hand-written records on a grid map to incorporation of the general campus arboretum tree population listed and described in the GIS database. Special collections including heritage arboretum and UCA perennial gardens are currently managed independently but will be incorporated into the GIS database.

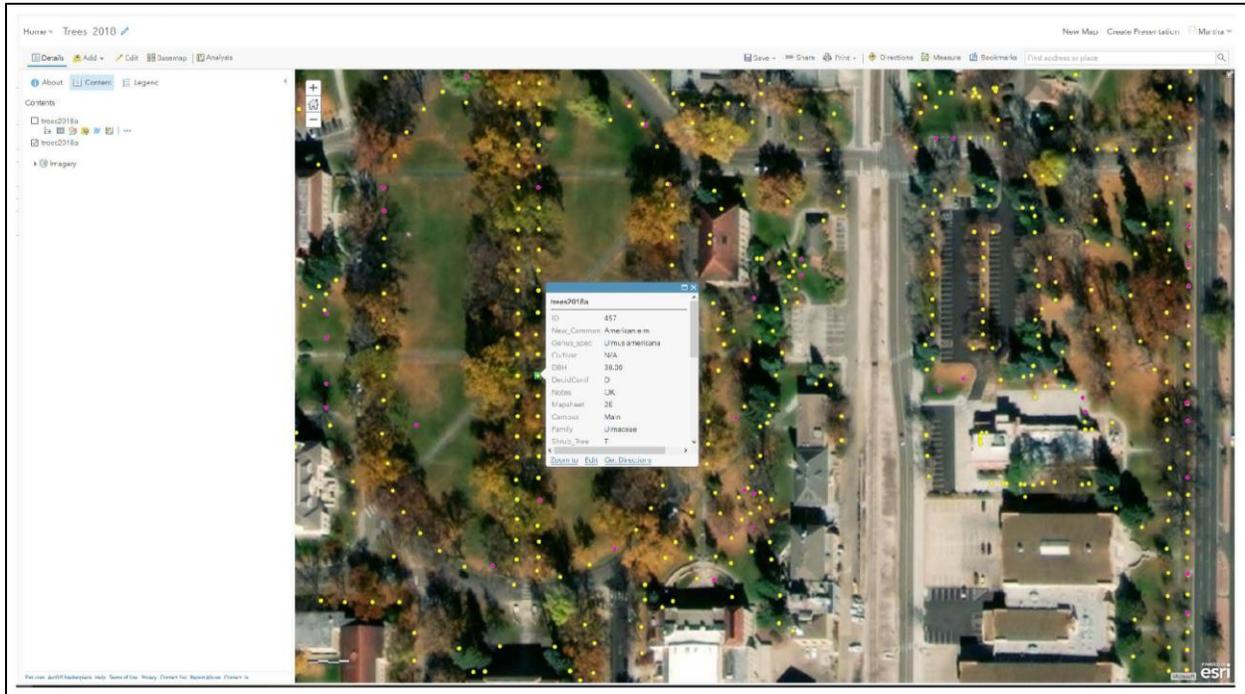
Collection Management: Plant Inventory Database

The CSU Campus Arboretum uses ArcGIS, a database to track the numerous characteristics and occurrences within a tree's life span. Attributes listed within our GIS Tree Database include:

