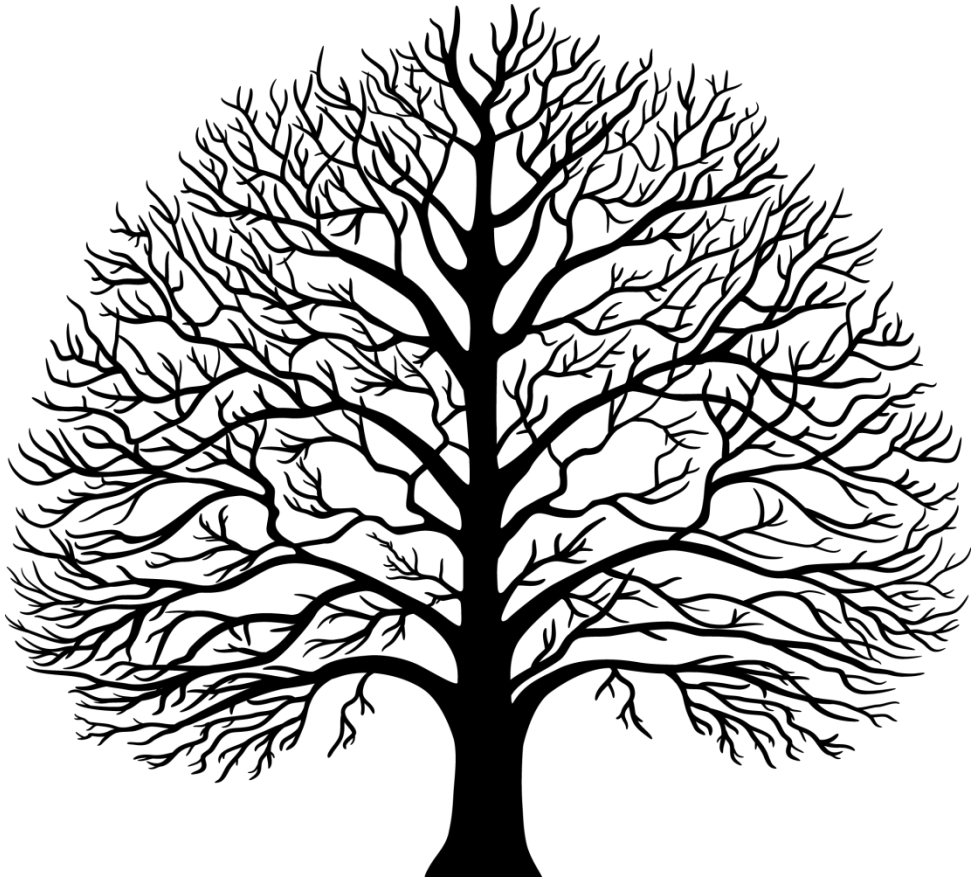
2014

Urban Forest Management Plan



California State University Northridge

10/15/2014

Table of Contents

Vision

Create a safe, healthy, sustainable, urban forest encompassing a large variety of species (200 and growing) and ages (newly planted to historic) that demonstrates to students, faculty, staff and visitors the environmental benefits and splendor that the urban forest provides.

Mission

The mission of the Urban Forestry Management Plan is to enhance the quality of life of the campus community by promoting sustainability, safety and aesthetics in the urban forest, while providing an environment for research, education, and recreation through responsible urban forest stewardship

Plan Synopsis

Urban Forestry has been defined as "…the sustained planning, planting, protection, maintenance, and care of trees, forests, green space and related resources in and around cities and communities for economic, environmental, social, and public health benefits for people. The definition includes retaining trees and forest cover as urban populations expand into surrounding rural areas and restoring critical parts of the urban environment after construction. Expansion at the urban/rural interface raises environmental and public health and safety concerns as well as opportunities to create educational and environmental links between urban people and nature. In addition, urban and community forestry includes the development of citizen involvement and support for investments in long-term on-going tree planting, protection, and care programs." —(Urban Forestry in North America: Towards a Global Ecosystem Perspective. pp 4-8. Deneke, F. 1993).

California State University Northridge's urban forest consists of more than 4,000 trees and over 200 different species on the main campus of nearly 100 cultivated acres within 356 total acres. The forest trees range from newly planted to 80+ years old. Many trees have health, insect and structural issues due to a history of poor and/or incorrect management practices.

Continued training of young trees and corrective and mitigative maintenance of mature trees together with tree protection and an Urban Forest Management Plan are essential to preserve and protect valuable campus resources, our people and our trees. A healthy, properly maintained urban forest will welcome the campus community into a safe and beautiful atmosphere. A health and hazard assessment of each tree has occurred within the past 5 years, or will occur in the near future. These assessments provide critical information for building the Tree Atlas database that will include ranking, valuation, tree care maintenance, removal and replacement schedule. The plan also presents guidelines that will protect the Urban Forest during maintenance work and construction projects.

This plan provides an overall framework for managing the urban forest of CSUN. It is based on the condition of the forest in 2009, as well as an analysis of appropriate and necessary management practices and a consideration of the plans that will influence the forest in the future.

Introduction

Historical Overview

California State University Northridge (also known as CSUN or Cal State Northridge) is a public university in the Northridge neighborhood of Los Angeles, California, United States in the San Fernando Valley. CSUN is one of the 23 campuses in the California State University system. Cal State Northridge is the third largest university in California in terms of enrollment, just behind Cal State Fullerton and UCLA. It was founded first as the valley satellite campus of Cal State Los Angeles. It then became an independent college in 1958 as San Fernando Valley State College, with major campus master planning and construction. The University adopted its current name of California State University, Northridge in 1972

Throughout the San Fernando Valley one can see pockets of citrus trees on private land, but on the far southeast corner of the Cal State Northridge campus stands the oldest, most contiguous remnant of the Valley's agricultural past. When the University was built in the late 1950's, the campus inherited the Grove and the responsibility of its maintenance. In 1972, Associated Students deemed the Orange Grove a historic site. Today, nearly 500 orange trees of multiple varieties remain.

The CSUN campus hosts over 4000 trees, which include more than 200 different species. Of these, nearly 3900 trees have been tagged, mapped and measured as part of a Geography Department project in cooperation with the CSUN Institute of Sustainability.

