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Virginia Tech Campus Tree Care Plan

Summary

The purpose of the Virginia Tech Tree Care Plan is to identify the policies, procedures, and practices that are used in establishing, protecting, maintaining, and removing trees on the Virginia Tech Blacksburg campus. This document shall serve as a source for designers, contractors, and Virginia Tech Faculty and Staff to reference when planning/implementing activities on Virginia Tech properties that may impact tree assets. The overall goal of the standards is to ensure a safe, attractive, and sustainable campus urban forest and help the University reach the goals set in the draft Urban Forest Master Plan in compliance with the draft Virginia Tech Tree Policy.

The specific objectives of the standards are:

- Ensure proper species selection, high-quality nursery stock acquisition, and installation compliant with industry standards.
- Promote appropriate species diversity, tree age distribution, and urban canopy structure for campus urban forest sustainability.
- Protect and conserve high-value campus trees during development, construction, and renovation projects.
- Promote tree health, structure, and safety by implementing ANSI standards and ISA's best management practices when maintaining the campus urban forest.
- Ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, construction, or development displacement.
- Encourage the campus community to respect and value the campus urban forest.

Responsible Department

Virginia Tech University Arborist office located within the division for Campus Planning, Infrastructure, and Facilities (CPIF) under the direction of the Vice President of CPIF, the Assistant Vice President for Facilities Operations, and Director of Facilities and Grounds.

Campus Tree Advisory Committee

The tree advisory committee is formally known as the Arboretum Committee. The committee is comprised of faculty and staff from numerous plant-related programs throughout the University and town of Blacksburg, VA. The committee meets biannually or as needed, provides important input into care and improvement of the campus landscape, and committee member terms are laissez-faire.

Campus Arboriculture Practices

All tree care practices shall conform to ANSI Z133 standards and ANSI A300 standards.

Pruning Schedule

The maintenance pruning schedule shall be dictated by tree species, age, condition, function, and location.

- Trees classified as young in the Core Campus Tree Inventory shall receive structural pruning every 4 years or more frequently as needed.
- Trees classified as immature in the Core Campus Tree Inventory shall receive structural pruning every 4 years or more frequently as needed.
- Trees classified as mature in the Core Campus Tree Inventory shall receive maintenance pruning every five years to remove dead, diseased, dying, and defective branches from the crown and/or resolve any tree/human conflicts. Some mature trees may require more frequent maintenance and shall be assessed as needed.
- Trees adjacent to roadways, walkways, signs, buildings, and street lights should be inspected annually for safety and clearance issues. Maintenance pruning should be scheduled as necessary.

Pruning Practices

To encourage the development of a strong, healthy tree, the following guidelines shall be followed when pruning.

All pruning shall conform to ANSI Z133 and ANSI A300 standards.

General

- Pruning shall not occur without a clear objective.
- Prune first for safety, next for health, and finally for aesthetics.

- When removing branches, the pruning cut shall not damage the branch bark ridge and branch collar.
- Internode (heading) cuts should not be used except in storm response and crown restoration procedures.
- Branch reduction or thinning should be used to achieve pruning objectives rather than making large (> 8” diameter) branch removal cuts.

Dead Wood Pruning

- Pruning shall be performed to remove dead, diseased, dying, and compromised branches; this practice reduces risk, promotes health, and improves appearance.
- Large branches should be removed with the aid of ropes and rigging equipment to minimize the risk of tree injury from falling debris.
- Some dead wood may be retained in low occupancy areas for the benefit of wildlife and to aid in education/outreach.

Thinning

- Thinning shall be performed when necessary to reduce the density of branches, which increases light penetration, improves visibility, and decreases wind load.
- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U- shaped angles of attachment. Remove branches with weak, V-shaped angles of attachment and/or included bark when necessary to improve structure or reduce risk.
- Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- Remove any branches that rub or cross another branch.
- Make sure that lateral branches are no more than one-half to three-quarters of the diameter of the main stem to discourage the development of codominant stems.
- Do not remove more than one-quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.