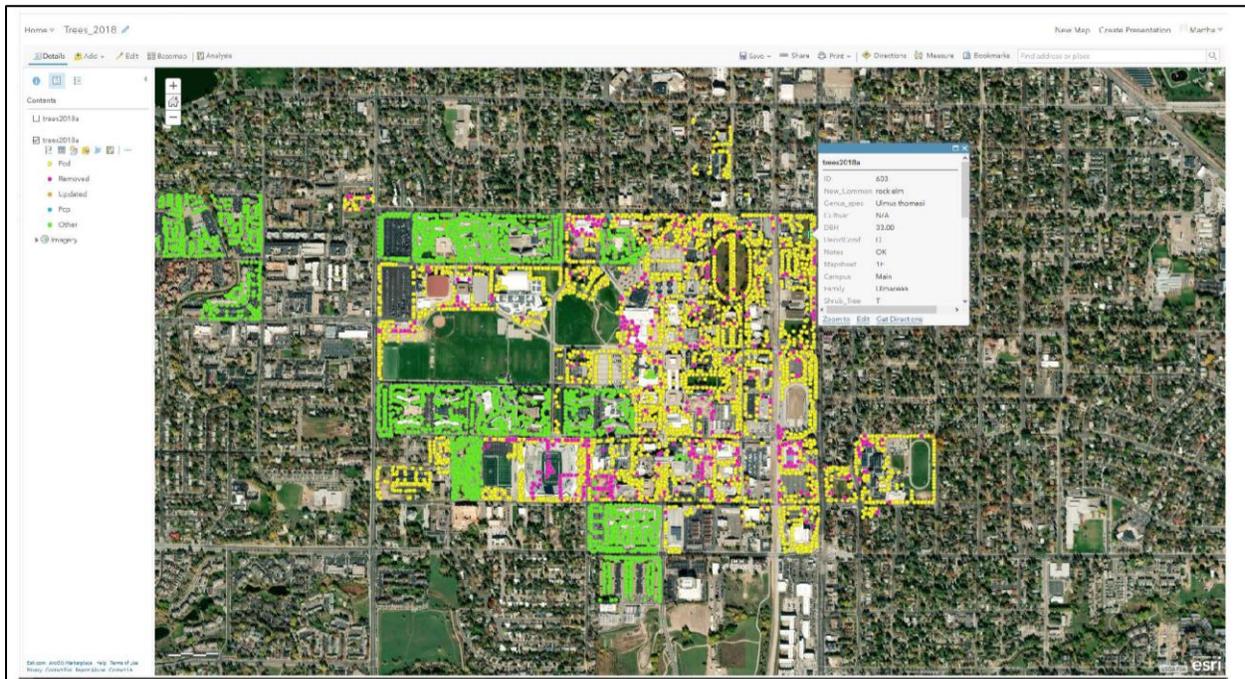
- ID
- New_common
- Genus_spec
- Cultivar
- DBH
- DecidConif
- Notes
- Mapsheet
- Campus
- Family
- Shrub_Tree
- ReviseYear
- Status
- Memorial
- GlobalID
- CreationDate
- Creator
- EditDate
- Editor
- Condition
- Observation
- Tree_Care
- CareCompYr



Phone Screen Captures GIS Tree Database 1, 2, 3



Desktop Screen Capture GIS Tree Database 1



Desktop Screen Capture GIS Tree Database 2

Collection Preservation ³

The following actions are completed on an as-needed basis:

- Tree health evaluations
- Pruning
- Relocation
- Removal
- Replacement

Tree Health Evaluations

Health evaluations are conducted regularly throughout the year by the Campus Arborist. Every tree is checked for condition, safety hazards, insects, pruning and raising needs, and storm damage. Any resulting prescribed work or treatment is done in-house or contracted out. Additionally, the Campus Arborist does an ongoing pruning assessment to generate a list of trees that need pruning to be sent out to contractors for bids.

Pruning

Pruning is accomplished with our inhouse arborist staff and through outside contractors. The Outdoor Services Group, totaling over 45 employees, has approximately five arborists on staff. Apart from the Oval, which is on a shorter pruning cycle, trees are generally on a three- to five-year pruning cycle.

Pest Treatment

Pest treatment is per the IPM guidelines. Dates and treatments are recorded and documented in GIS.

Relocation

The University Landscape Architect manages tree location and relocation as necessary in consultation with the Campus Arborist when campus construction impacts location. This relocation is tracked through the GIS database.

Removal

Small trees may be removed in-house; larger trees are contracted out. When trees are removed the process is documented in the GIS database.

Replacement

If viable, trees are returned to the same or nearby location. Species may vary in this type of replacement. For mature trees, the arborist replaces trees at a two for one ratio and emphasis is placed on tree diversity for replacement trees.

³ Please see Protection and Preservation Policies under the Campus Tree Care Plan section, listed on page 16.