Environmental Overview

The sustainable management of the environment and natural resources is vital for human wellbeing. Trees in urban areas, and especially on campuses, reduce the heat island effect caused by pavement and buildings. Leaves filter the air we breathe by removing gasoues pollutants and filtering particulates. Properly placed trees create a welcoming environment that makes students, administration and alumni want to be a part of the campus.

When managed wisely, renewable natural resources, watersheds and productive landscapes can provide the foundation for sustained inclusive growth by improving livelihoods, increasing carbon storage and mitigating climate change risks.

Current State of the CSUN Urban Forest

The campus trees are varied in age and species. The mature trees represent the rich history of the property, while the young trees are a legacy for the future. Most of the trees are mature, and very few are in decline. Some species are native to this region, and some come from across the oceans. There are some magnificent historic trees on the campus, and over the years, some have been damaged by poor pruning practice and lack of adequate preservation measures during construction.

Purpose of the CSU Northridge Urban Forest Management Plan

Over the last 6 years there has been a steady improvement in the care and management of trees on the CSU Northridge campus. The creation of the Campus Tree Atlas, the comprehensive evaluation of all campus trees by location and type, installation of a centralized irrigation control system, and strategy based tree replacement plan incorporating the use of local species are all examples of these

improvements at CSUN. As a continuation of these practices this plan has been developed to ensure the sustainable development of the Universities urban forest.

The challenges that face the campus community concerning the management of the urban forest include maintenance budgeting, safety of life and property, and interdepartmental communication.

Maintenance costs for young, newly planted trees can be kept to a minimum throughout their lives by training and pruning these trees early in their lifecycles using ANSI Standards as a guideline. Elevated mature tree maintenance costs on campus exist due to maintenance practices that did not adhere to industry standards during the recovery period after the 1994 earthquake. This absence of oversight allowed some trees to be pruned in ways that resulted in wounds that could not heal correctly which created an avenue for disease, harmful insects and decay to easily enter the trees or that resulted in weak structural form which leaves the trees susceptible to breakage and failure.

The Northridge campus has a variety of trees that were planted from the early 40's to the present. The campus has a diverse inventory of more than 200 tree species. Knowledgeable management and skilled care is necessary for the life of the urban forest. The campus has ongoing construction projects which will continue over the next 10 years. These projects will likely impact the health of the existing urban forest and oversight will be needed to protect the campus trees during construction. Another concern is the planting and care of young trees as a part of new construction and various landscaping projects. Staff and outside contractors need to follow strict guidelines to ensure proper installation of new trees affording these trees strong establishment. A standard operating procedure is in place for Physical Plant Management (PPM) and is included in the contractual specifications for major and minor capital projects.

The safety of our students, faculty, staff and visitors and the protection of physical resources is always the number one concern of our campus community. Poor structure exhibited by any campus tree creates the need for a hazard assessment, corrective maintenance and/or the implementation of a management plan, which requires personnel and financial resources.

A management hierarchy is in place to properly administer and enforce tree care standards throughout the campus. Staff is continually trained in correct tree maintenance concepts and practices to ensure the proper care of campus trees. Contractors are held to specific standards (ANSI) when working on or near trees, which is included in all contracts.

The main campus has approximately 4,000 newly planted and mature trees that need some form of regular maintenance ranging from once a year to once every seven years. Until an annual maintenance agreement is in place with an outside contractor, the University currently budgets approximately $100,000 annually, if needed, for tree care and maintenance. This plan is designed to further an understanding of the needs of the campus to properly care for its trees in a way that promotes health and vigor of the trees while providing a safe environment. It calls for adequate budgeting of time and materials necessary to maintain this incredible asset. An Urban Forest Management Plan is necessary in order to define and enforce standards of care for the campus urban forest.

The CSUN Forest Management Plan provides a framework for sustainable management procedures and continuing enhancement of the urban forest resource. The plan describes specific policies to guide campus tree planting, maintenance, management and removal activities. The plan outlines the active participation of the campus community in the management of the urban forest at CSUN. The implemented Urban Forest Management Program will enhance the quality of life of the CSUN Campus community, while promoting safety, supporting aesthetics and providing a living laboratory for education and research.

This plan will show the benefits of a well-managed urban forest, including improved use of existing funds and personnel. There are maintenance and care guidelines for existing trees as well as standards for selecting, planting and caring for new trees and will address issues of protecting trees during construction. The CSUN Urban Forest Management Plan will allow the campus to apply for and compete for outside grant funding in the future.

Benefits of the CSU Northridge Urban Forest

The trees with the urban forest at Cal State Northridge provide incalculable value to the campus atmosphere by adding aesthetic beauty as well as other intangible benefits such as carbon sequestration that can be quantified.

Benefits derived from the Urban Forest other than the aesthetic value include reduction in heating and cooling needs, storm water retention and erosion control, and air pollution removal.

Heating and Cooling

Trees that surround buildings approximately reduce cooling costs by 30% and heating costs by 10%-25% annually.

Stormwater Retention and Erosion Control

“Trees and forests improve stream quality and watershed health primarily by decreasing the amount of stormwater runoff and pollutants that reaches our local waters. Trees and forests reduce stormwater runoff by capturing and storing rainfall in the canopy and releasing water into the atmosphere through evapotranspiration. In addition, tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil. This helps to replenish our groundwater supply and maintain stream flow during dry periods.

“The presence of trees also helps to slow down and temporarily store runoff, which further promotes infiltration, and decreases flooding and erosion downstream. Trees and forests reduce pollutants by taking up nutrients and other pollutants from soils and water through their roots, and by transforming pollutants into less harmful substances.” – The Environmental Protection Agency

Air Quality

According to American Forests Organization, the average healthy, mature tree produces roughly 260 pounds of oxygen annually. Approximately 14.65 acres of tree canopy will remove 488.72 pounds of Ozone, 150.9 pounds of Sulfur Dioxide, 277.91 pounds of Nitrogen Dioxide, 422.36 pounds of particulate matter of size less than 3 microns, and 55.23 pounds of Carbon Monoxide. Young trees absorb CO2 at a

rate of 13 pounds per tree each year. Trees reach their most productive stage of carbon storage at about 10 years at which point they are estimated to absorb 48 pounds of CO2 per year. At that rate, they release enough oxygen back into the atmosphere to support two human beings.

At CSUN, using the Tree Atlas, it has been identified that in the campus' current state of total carbon dioxide sequestration for all the 4,000 plus trees on campus is computed to be approximately 154 tonnes/year (with an estimated 50% uncertainty), an average of 40kg/tree. This information was calculated using CUFR Tree Carbon Calculator (CTCC) software.