Raising

- Raising shall be performed when necessary to provide vertical clearance from thoroughfares, around signs and street lights, and near structures.
- Always maintain live branches on at least two-thirds of a tree’s total height. Removing too many lower branches may prevent the development of stem taper.
- Remove basal sprouts and vigorous epicormic sprouts.

Reduction

- Reduction shall be performed to decrease the overall height of a tree, to decrease the length of an individual branch, or reduce the size of a tree's crown.
- Use reduction pruning only when absolutely necessary. Make the pruning cut at a lateral branch that is at least one-third the diameter of the stem to be removed.
- If it is necessary to remove more than half of the foliage from a branch, remove the entire branch.

Cultural Practices

All cultural tree care practices shall conform to ANSI Z133 and ANSI A300 standards.

Mulching

Tree mulching - apply mulch to a depth no greater than 3 inches, care shall be taken to prevent mulching around the root collar. Mulch shall be applied every two years for trees up to approximately 6". Periodically, drip lines of larger trees, tree stands, and high-value trees are mulched extensively with coarse wood chips.

Fertilization and Pest Management

Trees are treated for pest problems as needed. There is an extensive Dutch Elm Disease treatment program on campus. There is some regular treatment of hemlocks on campus for Hemlock Wooly Adelgid and ash trees for the Emerald Ash Borer.

There is no regular tree fertilization beyond treatment received as a result of fall lawn fertilization. Specimen or high-value trees may receive prescription fertilization when severe nutrient deficiencies are diagnosed.

Tree, Plant, and Soil Protection During Construction

Tree protection fencing is required for all trees within construction limit fencing or as noted on plans for projects where no construction limit fencing is specified.

Tree Protection fencing shall be installed around existing trees noted to remain on plans within the fenced area. Fencing shall be installed and maintained at a distance from the trunk equal to 1.5-feet per each inch of trunk diameter as measured at 4.5-feet above grade (DBH) or 10-feet, whichever is greater. For example, a tree with a 12-inch trunk diameter shall be fenced 18-feet from the trunk (36-feet diameter). Please see TPZ details here. Alternative shapes and sizes of TPZs may be considered on sites with size/location constraints and must be authorized by the University Arobirst office.

Sites used for material laydown, equipment transport, and construction shall be planned to avoid conflicts with tree crowns. The University Arborist office may permit pruning of small branches and minimal reduction cuts to increase clearance when conflict is unavoidable.

All work occurring within the critical root zones of campus tree assets that involves excavating/soil disturbances, root cutting, and grade changes must be planned and supervised by the University Arborist, who will develop a root pruning or tree preservation plan for the tree or project. Non-invasive techniques, e.g. horizontal boring, air spade excavation, and hydro-vac excavation, shall be considered before trenching, grading, and excavating/soil disturbances are planned within the critical root zone of campus tree assets.

Fencing shall be installed prior to any equipment arrival on the site. Work may not begin until fencing is installed.

Fencing shall be galvanized chain link, 4-feet minimum height. Plastic fencing and wood stakes/T-posts, or snow fencing are not acceptable.

Fencing shall be maintained for the duration of the project and shall not be removed without the University Arborist's permission.

A layer of wood chip mulch, approximately 5 inches thick, shall be spread over the critical root zone. Special care shall be taken to avoid mulch placement on trunk flare. Any areas outside of the critical root zone that may experience vehicle traffic and compaction shall be mulched in the same manner, to a depth of 8"-12" thick.

No material storage, vehicles, or any other activity shall occur at any time within tree protection fencing.

Contractor's that allow any incursion into tree protection zones are required to pay for tree asset appraisal, replacement, and/or soil compaction remediation costs as directed by the University Arborist office.

Sites at the project that are designed for landscape use and tree planting should not be used for material laydown and equipment transport. In the event that these planting sites are impacted by construction/equipment transport/material laydown, compaction shall be remediated with the Soil Profile Rebuilding Technique or another process approved by the Office of University Planning. Please see Soil Profile Rebuilding specifications here.