Arboretum Responsibilities and Staff

Responsible Department

The responsibility for enforcing the collections management guidelines and campus tree care plan rests with the Facilities Management Department, under the direction of the Vice President for University Operations. Ongoing tree care activities, both in-house and by outside contractors are overseen by the Campus Arborist within the Outdoor Services Group. The Campus Landscape Architect has the primary role within Facilities Management in species selection, tree placement, and the enforcement of tree protection during construction.

Campus Arboretum Committee

The Campus Arboretum Committee leads all efforts for the Campus Arboretum.

Representatives:

- CSU University Planner
- CSU Campus Landscape Architect
- CSU Campus Arborist
- CSU Outdoor Services Manager
- CSU Horticulture and Landscape Architecture Department representative
- CSFS Community Forestry Program Manager
- Fort Collins City Forester
- CSU Student representative
- Fort Collins community member
- GIS Specialist
- Program Assistant, Facilities Management

Tree Campus USA Committee

The Tree Campus USA Committee provides recommendations and support for overall tree care, while contributing to maintain a comprehensive Campus Tree Care Plan. Through service learning opportunities and Arbor Day observance events. The committee affirms the benefits of the campus trees and our community forests to CSU students, CSU employees, and the public. Committee members serve for two years with an option for renewal. The student representative serves for two years, and then serves one more year as a mentor to a new student representative. Several committee members represent the Colorado State Forest Service (CSFS), a service and outreach agency of the Warner College of Natural Resources at CSU.

Representatives:

- CSU University Planner
- CSU Campus Landscape Architect
- CSU Campus Arborist
- CSU Outdoor Services Manager

- CSU Horticulture and Landscape Architecture Department representative
- CSFS Community Forestry Program Manager
- CSFS Public and Media Relations Coordinator
- Fort Collins City Forester
- CSU Student representative
- Fort Collins community member
- Program Assistant, Facilities Management

Collection Responsibilities

<p>Curator</p>	<ul style="list-style-type: none"> • Currently the position of curator is held by a faculty member within the Department of Horticulture and Landscape Horticulture. The current curator will transition into full retirement on July 1, 2022. The Department is advertising for a replacement and part of that person’s responsibilities will be as Curator. • The curator will continue educational programming about the campus arboretum, including the Heritage Arboretum and Centre Avenue Arboretum, which are also research facilities for testing adaptability of woody landscape plants for the Rocky Mountain and High Plains area. • Educational programming will include tours, lectures, field days, demonstrations about specific woody plant taxa and proper care and maintenance of these woody plants.
<p>Outdoor Services Manager</p>	<ul style="list-style-type: none"> • Works with University landscape architects, consultants, and contractors from concept to installation • Makes decisions with Campus Arboretum Committee in consultation with Tree Campus USA Committee about: <ul style="list-style-type: none"> ○ which trees to add to collection ○ tree relocations ○ when to remove a tree • Helps to evaluate specimens
<p>Campus Arborist</p>	<ul style="list-style-type: none"> • Maintain inventory through GIS <ul style="list-style-type: none"> ○ Fills out the Pruning, Spraying, Relocation, and Removal Logs through GIS ○ Updates the GIS inventory and grid map • Makes decisions with Campus Arboretum Committee about: <ul style="list-style-type: none"> ○ which trees to add to collection ○ tree relocations ○ when to remove a tree ○ tree pruning, spraying, and insect applications
<p>University Planner</p>	<ul style="list-style-type: none"> • Overall management of collection <ul style="list-style-type: none"> ○ Leads efforts for the care and development of the Arboretum, guiding CSU forward with a tree care plan and tree collections policy, creating a legacy for the CSU community to value and interact with • Makes decisions with arborist, researchers, educators, and/or Campus Arboretum Committee about:

	<ul style="list-style-type: none"> ○ how plant records will be managed ○ what nomenclatural sources will be used ● Manages exterior design and operational aspects of CSU’s 2,300-acre campus, including facilitating the master planning efforts and physical development standards for the university ● Advocates for and contributes to the strategic implementation of sustainability initiatives, such as Arboretum status, Tree Campus USA, Bee Campus USA, and Botanical Garden certifications for CSU
GIS Specialist	<ul style="list-style-type: none"> ● Overall management of GIS inventory ● Compiles inventory reports ● Requests collection data and inventories for research students ● Makes collections accessible to the public
Program Assistant	<ul style="list-style-type: none"> ● Manage Campus Arboretum status among other related sustainability initiatives ● Routine revisions to Campus Tree Care Plan in consultation with University Planner and Landscape Architect ● Act as primary interface with national organizations, students, faculty and staff. ● Gather data and provide reporting as required to achieve and continue university status ● Create, compile and format materials for community outreach/information ● Develop and maintain websites specific to Arboretum program, highlighting educational and outreach opportunities for the public

Campus Tree Care Plan

Tree Planting and Maintenance Best Practices

Colorado State University Facilities Management employees and tree care companies contracted to do work on CSU campuses shall be supervised in their work efforts by an International Society of Arboriculture (ISA) Certified Arborist, or by an individual holding a current arborist license issued by the City of Fort Collins Forestry Division. The work shall be performed in accordance with American National Standards Institute (ANSI) A300 Standards for Tree Care Operations. Best Management Practices for Tree Care Operations on the CSU campuses are defined in the following publications, available from the International Society of Arboriculture. These publications can be accessed online at <http://isa-arbor.com/home.aspx>

- ANSI A300 Best Management Practices – Tree Pruning
- ANSI A300 Best Management Practices – Utility Pruning of Trees
- ANSI A300 Best Management Practices – Tree Support Systems
- ANSI A300 Best Management Practices – Tree Lightning Protection Systems
- ANSI A300 Best Management Practices – Tree Planting
- ANSI A300 Best Management Practices – Integrated Pest Management

- ANSI A300 Best Management Practices – Managing Trees during Construction
- ANSI A300 Best Management Practices – Tree and Shrub Fertilization

Landscaping Standards

Standards for tree planting and protection are contained within the Facilities Management Construction Standards Technical Specification, Section 32 – Exterior Improvements -

https://www.fm.colostate.edu/sites/default/files/standards/III-Division-32.Exterior_Improvements.pdf

Drawings detailing the standards for tree planting and protection are contained within the Facilities Management Construction Standards Drawing Appendix - <https://www.fm.colostate.edu/drawings>

Tree Removal Policy

Trees with a potential of being removed as part of construction or utility projects are evaluated on a tree-by-tree basis. The process for removal, transplanting or protection is detailed in the Protection and Preservation section of this document.

Trees potentially requiring removal because of disease or safety risks posed to the campus community undergo a risk assessment by the Campus Arborist, City Arborist and Campus Landscape Architect. Based on this assessment, a recommendation is made to the Associate Vice President for Facilities Management and the Vice President for University Operations. If the determination is made that a tree requires removal, the removal is communicated to the campus community through the building proctors.

Trees that require removal as part of major campus development projects must be approved for removal as part of the development review process. The Master Plan Committee reviews all tree removal proposals and recommends further action as necessary. Diversity of tree species is encouraged with all tree replacement, in accordance with the university's designation as an ArbNet arboretum.

Wood Utilization Policy

Facilities Management at CSU is dedicated to the responsible management of all wood waste associated with tree care operations, including dead, broken, or low-value wood as caused by heavy snowfall or strong winds. All wood waste from tree care operations is chipped on campus. The chipped wood is then used as high-quality mulch on landscaping projects across campus. Removed wood material is also milled with the intention for use within the interior millwork of on-campus construction and remodel projects. No wood or material is sent to the landfill, except that which is suspected as being infected by disease.

Recommended Species

Trees recommended for planting on the CSU campuses are listed in the Front Range Tree Recommendation List - <http://www.coloradotrees.org/PDFs/TreeRecommendationList.pdf>. The Larimer County CSU campuses vary in soil characteristics, exposure, and temperature extremes. The recommended list is intended as a reference for design consultants doing work on the CSU campuses; however, all tree plantings require the approval of the Campus Landscape Architect. Building projects

require planting plans, which specify both species and size of proposed trees, and these plans also require the approval of the Campus Landscape Architect.