Safeguard of Life and Property at CSU Northridge

The implementation of this Urban Forest Management Plan is expected to resolve and keep in abeyance the varied forest management issues that the CSUN urban forest faces. As a consequence to historic forest management issues, incidence of tree failure can occur and this is a serious safety concern to the campus community. Proper management of the urban forest at CSUN can reduce the incidence of potential failure, damage to property, minimize the potential for pedestrian safety issues, and prevent the loss of the benefits that the urban forest provides to the University.

Several memorial trees on campus are dedicated to an individual or group creating a substantial bond to those particular trees. Their value is incalculable to the campus community and its legacy.

CSU Northridge Urban Forest Program Administration

Enhancement of CSUN Campus Urban Forest

The entire campus of California State University Northridge encompasses over 300 acres. CSUN maintains over 250 acres and of that over 90 acres are landscaped. It is a goal of the University to reach a canopy cover of 40% in the landscaped locations on campus.

The University's urban forest consists of many different species of trees. A significant portion of these tree species are not native to this region or classified as drought tolerant. All of our trees have been mapped through a collaborative effort with our Geography department as well as the Grounds Department. This map, The Campus Tree Atlas, has been published on the Institute for Sustainability's website for anyone interested to view it. Please see the following link to view the Universities Tree Atlas: http://www.csun.edu/sustainability//kmz/Tree_Inventory_2010_web_byspecies.kmz

In addition to the new trees associated with projects, the campus will determine a number of re-plantings to be done on a yearly basis, contingent on availability of funds. This commitment to planting of new trees will, in time, increase the campus canopy and help offset the loss of trees to age and health issues.

Climate Appropriate Plantings

Native vegetation evolved to live with the local climate, soil types, and fauna. This long process brings us several advantages:

- Water Conservation: Once established, many native plants need minimal irrigation beyond normal rainfall.

- Reduced Maintenance: Low maintenance landscaping methods are a natural fit with native plants that are already adapted to the local environment. These plants use less water, little to no fertilizer, little to no pesticides, and less pruning.
- Reduced Pesticide Use: Native plants have developed their own defenses against many native pests and diseases. Since most pesticides kill indiscriminately, beneficial insects become secondary targets in the fight against pests. Reducing or eliminating pesticide use keeps garden toxins out of our creeks and watersheds.
- Establish Wildlife Habitat: Research shows that native plants, birds, butterflies and insects prefer native plants over non-natives.

Selection of trees to be installed as part of new landscaping projects will consider their appropriateness to our climate. Native trees will be given preference with certain accent and specimen trees used according to their adaptability to our environmental concerns.

Campus Tree Advisory Committee

The University has established a Campus Tree Advisory Committee as a part of the Urban Forest Management Plan. This Committee will play a key role in ensuring the successful management and continuity of this Urban Forest Management Plan.

The Founding Tree Advisory Members

Student

- Claudia Hasenhuttl, CSUN

Faculty

- Mario Giraldo, Geography Faculty, CSUN

Facilities Management

- Jim Logsdon, Grounds and Event Manager, CSUN
- Austin Eriksson, Sustainability Program Manager, CSUN

Community

- Craig Crotty, Arborist Consulting

The Roles of the Campus Tree Committee Members

The committee members will accept to serve for a period of one calendar year with a renewal option. Members shall appoint officials who will conduct the day to day business of the committee. Committee members are expected to actively participate and contribute in policy/guideline issues as well as research/information gathering that would aid in the campus tree care plan.

Urban Forest Management

Urban Forest Management Responsibility

The management of the CSU Northridge urban forest includes the maintenance and care (pruning) of existing trees, coordination of and approval for tree removal, protection of trees during construction and selection and proper planting and care of new trees.

At CSU Northridge, groundskeepers are expected to perform minor trimming and the major trimming is done by contract with a commercial tree care service. All work concerning trees, as outlined in this plan,

will first be reviewed by the Manager of Grounds and Events as the primary point of contact. In all cases of catastrophic events concerning trees, the Manager of Grounds and Events will be the first responder.

Urban Forest Management Policies

The following policies and operation plans provide direction for the maintenance and enhancement of the Campus Urban Forest at CSU Northridge. The industry standards put forth in the ANSI A300 standards and the Best Management Practices (BMP) guides are referenced. The ANSI standards and BMP guides represent the industry criteria for performing tree care operations.

Tree Inventory (ANSI A300)

A proper and thorough tree inventory will be completed. Tree inventory will describe the pertinent individual tree, its location, health and any safety issues. With tree inventory information, program resources can be allocated appropriately among the various tree management functions, work can be scheduled for maximum efficiency, and financial decision-makers can evaluate various work plan proposals by comparing expected results with projected budgets.

• Location

- The physical location in relation to public right of way, important facilities, and/or public space will be recorded. The GPS coordinates of each tree will be recorded.

• Species

- Trees will be identified by genus and species, and by common name.

• Diameter

- Tree trunk diameter will be recorded. This shall be to the nearest 1 inch.

• Stems

- The number of stems a tree has will be recorded.

• Health Observations

- General observations referring to health and structure will be made.

• Clearance Requirement

- Trees which are causing or may cause visibility or clearance difficulties for pedestrians or vehicles will be identified as well as those trees blocking clear visibility of signs, lighting or traffic signals.

• Hardscape Damage

- Damage to sidewalks and curbs by tree roots are noted. Notes on potential fixes for the problem are encouraged.

• Overhead Utilities

- The inventory indicates whether overhead conductors or other utilities are present at the tree site that could result in conflicts with the tree.

• Grow space

- The area the tree is growing in is categorized as:
    - **T** Tree Lawn
    - **W** Well/Pit
    - **M** Median
    - **P** Parking Lot
    - **R** Raised Planter
    - **O** Open/Unrestricted
    - **I** Island
    - **U** Unmaintained Area

• Space Size

- The narrowest dimension of the grow space, in feet (i.e. 3'x3' cutout, 4' street planting strip, open parkland, etcetera) will be noted.

• Condition

- In general, the condition of each tree will be recorded in one of the following categories adapted from the rating system established by the International Society of Arboriculture:
    - Excellent 100%
    - Very Good 90%
    - Good 80%
    - Fair 60%
    - Poor 40%
    - Critical 20%
    - Dead 0%

• Required maintenance

- A summary of scheduled maintenance works and time frames will be included.