Preservation During Design Phase

Consult with the University Arborist to determine what trees may require tree preservation zones; construction, renovation, and development shall not occur within specified tree preservation zones.

Sites at the project that are designed for landscape use and tree planting should not be used for material laydown and equipment transport.

On the site survey map, identify all trees that may be impacted (above and below ground) by construction equipment, cut and fill activities, utility corridors, proposed walks and roads, and potential construction staging areas.

NOTE: if trees are grouped in a forest or woodlot, then only the location of the woodlot and any trees of 15 inches or greater diameter as measured at 4.5-feet above grade (DBH) should be identified

Low Priority for Preservation

- Small trees (less than 5 inches DBH) that will likely be impacted by construction activities.
- Larger trees with relatively low landscape value. Examples include but are not limited to, trees with poor form, trees of undesirable species, or trees with inadequate space to accommodate current or future growth even if the site is ameliorated, as determined by the University Arborist office.

High Priority for Preservation

- Larger trees (greater than 5 inches DBH) of desirable species with fair/good form, good health, and room to continue to grow, as determined by the University Arborist office.
- Trees that were planted as memorials, commencement trees, and commemorative trees.

Avoid locating the general construction site around tree assets where possible by:

- Planning all construction activities including new utility corridors, staging areas, new sidewalks and new roads for a minimum clearance of 25 feet away from the base of trees, and not within the critical root zone as determined by the University Arborist. Greater distances are desirable.
- High priority trees should receive more consideration than low priority trees in planning corridors, staging areas, walks, and roads.

Tree Removals

All tree removals shall conform to ANSI Z133 and ANSI A300 standards.

Live trees are generally removed to reduce risk to the public, property, and services. Rarely tree removal occurs to improve the quality of the landscape.

Trees may be removed after assessment by the University Arborist office, who will consult with the Arboretum Committee where the committee reaches a consensus.

When the University Arborist office and the Arboretum Committee cannot reach a consensus, an independent assessment by a consulting arborist may be required and submitted to the committee for review.

Planting and Tree Diversity

Planting Specifications

Planting shall consist of excavating all planting holes, planting, and maintaining new trees of the type and size designated on the approved list, found here. All work shall be in accordance with these specifications and to the satisfaction of the University Arborist office.

It is the responsibility of the installer to notify all owners/operators of underground facilities and have all utilities located and marked before work occurs.

Once work begins, the installer takes full responsibility for the planting sites/locations. All excavated materials that are not backfilled into the planting hole, shall be removed from the site and disposed of properly. The area shall be safe and secure throughout the job and at the end of the workday.

Site characteristics, such as overhead utilities, existing vegetation, and infrastructure items, such as curbs and sidewalks, shall be considered. Trees that grow taller than 25 feet should not be planted directly under utility lines. When possible the tree leader shall be offset from power lines. Where subsurface obstructions (vaults, utilities, sprinklers) are encountered during excavation and restrict the planting of a tree, the installer shall restore the disturbed area to its original condition. If damage is done to an underground obstruction, it is the responsibility of the installer to restore the site to its original condition. A new planting location will be designated if conditions permit.

Trees shall be transported and handled with care to ensure adequate protection against injury and desiccation. When transported in closed vehicles, plants shall receive adequate ventilation to prevent sweating. When transported in open vehicles, plants shall be protected by tarps or other suitable cover material. Balled and burlapped trees shall be set on the ground and balls covered with soil. Until planted, all materials shall be properly maintained and kept adequately watered. Installers are liable for any damage to property caused by planting operations and related work. All disturbed areas shall be restored to their original condition.

Traffic shall not be disrupted at any time during planting operations, unless VT Transportation has permitted the disruption. Work shall not be performed on opposite sides of the street at the same time.

Planting Seasons

Trees may be planted in the fall from October 1 through December 15, and in the spring from March 1 through May 15. No planting is permitted in the summer. Any off season planting must be permitted by the University Arborist office.