Prohibited Species

Trees listed in the National Resources Conservation Service State of Colorado Invasive weed list (<http://plants.usda.gov/java/noxious?rptType=State&statefips=08>) are prohibited from plantings on campus. As of 2007 there has been a moratorium on any new plantings of green or American ash because of a concern about emerald ash borer, and due to an overrepresentation (on a percentage basis) of green ash on the CSU campuses.

Managing for Catastrophic Events

Catastrophic events are managed by the CSU Emergency Management Team. This team includes members from Facilities Management, the CSU Police Department and Environmental Health. The CSU campuses frequently experience early and late season snowstorms (three major events in the last 10 years). Each of these events caused significant damage to trees on the campuses, especially in the historic Oval area. The first priority of the Emergency Management Team is the safety of the campus community.

Areas of campus which are assessed at high risk for either branch or total tree failure by the Outdoor Service Group are closed to vehicle and pedestrian traffic during major events, and individual trees that are assessed as high risk are cordoned off. Arborists from the Outdoor Services Group and external tree care companies are called in immediately to remove limbs and trees that pose the highest risk.

Work continues by both the internal and external work forces until risks are removed and trees damaged in the event have been pruned for safety and long-term structural health. Trees destroyed in catastrophic events are replaced on a tree-for-tree basis.

Protection and Preservation Policies

Colorado State University recognizes the environmental, economic, and aesthetic value of the campus urban forest and focuses efforts to be good stewards of trees on campus with specific concerns for both significant individual trees and significant collections.

Trees that have potential for damage from development activities on campus are subject to the following process:

1. The contractor or design-build team shall provide a tree inventory of all the trees on site and develop a tree mitigation plan as part of the work.
2. The Campus Landscape Architect works with a design team starting in the conceptual design phase to determine if there are alternatives to building, utility and pavement layouts which will allow for existing trees to remain in the project.
3. An existing conditions drawing, based on a topographic survey and detailing the location and size of each existing tree, is submitted as part of schematic design submittal. Based on this

submittal, the design consultant, working with the Campus Landscape Architect and Campus Arborist, makes a determination as to which trees are to be removed, transplanted or protected. Trees up to 10" DBH are considered of transplantable size, and are moved per criteria at the following webpage: <http://www.sustland.umn.edu/implement/treespade.htm>.

4. Trees to be removed are replaced based on the standards described as follows (these standards mirror the replacement process required of development projects in the City of Fort Collins). A tree that is removed shall be replaced on the CSU campus from which it was removed with not less than one (1) or more than two (2) replacement trees sufficient to mitigate the loss of value of the removed tree. The applicant shall select either the Campus Landscape Architect or a qualified landscape appraiser to determine such loss based upon an appraisal of the tree to be removed by using the most recent published methods established by the Council of Tree and Landscape Appraisers (<http://viewer.zmags.com/publication/4d7e29e6#/4d7e29e6/1>)
Replacement trees shall meet the following minimum size requirements: (a) Canopy Shade Trees - 3.0" caliper balled and burlap or equivalent, (b) Ornamental Trees - 2.5" caliper balled and burlap or equivalent, (c) Evergreen Trees – 8' height balled and burlap or equivalent
5. All development projects require a Tree Protection Plan as part of Contract Documents. The Tree Protection Plan is enforced through the life of the project by the CSU Project Manager assigned to the project and the Campus Landscape Architect. The contractor is required to follow ANSI A300 Best Management Practices – Managing Trees during construction. This requirement is reinforced with the contractor throughout the project, starting with the CSU-mandated pre-construction meeting, in which specific tree protection for the project is discussed on a tree-by-tree basis with the site superintendent.

Goals and Targets

Inventory: A comprehensive GIS inventory of all campus trees has been developed within Facilities Management. Using this inventory, goals are to complete a campus-wide tree canopy analysis and set a canopy percentage goal to be achieved through strategic tree planting. The use of available software such as i-Tree to complete an environmental services statistical sampling inventory will help meet goals of the campus-wide Sustainability Tracking Assessment and Rating System (STARS) program. In 2013, students in the HORT 466, Urban and Community Forestry Class, began this i-Tree analysis.

Tree replacement: Implement tree replacement and damage assessment policies as outlined in the Campus Tree Care Plan. Since 2012, CSU has implemented Arbor Day observance planting projects with students on campus each year.