• Maintenance history

- Provision shall be made for recording maintenance history of each tree.

4.2.2. Tree Pruning and Tree Removal. (ANSI A300)

- All tree pruning and removal work, in total conformity with ANSI A300 Pruning Standard, will be reviewed and approved by the Campus Urban Forestry Resource Manager. The following service priority gradations will be observed in determining trees to be pruned or removed:

4.2.2.1. Guidelines for Pruning and Removal

- **Priority 1 Prune (Trees ≥6" DBH, ≥12' Height).** Trees that require Priority 1 Pruning are recommended for trimming to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than four inches in diameter.
- **Priority 2 Prune (Trees ≥6" DBH, ≥12' Height).** These trees have dead, dying, diseased, or weakened branches between two and four inches in diameter and are potential safety hazards.
- **Large Tree Routine Prune (Trees ≥20" DBH, ≥50' Height).** These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. Trees in this category are large enough to require bucket truck access or manual climbing.
- **Small Tree Routine Prune (Trees 2"-6" DBH, ≤12' Height).** These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can be evaluated and pruned from the ground.
- **Training Prune (Trees 1"-2" DBH, ≤8' Height).** Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole saw by a person standing on the ground.
- **Priority 1 Removal.** Trees designated for removal have defects that cannot be cost-effectively or practically treated. The majority of the trees in this category has a large percentage of dead crowns and poses an elevated level of risk for failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities would be in this category. Large dead and dying trees that are high liability risks are included in this category. These trees are the first ones that should be removed, and they should be removed as soon as possible.
- **Priority 2 Removal.** Trees that should be removed but do not pose a liability as great as the first priority will be identified here. This category would need attention as soon as "Priority One" trees are removed.
- **Priority 3 Removal.** Trees that should be removed, but that pose minimal liability to persons or property, will be identified in this category.

Tree Removal Adjacent to Protected Trees. (ANSI A300)

When trees are removed and adjacent trees must be protected, then the following tree removal practices apply:

a. **Tree Removal** - Removal of trees that extend into the branches or roots of protected trees shall not be attempted by grading or other heavy equipment. A certified arborist or tree worker shall

remove the tree carefully in a manner that causes no damage above or below ground to trees that remain.

Stump Removal. (ANSI A300)

The following standards will be followed when removing or grinding stumps:

Before commencing stump removal, all underground utilities within the vicinity of the tree stump, allowing one foot for every inch of stump diameter, must be identified and clearly marked out. Proper precautions must be taken to prevent damage to utilities within tree stump removal areas.

Before performing stump extraction, the tree worker or project contractor shall first consider if roots may be entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting the stump.

When a tree root is to be ground, as opposed to being pulled out (depending on accessibility, topography, proximity to a building/pathway or other considerations), removal shall include the grinding of stump and roots to a minimum depth of 24 inches.

Tree Work Requests

Regular tree work requests are for all tree maintenance works that do not fall under the Tree Emergencies category. These types of requests include pruning of trees not posing an immediate hazard to human life or property or for large-scale projects (for example, trees blocking light fixtures, signs, or impeding walkway/road clearance), and require a request submitted to the Urban Forest Resource Manager. Requests will be reviewed and prioritized by the Urban Forest Resource Manager. Trees that pose immediate danger to life and property have priority over all other requests.

Protection of Trees during Construction. (ANSI A300)

The goal of the CSU Northridge Urban Forestry Plan is urban forest sustainability and improvement of the canopy cover. Stewardship and management involves both naturally occurring and cultivated trees. The objective of this section is to describe procedures to protect these trees during construction projects. Concerns about tree health and structure and preservation during construction are integral to a sustainable urban forest.

“Tree protection should not begin subsequent to construction. If preservation measures are delayed or ignored until construction begins, the trees may be destined to fail. Because in most cases construction effects to trees cannot be completely eliminated, the goal for our facilities planners and designers is to keep injury to trees to a minimum and allow building projects to proceed at the same time. Successful tree preservation occurs when designers, construction personnel, and project managers are committed to tree preservation. All trees cannot and should not be preserved. Trees that are structurally unstable, in poor health, or unable to survive the effects of construction become a liability to the project and should be removed. A realistic tree preservation program acknowledges that conflicts between trees and infrastructure development may sometimes result in the removal of some trees and also recognizes the detrimental effect to the project and community when trees die after construction is completed. Successful tree preservation occurs when construction impacts to trees are minimized or avoided

altogether. The challenge is to determine when impacts will be too severe for the tree to survive, not only in the short term, but also in the long term. There are no quantitative methods to calculate this critical level. Determining the optimum tree protection zone provides a guideline, although trees sometimes survive and flourish with smaller protection areas." --(From UCSD Urban Forest Management Plan, 2011 Samuel O. Oludunfe, BSF)

Planning and Designing for Construction Projects (ANSI A300)

All design teams shall be given a set of guidelines defining the University's Tree Pruning and Tree Removal Policy and Protection of Trees during Construction Guidelines (Sections 4.2.2. and 4.2.3. of the Urban Forest Management Plan), to ensure that trees are accounted for from project initiation forward.

1. **Survey before Planning: The** survey must accurately plot the trunk locations within the project site. Include construction staging areas and delivery routes.
2. **Plan and Design with Knowledge of Trees:** The health and structural confirmation of the surveyed trees must be evaluated in order to anticipate how well they will respond to development. The evaluation must describe the character of trees and their suitability for preservation at a level of detail appropriate for the project and phase of planning. An arboricultural or forestry consultant must be obtained for this evaluation.
3. **Plan with a Vision:** Disturbance of any tree by construction activities may negatively affect its physiological processes, and cause depletion of energy reserves and decline in vigor, often resulting in tree death. Typically this does not manifest until many years after the tree is disturbed. Preservation of mature trees during construction has limitless benefits to the success of a project.
4. **Plan for all Aspects and Entire Duration of Project:** Construction projects often require participation of various construction trades and subcontractors. It is important to plan for tree protection with an understanding of construction dynamics. Trees must be protected in the staging area, construction employee parking area, adjacent properties, as well as on the actual construction site.