Installation

Remove all materials from the planting hole for the full length and width of the planting hole to the depth of the tree's root ball. For excavation of a lawn strip, excavate an area at least three times the diameter of the root ball in length by the width of the lawn strip (up to 3 times the diameter of the root ball). Extreme care shall be taken to avoid excavation to a depth greater than required. The subgrade below the root ball shall be tamped slightly to prevent settlement. All ropes, stones, etc. shall be removed from the planting site before backfilling. All excavated materials shall be removed from the site and disposed of in an acceptable manner.

Place balled and burlapped material in the prepared planting hole by lifting and carrying it by the root ball so that the ball will not be loosened. Set the tree straight and in the center of the pit. All trees shall sit, after settlement, with the base of the trunk and the beginning of the roots, known as the "trunk flare", level with the site soil grade. If the top of the root ball is not consistent with this area, the depth of the planting site should be adjusted by adding or removing soil below the root ball to make the trunk flare level with the sidewalk grade.

Cut and remove rope and wire from the root ball. All rope, wire, twine, burlap and other materials shall be removed and not backfilled into the hole. Backfill shall be loose and friable and clumped, this will reduce air pockets and settling. Soil shall be firmed as the hole is backfilled but not compacted. All planting holes shall be filled with the backfill and made level with existing conditions. Cultivate and rake over finished planting areas leaving them in a clean condition. At no time should soil/mulch be mounded to cover the trunk of the tree. The trunk flare shall always be visible. Final soil level shall be flush with the surrounding soil grade to prevent potential tripping hazard.

Staking and Tree Wrap

All staking shall be done during the planting operation and shall be maintained throughout the first year of the 2 year guarantee period. After the first year, the stakes shall be removed. Stakes shall be of seasoned hard wood, oak preferred, and shall show no sign of cracking or decay. Stakes shall be cut even so they are the same height. All trees shall be supported by 2 stakes, they shall be 5 feet long; the diameter at the middle shall be not less than 2 inches. Stakes shall be placed outside of the rootball, driven 30 inches into the ground, and shall be fastened to the tree with a suitable length of ¾” wide, flat, woven polypropylene material (arbor tie). Unless otherwise directed, trees shall be staked as shown on the plans and in accordance with these specifications. Stakes shall be set parallel to curbs. Trees shall stand plumb after staking. Stakes and arbor tie shall be removed at the end of the first year of the 2 year guarantee period, unless otherwise directed by the University Arborist office. At the time the stakes are removed any holes left by the stake shall be filled.

No tree trunks shall be wrapped. Remove all nursery tags and protective wrapping. No material shall be left that may girdle the stem.

Pruning

Pruning shall be done in accordance with ANSI A300 Part 1 Standard Practices for structural pruning. Pruning before and immediately after (2 years) planting shall be limited to the removal of dead, broken, or diseased branches. All diseased branches and all dead branches shall be removed. Any branch which may be partly dead, yet has a healthy lateral branch at least one third the diameter of the parent branch shall be pruned back to the healthy lateral branch. All stubs or improper cuts resulting from former pruning shall be removed. All cuts shall be cleanly made with

sharp/sterile tools as close to the parent trunk or limb as possible without disturbing the branch bark ridge or callus collar. Any existing nails, spikes, wire, plastic or other materials found driven into or fastened to the trunk or branches shall be removed or if approved they shall be cut flush in a manner to permit complete sealing over.

Watering

At the time of planting, the soil around each tree shall be thoroughly saturated with at least 20 gallons (20 gal) of water. Care shall be taken to avoid compacting the backfill or eroding the planting hole. Water shall be free from oil, have a pH not less than 6.0 nor greater than 8.0 and shall be free from impurities injurious to vegetation. Water shall not be applied in a manner which damages plants, stakes, or adjacent areas. Each tree bed shall be watered evenly in a manner which does not erode the soil or mulch. Watering shall not cause uprooting or exposure of plant roots to the air.