Increase species representation: Using the GIS tree inventory as a benchmark, increase the percentage of underrepresented species, especially in the historic areas of campus. Recent planting projects include considerations toward increased species diversity.

Shorten pruning cycle in overly mature trees: Obtain resources to increase the frequency of pruning in the historic pre-1922 American elm Oval area.

Experiential Learning and Outreach: The University will focus on providing 1-2 experiential learning opportunities per semester in urban and community forestry to CSU students and the surrounding community. Students and volunteers will assist with efforts in inventory and tree care. An Urban and Community Forestry Course (HORT 466) was offered in fall of 2013; and fall of 2015.

Emerald Ash Borer (EAB): EAB was confirmed in Fort Collins in 2020, but has not yet been identified at CSU. The University anticipates that up to three quarters of the ash on campus justify treatments based on their condition and contribution to the campus environment. Funding is in place to remove and replace the remaining untreated ash trees. Base funding will be allocated through 2025, which we will use for treating trees, as well as to address the ongoing cost of removal and replacement dollars. Total Ash trees = 914; Ash trees to be treated = 590; Ash trees remaining to be removed = 324. Note that over 200 Ash trees have already been removed over the last 3 years. Treatment will be on a 3-year cycle starting in 2020. (See tree care plan below for treatment of trees.)

Oval Preservation: Facilities Management maintains routine pruning of the historic trees on the Oval to help prevent damage and keep the trees healthy, an investment of \$125,000 or more each time the trees are pruned. Costs are supported through university funds. The Oval Tree Preservation Endowment was created in 2011 to devote resources specifically to preserving the elms, and contributes a fraction of the costs until it reaches a sustainable level.

Tree Stocking: The campus goal is to establish and maintain optimal tree stocking, and optimal age and species diversity of the campus urban forest. We are moving towards these goals through the current construction projects. A minimum of two trees are being replaced for every one tree removed as a result of the current era of construction - an era of construction which is unprecedented since the 1960's. Our tree planting efforts are resulting in a 10% increase in the total number of trees in our main campus urban forest. At the same time as we are increasing the urban forest in absolute numbers, we are also increasing species diversity.

Emerald Ash Borer - Plan for Treatment of Trees

CSU has developed treatment recommendations appropriate for the Front Range and Colorado.

Trees are treated per the following criteria:

1. Size of tree
 - Trees of a significant size (over 15" DBH) will be evaluated for treatment
2. Tree benefit to the public and CSU
 - Trees that provide significant environmental, social, or economic value are candidates for treatment.
3. Health of tree
 - Very mature and declining trees are not the best candidates for treatment.
 - If there is less than 40% canopy dieback, treatment may be effective.

Treatment protocol:

- CSU will treat trees evaluated to remain on campus over a 3-year cycle through trunk injection of Emamectin Benzoate.

Tree Replacement for EAB:

- Diversity of tree species is encouraged with all tree replacement, in accordance with the university's designation as an ArbNet arboretum.
- The Front Range Tree Recommendation List is an excellent resource for recommended tree species; developed by CSU Extension, CTC, CNGA and ASLA. A copy of this list is available on the CNGA website – http://coloradonga.org/articles/Tree_Recommendation_List.pdf

If EAB is suspected on campus, contact:

1. Colorado Department of Agriculture
 - 888-248-5535
 - <http://www.eabcolorado.com>
2. USDA/APHIS/PPQ
 - 303-371-3355
 - Updated information regarding EAB in Colorado and the delimitation survey is located at <http://www.eabcolorado.com>

Tree Damage Assessment

Trees damaged during construction, which are either noted for protection or preservation in the project Contract Documents, or are outside the development limits of work, shall require monetary compensation from responsible parties.

The damage will be assessed by the Campus Landscape Architect or a qualified landscape appraiser based upon an appraisal of the damaged tree using the most recent published methods established by the Council of Tree and Landscape Appraisers. The amount of monetary compensation shall be the full value of the tree.