Managing In-House Construction Projects (ANSI A300)

The in-house Construction team should be given a set of guidelines that define the Facilities Management Department's Tree Preservation and Tree Protection procedures (Sections 4.2.2. and 4.2.3. of this Forest Management Plan), and to assure that trees are accounted for from project initiation forward.

1. **Survey before Planning:** For all in-house projects, contact the Campus Urban Forest Resource Manager for an accurate survey of trees on the job site.
2. **Plan and Design with Knowledge of Trees:** In order to better understand the condition of the affected trees, the Campus Urban Forest Resource Manager will make available the results of the tree evaluation. This evaluation will provide the in-house Construction team with knowledge of the resources and the anticipated construction tolerance of the affected trees.
3. **Plan with a Vision:** Obtain information about trees and minimize negative impacts on the urban forest. Conduct all projects with tree preservation in mind.

4. **Plan for all Aspects and for the Entire Duration of the Project:** Trees must be protected in the staging area, construction employee parking area, and during demolition and grading. Arrange with the Campus Urban Forest Resource Manager for trees to be watered and for the soil to be protected from compaction.

Pre-Construction Requirements (ANSI A300)

A. **Tree Protection and Preservation Plan.** Prior to the commencement of a development project, the Campus Urban Forest Resource Manager must be assured that if any activity of the project is within the dripline of Protected Trees (all trees 6" dbh and above), a site specific tree protection plan is prepared. The following six steps shall be incorporated as part of the Tree Protection and Preservation Plan:

   a. **Site Plan:** For all projects, site plans must indicate accurately plotted trunk locations and the dripline areas of all trees or group of trees to be preserved within the development area. Additionally, for all Protected Trees the plans shall accurately show the trunk diameter, the dripline and clearly identified tree protection zones. The type of protective fencing shall be specified and indicated with a bold dashed line.

   b. **Protective tree fencing for all categories of Protected Trees:** Fenced enclosures shall be erected around trees to be protected. This will achieve 3 primary goals:

      i. To keep crowns and branching structure clear from contact by equipment, materials, and activities;

      ii. To preserve roots and soil condition in an intact and non-compacted state; and

      iii. To identify the Tree Protection Zone in which no soil disturbance is permitted and activities are restricted, unless otherwise approved by Campus Urban Forest Resource Manager.

All trees to be preserved shall be protected with physical barriers approved by the University's Urban Forester. Tree barriers shall be erected before demolition, grading, or construction begins and remain until final inspection of the project. There shall be a "Warning" sign prominently displayed on each protective fence. The sign shall be a minimum of 8.5 inches x 11 inches and clearly state the following:

TREE PROTECTION ZONE This Barrier Shall Not Be Removed. Warning: Critical Root Zone, No Encroachment.

All work within the Tree Protection Zone requires approval of Campus Urban Forest Resource Manager. No storage of material, topsoil, vehicles, or equipment shall be permitted within the fenced area throughout the entire duration of the construction project.

a) Type I Tree Protection Barrier is for trees to be preserved throughout the duration of the project. The fences shall enclose the entire area under the canopy dripline or Tree Protection Zone, if specified by Campus Urban Forest Resource Manager. If fencing must be located on paving or concrete that will not be demolished, an appropriate grade level concrete base may support the posts.

b) Type II Tree Protection Fence is for trees situated in small planting areas, where only the planting area is enclosed with the required chain link protective fencing. The walkways and traffic areas are left open to the public.

c) Type III Tree Protection Fence is for trees in small tree wells, building site planters or sidewalk planters. Trees shall be wrapped with 2 inches of orange plastic fencing from the ground to the first branch and overlaid with 2-inch thick wooden slats that are bound securely (slats shall not be allowed to dig into the bark). During installation of the plastic fencing, caution shall be used to avoid damaging branches. Major scaffold limbs may also require plastic fencing as directed by the Campus Urban Forester.

B. **Verification of Tree Protection.**

The project contractor or construction supervisor shall verify in writing that all preconstruction tree preservation conditions have been met as follows:

a. Tree fencing installed
b. Erosion control secured
c. Tree pruning completed
d. Soil compaction preventive measures installed
e. Tree maintenance schedule established.

C. Pre-construction meetings.

The Campus Urban Forest Resource Manager shall attend all pre-construction meetings to ensure that everyone fully understands previously reviewed procedures and tree protective measures concerning the project site, staging areas, hauling routes, watering, contacts, etc.

D. The Tree Protection Zone.

Each tree to be retained shall have a designated Tree Protection Zone, identifying the area sufficiently large enough to protect it and its roots from disturbance. The Tree Protection Zone shall be shown on all site plans: Demolition, Grading, Irrigation, Electrical, Landscape, etc. Improvements or activities such as paving, utility and irrigation trenching, including other ancillary activities, shall occur outside the Tree Protection Zone unless otherwise specified. The protection fence shall serve as the Tree Protection Zone.

a. Activities prohibited within the Tree Protection Zone include:
    i. Parking vehicles or equipment, storage of building materials, refuse, or excavated soils, or dumping poisonous material on or around trees and roots. Poisonous materials include but are not limited to paint, petroleum products, concrete, stucco mix, dirty water or any material that may be harmful to tree health
    ii. The use of tree trunks as backstops, winch supports, anchorages, as temporary power poles, signposts or other similar functions
    iii. Cutting of tree roots by utility trenching, foundation digging, placement of curbs and trenches, or other miscellaneous excavations without prior approval of the Campus Urban Forester
    iv. Soil disturbance or grade change
    v. Drainage or hydrological changes.

b. Activities permitted or required within the Tree Protective Zone include:
    i. Mulch: During construction, wood chips may be spread within the Tree Protection Zone to a two- to four-inch depth, leaving the trunk clear of mulch. This will minimize inadvertent soil compaction and moisture loss. Mulch shall be ≤ 2-inch unpainted, untreated shredded wood or other approved material.
    ii. Root Buffer: When areas under the tree canopy cannot be fenced, a temporary buffer is required and shall cover the root zone and remain in place at the specified thickness until the final grading stage. The protective buffer shall consist of shredded wood chips spread over the roots at a minimum of 6-inches in depth (keeping the trunk clear of chips), and layered by ¾-inch quarry gravel to stabilize the 3/4–inch plywood sheets laid on top. Steel plates can also be used.
    iii. Irrigation, Aeration, fertilization, mycorrhizae treatments or other beneficial practices that have been specifically approved for use within the Tree Protection Zone.
c. Erosion Control within the Tree Protective Zone:
    i. If a tree is adjacent to or in the immediate proximity to a grade slope of 8% (23 degrees) or more, approved erosion control or silt barriers shall be installed outside the Tree Protection Zone to prevent siltation and/or erosion within the zone.