Mulching

Bark Mulch/arborist chips/coarse woody debris shall be applied as a ground cover to the surface of all planting beds at the time of planting and again after the tree stakes have been removed, one year after planting.

Mulch shall be applied to a uniform depth of 3 inches and shall be so distributed as to create a smooth, level cover over the exposed soil. A gap of approximately 2 inches should be left between the mulch and the trunk of the tree to avoid mounding above the trunk flare.

Seasonal Installation Maintenance

Watering

Watering must take place throughout the 2 year guarantee period, at least 20 gallons at approximately two week intervals from May 15 to October 31. You may need to increase or reduce the frequency of watering based on weather conditions, resulting soil water content, other factors, or at the request of the University Arborist office.

Water shall not be applied in a manner which damages plants, stakes, or adjacent areas. Each tree bed shall be watered evenly in a manner which does not erode soil or mulch. Watering shall

not cause uprooting or exposure of plant's roots to the air. Damages resulting from these operations shall be immediately repaired at the expense of the installer.

Other Maintenance Activities

All newly planted trees shall be maintained by the installer until 2 years after the final inspection by the University Arborist office. Maintenance shall include weeding, cultivating, edging, pruning, adjustment and timely removal of stakes/arbor tie (these must be removed after one year), repair of minor washouts, mulching, soil replacement and other horticultural operations necessary for the proper growth of all trees, and for keeping the entire area within the planting area neat in appearance. All planting areas shall be cultivated and weeded with hoes or other approved tools within the period from May 15 to October 31, and such cultivating and weeding shall be repeated at least every 3 weeks. Under no conditions shall weeds be allowed to attain more than 6 inches of growth.

Guarantee Period

All trees must be guaranteed for 2 years. All installers shall provide a guarantee for the trees planted.

Plant Selection, Diversity Requirements, and Planting Stock Standards

As the campus is used as a teaching lab and a resilient canopy is a priority, increasing the diversity of tree species is extremely important. Diversity thresholds of 5% of any one species, 10% of any one genus, and 15% of any family shall be implemented during planting projects; this practice will ensure adequate diversity as tree populations are installed. Small, mostly ornamental, tree species shall be limited on new planting projects to no more than 10% of the population installed. However, species selection must be dictated by site conditions, available planting stock, and expected changes in the climate.

The Core Campus Approved Tree Specimens may be found here. Arboretum Committee members often request the installation of new cultivars and species that are absent or underrepresented on campus to assist in their teaching activities. Based on the vernacular of the site, some landscapes will be planted in native species while others may include selected specimens. Known invasive woody plants are consciously avoided in tree planting plans.

Storm Response and Recovery

Storm response and recovery are generally accomplished in-house. In a crisis, the first priority is to remove tree debris that blocks campus thoroughfares, disrupts campus operations, or pose high or imminent risk to the campus community. Once these critical needs are addressed, a prioritized recovery plan is implemented during which seriously damaged trees are systematically removed and other impacted trees are pruned to restore their health and structure while reducing risk. As the tree planting budget permits, lost trees are strategically replaced to restore the structure and function of the campus urban forest in a reasonable time frame. During storm response and recovery, trees requiring specialized equipment or skills not available in-house are addressed by private contractors.

Goals and Targets

Urban Forest Master Plan and Tree Policy

Virginia Tech hired the institution's first University Arborist in fall 2019 to develop a comprehensive urban forestry program for the Blacksburg campus. Throughout 2020, the University Arborist has worked closely with the VT community and the Arboretum Committee to draft a campus urban forest master plan and associated tree policy. Adoption of this plan and policy is the next step in development of the campus urban forest program and should occur in 2021.

Campus Tree List

Preferred woody plants for use on the Virginia Tech campus may be found on the Core Campus Approved Tree Specimens list found here. This is not an exhaustive list of all acceptable plants. Other plants that follow the design guidelines may be used after permission from the University Arborist office is acquired.