Prohibited Practices

Practices not consistent with the Best Management Practices referenced in this Tree Care Plan are prohibited. In addition, the following practices are regulated by CSU Facilities Management and CSU Police Department, and prohibited on the CSU campuses:

- Locking of bikes to campus trees
- Attachment of slack lines to campus trees
- Attachment of swings and ropes to campus trees

Definitions of Terminology

Unless defined below, definitions of terminology are to be those defined in the International Society of Arboriculture online dictionary at www.isa-arbor.com/Dictionary/

American National Standards Institute A300 standards (commonly referred to as the ANSI A300) - Industry developed, national consensus safety standards of practice for tree care in the U.S.

National Standards Institute Z133.1 standards (commonly referred to as the ANSI Z133.1) - Industry-developed, national consensus safety standards of practice for tree care in the U.S.

Best management practice - Best available, industry-recognized course of action, in consideration of the benefits and limitations, based on scientific research and current knowledge.

Campus Arborist - The Colorado State University Facilities Management Arborist or duly designated representative.

Campus Landscape Architect - The Colorado State University Facilities Management Landscape Architect or duly designated representative.

Canopy tree - A tree that will grow to a mature height of at least 35 feet with a spread of at least 25 feet.

City Forester - The City Forester of Fort Collins or a duly designated representative.

Development - The act, process or state of erecting buildings or structures, or making improvements to a parcel or tract of land.

Green Space - Any area retained as permeable unpaved ground and dedicated on the site plan to supporting vegetation.

Irrigation Plan - A construction drawing, approved by the Campus Landscape Architect, detailing the layout of mainline and lateral irrigation, valves, sprinkler heads and control wiring.

Job briefing -The communication of at least the following subjects for arboricultural operations: work specifications, hazards associated with the job, work procedures involved, special precautions, electrical hazards, job assignments, and personal protective equipment.

Landscape Plan - A construction drawing, approved by the Campus Landscape Architect, detailing the layout of plant material, as well as the species, sizes of the plant materials and the method of installation.

Replacement tree – A tree indicated on the Landscape Plan which replaces a tree removed as part of campus development.

Tree Protection Plan – A drawing included in the Contract Documents showing the location and means and methods of protection of each tree to be preserved on development sites.

Communication Strategy

The Campus Tree Care Plan and Policies are approved by the Campus Tree Advisory Committee, as well as from Colorado State University Administration. The university takes several steps to garner attention for the Tree Campus Higher Education program and CSU's ArbNet arboretum status.

To increase awareness among the university's internal audience (students and employees), University Communications publishes articles about the value of trees, tree plantings on campus, and CSU's

participation in the Tree Campus Higher Education program, as well as CSU's ArbNet arboretum status. Stories are published in *SOURCE*, a news email sent weekly to students and employees; *CSU Life*, a monthly publication designed specifically for faculty and staff; and in *Facilities Focus*, a quarterly newsletter for the Facilities Management Department. CSU's ArbNet arboretum status and Tree Campus Higher Education certification is additionally featured on university websites, including the CSU Facilities Management site (<https://www.fm.colostate.edu/arboretum>). University Communications and the Colorado state Forest Service help to communicate about and promote our spring Arbor Day event by sending a news release about the Campus Arboretum and Tree Campus Higher Education program to local media outlets, including the Rocky Mountain Collegian, the daily student newspaper; KCSU, the student radio station; and CTV, the student television news station. The news is also shared through CSU's main social media accounts.

Ongoing service learning opportunities provide further opportunities to communicate information about the importance of protecting and maintaining trees on campus and in the surrounding Fort Collins community.

APPENDICES

Maps

The CSU Campus Arboretum currently uses an interactive map, informed by GIS. Maps are updated annually to reflect information on relocated trees, removals, and additions to the collection. Maps are the only way to link a specific plant and the related records in the database to a specific location. They are used by staff and contractors to locate trees for work, as well as by visitors, students, and researchers.

Arboretum information is hosted on the Facilities Management website.

The Arboretum Committee has a future goal of developing a Tree Walk Guide brochure and kiosk map to highlight the assets of the Arboretum.

Tree Genus and Species List

View at this link: https://www.fm.colostate.edu/sites/default/files/CSU_Trees_Genus_Species.xlsx