E. Tree Pruning and Removal within Construction Projects

Prior to construction, various trees may need to be pruned away from structures or proposed construction activity. Construction or contractor personnel shall not attempt pruning. Only personnel approved by the Campus Urban Forest Resource Manager can perform pruning operations.

a. Removal of trees adjacent to trees that are to remain requires a great amount of finesse. Only personnel approved by the Campus Urban Forest Resource Manager shall engage in tree removal.
b. Removal of trees that extend into branches or roots of protected trees shall not be attempted by the demolition or construction crew, or by grading or other heavy equipment. Before removing tree stumps, the project manager shall determine if roots are entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting them.

4.2.3.4. Activities and Demolition near Trees during Construction. (ANSI A300)

Soil disturbance or other damaging activities within the Tree Protection Zone is prohibited unless approved by the Campus Urban Forest Resource Manager and mitigation for specific injuries is implemented. No encroachment within 10 feet of a trunk will be permitted without the prior notification and approval of the University's representative.

A. Soil Compaction

Soil compaction is the largest single factor responsible for the decline of trees on construction sites. The degree of compaction depends on several factors: amount and type of pressure applied, presence and depth of surface organic litter, soil texture and structure, and soil moisture level.

The greatest increase in soil density occurs during the first few equipment passes over the soil, which underscores the importance of implementing protective measures before the project begins and equipment arrives at the site.

B. Grading Limitations within the Tree Protection Zone

Lowering the grade around trees can have an immediate and long-term effect on trees. Typically, most roots are within the top 3 feet of soil, and most of the fine roots active in water and nutrient absorption are in the top 12 inches.

a. Grade changes within the Tree Protection Zone are not permitted.
b. Grade changes outside the Tree Protection Zone shall not significantly alter drainage.
c. Grade changes under specifically approved circumstances shall not allow more than 6 inches of fill soil or allow more than 4 inches of existing soil to be removed from natural grade, unless mitigated.
d. Grade fills over 6 inches or impervious overlay shall incorporate an approved permanent aeration system, permeable material, or other approved mitigation.
e. Grade cuts exceeding 4 inches shall incorporate retaining walls or an appropriate transition equivalent.

C. Trenching, Excavation and Equipment Use

Trenching, excavation or boring within the Tree Protection Zone shall be limited to activities approved by the Campus Urban Forest Resource Manager. Explore alternatives for trenching outside the root zone. Avoid exposing roots during hot, dry weather. Backfill trenches as soon as possible with soil and soak with water the same day. Small roots can die in 10 to 15 minutes and large roots may not survive an hour of exposure. If the trench must be left open all roots must be kept moist by wrapping them in wet burlap.

a. Root Severance: No roots measuring 2 inches or greater in diameter shall be cut without the approval of the Campus Urban Forest Resource Manager. Tunneling under roots is the approved alternative. Prior to excavation for foundation/footing/walls, or grading or trenching within the Tree Protection Zone, roots shall be severed cleanly one-foot outside the Tree Protection Zone to the depth of the planned excavation. When roots must be cut, they shall be cut cleanly with a sharp saw to sound wood and flush with the trench site.
b. Excavation: Any approved excavation, demolition, or extraction of material shall be performed with equipment that is placed outside the Tree Protection Zone. Hand digging, hydraulic, or pneumatic excavation are permitted methods for excavation within the Tree Protection Zone.

c. Heavy Equipment: Use of backhoes, Ditch Witches, steel tread tractors or other heavy vehicles within the Tree Protection Zone is prohibited unless approved by the Campus Urban Forest Resource Manager. If allowed, a protective root buffer is required.
d. Tunneling and Directional Drilling
It is recommended that trenching or pipe installation within the Tree Protection Zone shall be accomplished by hand, by air-spade, or by mechanically boring a tunnel under the roots with a horizontal directional drill, using hydraulic or pneumatic air excavation technology. In all cases, install the utility pipe immediately, backfill with soil and soak with water within the same day. Tunneling under the root system can greatly reduce both damage to the tree and the cost to repair landscape and other features destroyed in the trenching process. There are times, such as when working in rocky soils and slopes, when tunneling is not a reasonable alternative.

The following remedies should be considered as an alternative to severing tree roots:

i. Grinding a raised walkway or concrete pad
ii. Ramping the walkway surface over the roots or lifted slab with pliable paving.
iii. Routing the walkway around tree roots
iv. Employing permeable paving materials (e.g., decomposed granite), interlocking pavers, or flagstone walkways on sand foundations.

4.2.3.5. Tree Maintenance during Construction. (ANSI A300)

Providing adequate maintenance can mitigate stressful changes that occur to a tree's environment during construction. To remain vigorous the tree needs to maintain stored carbohydrates and preserve the effectiveness of its growth regulators. It is recommended that large projects provide:

A. Irrigation
Providing supplemental irrigation for trees under water stress may be the single most important treatment needed to reinvigorate them. Irrigation should be designed to wet the soil within the Tree Protection Zone to the depth of the root zone and to replace that water once it is depleted. Light, frequent irrigation should be avoided. Create a six-inch berm around trees at the edge of the Tree Protection Zone and fill with no more than six inches of mulch. Fill the basin with water. Irrigation should wet the top two to three feet of soil to replicate similar volumes and normal seasonal distribution.

B. Soil Compaction Mitigation
To prevent negligent encroachment into the Tree Protection Zone, trees to be preserved during construction must have the specified type of protection fences in place at all times. Removal of fences, even temporarily, to allow deliveries or equipment access is not allowed unless approved by the Campus Urban Forester and a root buffer is installed. The root buffer components (mulch, gravel and plywood) must be maintained continually to ensure its effectiveness against soil compaction.

C. Dust Control

During periods of extended drought, wind or grading, trunks, limbs and foliage should be sprayed with water at the end of workday to remove accumulated construction-engendered dust.

4.2.4. Tree Planting. (ANSI A300)

The most common cause of tree decline is improper planting. The following sections are guidelines to be followed when choosing, planting and caring for young trees. At all times, the ANSI standards for planting trees must be followed.