Tree Damage Assessment, Enforcement, and Penalties

Assessment on low profile trees is performed by the University Arborist office. High profile trees are assessed by the University Arborist with support from the Arboretum Committee or an outside consultant when needed. Enforcement of protection measures is performed by project managers and on-site engineers who shall consult with the University Arborist office before work begins.

Destruction of Trees

Code of Virginia, Title 18.2, Chapter 5, § 18.2-140. Destruction of trees, shrubs, etc.:

It shall be unlawful for any person to pick, pull, pull up, tear, tear up, dig, dig up, cut, break, injure, bum or destroy, in whole or in part, any tree, shrub, vine, plant, flower or turf found, growing or being upon the land of another, or upon any land reserved, set aside or maintained by the Commonwealth as a public park, or as a refuge or sanctuary for wild animals, birds or fish, or upon any land reserved, set aside or maintained as a public park by a park authority created under the provisions of § 15.2-5702. without having previously obtained the permission in writing of such other or his agent or of the superintendent or custodian of such park, refuge or sanctuary so to do, unless the same be done under the personal direction of such owner, his agent, tenant or lessee or superintendent or custodian of such park, refuge or sanctuary.

Any person violating this section shall be guilty of a Class 3 misdemeanor; provided, however, that the approval of the owner, his agent, tenant or lessee, or the superintendent or custodian of such park or sanctuary afterwards given in writing or in open court shall be a bar to further prosecution or suit.

Topping of Trees

Topping, heading, hat-racking, or any other form of inappropriate crown/branch reduction pruning shall not be permitted except in emergency situations or in executing a crown restoration practice.

Communication Strategy

These tree care and protection standards are detailed in various standards and procedures developed and maintained by the University Arborist and are shared with developers, designers, and project managers through the VT Design and Construction Standards Manual, here.

The University Arborist consults with the VT community on all tree-related questions and issues and coordinates development near trees on campus.

Tree Terms Glossary

Arboriculture: The science and art of caring for trees, shrubs and other woody plants in landscape settings.

Arborist: A person possessing the technical competence through experience and related training to provide for or supervise the management of trees or other woody plants in a landscape setting.

Compaction: The compression of soil, causing a reduction of pore space and an increase in the density of the soil. Tree roots cannot grow in compacted soil.

Critical root zone: Portion of the root system that is the minimum necessary to maintain vitality or stability of the tree. Encroachment or damage to the critical root zone will put the tree at risk of failure.

Fertilization: The process of adding nutrients to a tree or plant; usually done by incorporating the nutrients into the soil, but sometimes by foliar application or injection directly into living tissues.

Landscape: Areas of land that are distinguished by differences in landforms, vegetation, land use, and aesthetic characteristics.

Mitigation: Action taken to alleviate potential adverse effects on wetlands and fish habitat undergoing modification. Also commonly used to mean compensation for damage done.

Mulch: Any material such as wood chips, straw, sawdust, leaves, and stone that is spread on the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, and evaporation.

Pruning: Selective removal of woody plant parts of any size, using saws, pruners, clippers, or other pruning tools.

Root System: The portion of the tree containing the root organs, including buttress roots, transport roots, and fine absorbing roots; all underground parts of the tree.

Root Zone: The area and volume of soil around the tree in which roots are normally found. May extend to three or more times the branch spread of the tree, or several times the height of the tree.

Soil: A dynamic natural body composed of mineral and organic materials and living forms in which plants grow.

Species: The main category of taxonomic classification into which living organisms are subdivided, comprising a group of similar individuals having a number of correlated characteristics.

Stress: Unfavorable deviation from normal. The action on a body of any system of balanced forces whereby strain or deformation results. In arboriculture, the adverse alteration of tree health by abiotic or biotic factors.

Thinning: Pruning technique in which branches are removed at their point of origin.

Tree protection zone: A designated area around trees where maximum protection and preservation efforts are implemented to minimize soil compaction, etc.

Urban forestry: Management of naturally occurring and planted trees in urban areas.