4.2.4.2. Choice of Trees

In all cases of tree planting, the guiding principle shall be to install the right tree, in both form and function, in the right place. When specifying trees for planting on CSU Northridge campus, consideration shall be given to tree species recommended for Coastal Southern California. All proposed trees shall be in compliance with established CSU Northridge approved tree list.

4.2.4.3. Tree Species Diversity Planting Requirements

Plans for tree planting will ensure species diversity (i.e. to avoid creating monocultures, or areas of plantings made up of only one species of trees). Monocultures are undesirable. If a certain species is prone to a particular disease or is more susceptible to storm damage or temperature extremes, then it is likely the entire stand could die or be destroyed by a single disease or weather event. Creating planting areas of several species creates a more diverse, and therefore more resilient, urban forest.

Factors to be considered in acceptable and successful tree planting include the long term health of the tree in its location and its compatibility with adjacent uses as well as design considerations.

In consideration of the financial impact realized by CSU Northridge, it is important that long term maintenance of proposed trees be considered prior to their selection.

Any tree species known to have an aggressive or rampant root system shall not be planted along campus streets to avoid damage to sidewalks, utilities and curbs.

4.2.4.4. Planting distances/spacing requirements

No large or medium tree species shall be planted within any power or utility easements or under overhead utility distribution lines if the average mature height of the tree is greater than the lowest overhead wire.

Tree selection shall take into consideration requirements for future height clearances. As they grow, trees will need to be pruned to provide pedestrian clearance of at least 8 feet over sidewalks, and vehicular clearance of 14 feet over roads.

4.2.4.5. Supply of Tree Planting Stock (ANSI A300)

Since the first step in avoiding future hazard trees is to plant high quality stock, poor stock trees will not be approved for planting in any part of the campus regardless of whether the trees are meant to complete in-house projects or supplied by contractors in association with facility development.

All trees delivered to CSU Northridge for planting shall be inspected and approved by the Campus Urban Forest Resource Manager before installation. For the reason that poor planting stock will end up costing much more money in the long run because of increased maintenance requirement and shorter life span, the University shall not neglect to exercise the right to reject poor quality trees upon delivery. The supplier(s)/contractor(s) shall bear the cost of evacuating such rejected tree stock from the campus.

All trees supplied by contractors in association with construction projects shall be guaranteed for 1 year from acceptance after planting.

While inspecting trees delivered to CSU Northridge for planting, the Campus Urban Forest Resource Manager shall look for the following:

A. Tree Health

   As typical for the species/cultivar, trees shall be healthy and vigorous, as indicated by:

   1. Foliar crown density
   2. Length of shoot growth (throughout crown)
   3. Size, color and appearance of leaves
   4. Uniform distribution of roots in the container media
   5. Appearance of roots
   6. Absence of twig and/or branch dieback
   7. Relative freedom from insects and diseases

   Note: some of these characteristics cannot be used to determine the health of deciduous trees during the dormant season.

B. Form: Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
C. Central Leader: Trees shall have a single, relatively straight central leader and tapered trunk, free of co-dominant stems and vigorous, upright branches that compete with the central leader. Preferably, the central leader should not have been headed. However, in cases where the original leader has been removed, an upright branch at least ½ (one-half) the diameter of the original leader just below the pruning point shall be present.
D. Trunk structure: Shade trees that are large at maturity, and most evergreen trees, with the best quality have a dominant or central leader or trunk up to the top of the canopy. Shade trees of lesser quality have two or more leaders or trunks; they could split apart as they grow older. Small ornamental trees can have several trunks.
   a. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.
   b. The trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.

c. Trunk diameter at 6" (six inches) above the soil surface shall be within the diameter range shown for each container size below:

Container Size	~ Soil Volume in Gallons	Trunk Diameter (in)	Soil Level From Container Top (in)
# 5	0.6	0.5-0.75	1.25-2
# 15	3.3	0.75-1.5	1.75-2.75
24 Inch Box	10.5	1.5-2.5	2.25-3

E. Branch structure: The better quality, large-maturing shade trees (below left) have all branches less than about two-thirds of the trunk diameter. Poor quality shade trees (below right) have larger upright branches. Trees such as crape myrtle and other small-maturing trees can have several trunks.

Trees with extensive defects in branches such as cracks and included bark represent lesser quality than trees free of these potential problems.

Branches with bark inclusions are weakly attached to the tree and can split easily.

F. Potential Main Branches: Branches shall be distributed radially around and vertically along the trunk, forming a generally symmetrical crown typical for the species.
   a. Potential main branches shall be evenly spaced and have appropriate space between them.
   b. Branches shall be no larger than 2/3 (two thirds) the diameter of the trunk, measured 1" (one inch) above the branch.
   c. The attachment of scaffold branches shall be free of included bark.

G. G.) Temporary branches: Unless otherwise specified, small "temporary" branches should be present along the lower trunk below the first potential permanent branch, particularly for trees less than 1-1/2" (one and one-half inches) in trunk diameter. Temporary branches should be distributed around and vertically along the lower trunk. They should be no greater than 3/8" (three-eighths inch) in diameter and no greater than ½ (one-half) the diameter of the trunk at the point of attachment. Heading of temporary branches is usually necessary to limit their growth.

H. Roots
   a. The trunk, root collar (root crown) and large roots shall be free of circling and/or kinked roots. Soil removal near the root collar may be necessary in order to verify that circling and/or kinked roots are not present.
   b. The tree shall be well rooted in the container. When the trunk is carefully lifted both the trunk and root system shall move as one.
   c. The upper-most roots or root collar shall be within 1" (one inch) above or below the soil surface. The soil level should be within 2' (two inches) of the top of the container (see table above, under “Trunk Structure”).
   d. When the container is removed, the root ball shall remain intact.

e. The root ball periphery should be free of large circling and bottom- matted roots. There should be a well-developed root system, but not a dense mass from being pot-bound.
f. The root ball size should be suitable to the height of the tree (see American Standard for Nursery Stock).
g. On grafted or budded trees, there shall be no suckers from the root stock.

All plants must conform to the current edition of the American Standard for Nursery Stock ANSI Z60.1.

I. Moisture Status: At time of inspection and delivery, the root ball shall be moist throughout, and the tree crown shall show no signs of moisture stress, as indicated by wilt. Roots shall show no signs of being subjected to excess soil moisture conditions, as indicated by root discoloration, distortion, death, or foul odor.

4.2.4.6. Planting Site Preparation (ANSI A300)

A. Soil preparation and conditioning: All debris, wood chips, pavement, concrete and rocks over 2 inches in diameter shall be removed from the planting pit to a minimum of 24-inch depth, unless specified otherwise.
B. Planter pit preparation:
    a. Trees in a confined planter pit or sidewalk area: The planting hole shall be excavated to the depth of the root ball by 2x the diameter of the root ball. Scarify the sides of the pit. Soil beneath the rootball shall be compacted to prevent settling.
    b. Trees in all other areas:
        i. Mark out a planting area 2 to 3 times wider than the rootball diameter (the wider the better). Loosen this area to about 8 inches deep. This will enable the tree to extend a dense mat of tiny roots well out into the soil in the first one to ten weeks in the ground.
        ii. Excavate the hole's width a minimum of two times the diameter of the container, and deep enough to allow the root ball of the container to rest on firm soil with the top of the root ball even with the grade. Scarify the sides and the bottom of the pit.

4.2.4.7. Planting the Tree (ANSI A300)

After the hole has been prepared as described above, the tree is ready to be planted.

A. Container grown tree: Pull the container away from the root ball. Don't pull the tree out by its trunk. Container grown trees often have circling or girdling roots running along the edge of the root ball. If they exist in this area, cut them and spread them apart. Place the root ball in the center of the hole and adjust the tree so it is straight and at the proper level. Make any adjustments prior to filling the hole with dirt.

B. Backfill soil, amended soil: Backfill with the original soil unless the original soil has been removed or the soil is poor. If soil must be amended, it shall be the most appropriate soil mix as directed by the Campus Urban Forest Resource Manager.
C. Filling the hole: Fill the tree hole until is half full. Flood the hole with a slow hose or tamp gently with your foot to firm the soil. Repeat until the hole is full. Do not press the soil too firmly, only firm enough to hold the tree upright. Backfilling with soil and water or gently tamping will remove large air pockets.
D. Construction of a berm or dam: In the case of some ornamental or fruit-bearing trees, construct a small berm or dam three (3) feet in diameter around the tree. The berm should be approximately three (3) inches high. When planting California native trees, consult with the Campus Urban Forest Resource Manager before constructing a berm.
E. Mulching: Cover the entire loosened area of soil with 2 to 4 inches of mulch composed of shredded wood or bark in the entire planting area. Mulch will be placed two to four inches away from the trunk of the tree.

4.2.4.8. Staking or Guying:

A. Nursery stakes, if any, will be removed. Staking or guying is to prevent movement of the lower trunk and root system until the new tree establishes strong anchorage. Movement of the top is desirable and will strengthen the tree.
B. The stakes will be installed 12-18 inches in undisturbed soil outside of the planting hole. Depending on height and size of the tree, stakes shall be six, eight, or ten feet tall. Trees shall be staked with 2 or 3 lodgepole stakes. Lodgepole stakes, arranged in a triangle or in a line perpendicular to the prevailing wind, are the acceptable materials for protective staking of young trees.
C. Tree ties will be located near the lowest main branch on the tree. Check a staked or guyed tree monthly during the growing season and after storms or strong wind. The system will be snug, but not to the point of making an impression on the stem or trunk. If that happens, the tie or wire around the trunk shall be loosened. No tree shall be staked any longer than absolutely necessary. One or two growing seasons is all that is needed. Cinch ties, made of rubber, are the acceptable ties for use with Lodgepole stake.

4.2.4.9. Trunk Protection

All trees planted in lawn areas will have wrap-around trunk protection installed on the lower 8” of the trunk. In addition significant clearance around the base will be maintained grass-free and mulched.

4.2.4.10. Pruning Newly Planted Trees (ANSI A300)

Young trees are pruned to allow for proper growth through the years. If the tree is of high quality stock, it should need little pruning. It is no longer common practice to automatically trim a certain percentage of limbs from a newly planted tree. The tree needs as much foliage as can be available to assure rapid growth and desirable leaf structure. This includes refraining from “limbing up” and topping.

4.2.4.11. Pruning guidelines for Young Trees (ANSI A300)

All tree pruning operations must be in full conformity with ANSI A300 Standards for Tree Care Operations.

A. Scaffolding/permanent branches: Identify the scaffolding/permanent branches. The lowest permanent branch should have a diameter of one-half or less of the trunk diameter where the branch attaches to the trunk. The vertical spacing of permanent scaffold branches should equal a distance 3% of the tree's eventual height. Thus, a tree that will be 50 feet tall should have permanent scaffold branches spaced about 18 inches apart along the trunk. Avoid allowing two scaffold branches to arise one above the other on the same side of the tree. Maintain radial balance with branches growing outward in each direction.
B. Limb removal: The following may be removed -
    a. Torn, damaged, dead branches: Remove the branch just outside of the branch collar.
    b. Double Leaders: Maintain a dominant trunk for at least six- eight feet without a major fork. If the trunk divides into two or more relatively equal stems, favor one strong stem and remove the others. Cut one stem back to a lateral branch.
    c. Rubbing branches: Eliminate branches that are rubbing or will soon rub against another branch.
    d. Crowding: Give each branch room to grow with minimal competition for sunlight. When possible, have major lateral branches evenly spaced eight to ten inches apart along the trunk. If the tree by its nature would lose too much foliage in the process of eliminating crowding, maintain at least half the foliage on branches in the lower 2/3 of the tree.
    e. Narrow Branch Angles/Included Bark: Remove one branch if the angle is 40% or narrower or if it appears that the bark from the branch is becoming pinched between the branch and the trunk.
    f. Sprouts and Suckers: Remove sprouts and suckers.
    g. Temporary branches: Leave temporary branches that are not competing with permanent, scaffolding branches.

4.2.5. Transplanting Trees. (ANSI A300)

Transplanting large trees is difficult, expensive, and requires expertise and equipment. Preapproval from the Campus Urban Forest Resource Manager and periodic inspections will be required for the transplanting of a tree.

When transplanting trees eight (8) inches in diameter and larger from existing landscapes, it is important to select healthy, vigorous trees, dig an appropriate size root ball, select a site that is consistent with the tree’s cultural needs, provide a saucer shaped planting hole approximately three times the root ball width, and then protect the root ball, trunk, and crown during lifting, transportation, and storage.

Follow the tree planting standards outlined in 4.2.4.

REFERENCES

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