

University of Kentucky

Tree Protection Standards

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Article 56 is in addition to, and takes precedence over the provisions of the Special Conditions for the Project.

ARTICLE 56

PART 1 –GENERAL

56.1.1 SUMMARY

- A. The scope of work includes all labor, materials, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with protection of existing trees and other plants as shown on the drawings and as specified herein.
1. Provide preconstruction evaluations and Arborist Report.
 2. Provide tree and plant protection fencing.
 3. Provide protection of root zones and above ground tree parts and plants.
 4. Provide pruning of existing trees and plants.
 5. Provide all insect and disease control.
 6. Provide maintenance of existing trees and plants including irrigation during the construction period as recommended by the Arborist Report.
 7. Provide maintenance of existing trees and plants including irrigation during the post construction plant maintenance period.
 8. Remove tree protection fencing and other protection from around and under trees and plants.
 9. Clean up and disposal of all excess and surplus material.

56.1.2 CONTRACT DOCUMENTS

A. Shall consist of specifications, general conditions and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

B. It is the intent of this section that the requirements apply to all sections of the project specification such that any subcontractor must comply with the restrictions on work within designated Tree and Plant Protection Areas.

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56.1.3 RELATED DOCUMENTS AND REFERENCES

A. Related Documents:

1. Drawings and general provisions of contract including general and supplementary conditions and Division I specifications apply to work of this section.
2. Section -Planting Soil
3. Section -Irrigation
4. Section -Planting
5. Section –Lawn

B. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.

1. ANSI A 300 (Part 5) – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, Management of Trees & Shrubs During Site Planning, Site Development & Construction. Most current editions.
2. ANSI A 300 (Part 1) – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, Pruning. Most current editions.
3. ANSI Z133 Safety Requirements for Arboricultural Operations.
4. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign IL, most current edition.

56.1.4 VERIFICATION

A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner’s Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner’s Representative.

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56.1.5 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.

56.1.6 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to his/her actions.

56.1.7 CHANGES IN THE WORK

A. The Owner's Representative may order changes in the work, and the contract sum should be adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

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56.1.8 DEFINITIONS

All terms in this specification shall be as defined in the "Glossary of Arboricultural Terms" or as modified below.

- A. Owner's Representative: The person appointed by the Owner to represent their interest in the Tree and Plant Protection and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.
- B. Reasonable and Reasonably: When used in this specification is intended to mean that the conditions cited will not affect the establishment or long term stability, health or growth of the plant. This specification recognizes that plants are not free of defects, and that plant conditions change with time. This specification also recognizes that some decisions cannot be totally based on measured findings and that professional judgment is required. In cases of differing opinion, the Owner's Representative expert shall determine when conditions within the plant are judged as reasonable.
- C. Shrub: Woody plants with mature height approximately less than 25 feet.
- D. Tree and Plant Protection Area: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle centered on the trunk with each tree with a radius equal to the crown dripline unless otherwise indicated by the owner's representative.
- E. Tree: Single and multi-stemmed plants with anticipated mature height approximately greater than 25 feet or any plant identified on the plans as a tree.

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56.1.9 SUBMITTALS

- A. ARBORIST REPORT: Prior to the start of construction, submit, for approval by the Owner's Representative, the report of a consulting arborist who is a Registered Consulting Arborist® (RCA) with American Society of Consulting Arborists or an ISA Board Certified Master Arborist, which details the following information for all trees to remain within the area designated on the drawings as the Tree and Plant Protection Area. The report shall include the following:
1. A description of each tree to protect indicating the following:
 - a. Genus and species
 - b. Condition including any visible damage to the root system or soil within the root zone
 - c. Tree diameter at 4.5 feet above grade
 - d. Tree height
 - e. Crown width
 - f. Any visible disease and/or insect infestations
 - g. Branch and/or trunk structural deficiencies.
 - h. Appraisal of value
 - i. Appraisal of benefits (storm water interception, heating/cooling, carbon sequestration)
 2. The report shall note all trees or parts of trees, which are considered a hazard or significant or extreme risk level. Include the International Society of Arboriculture Tree Risk Assessment evaluation sheet for each tree, which may reasonably be identified as a potential hazard tree.
 3. Recommendations as to treatment of all insect, disease and structural problems encountered.
 4. Recommendations for fertilizer treatments, if any.
 5. A plan of the site showing the location of all trees included in the report.
- B. PRODUCT DATA: Submit manufacturer product data and literature describing all products required by this section to the Owner's Representative for approval. Provide submittal four weeks before the start of any work at the site.
- C. QUALIFICATIONS SUBMITTAL: For each applicable person expected to work on the project, provide copies of the qualifications and experience of the Consulting Arborist, proof of either the registered Consulting Arborist® (RCA) with American Society of Consulting Arborists or an ISA Board Certified Master Arborist and any required Herbicide/Pesticide license to the Owner's Representative, for review prior to the start of work.

56.1.10 OBSERVATION OF THE WORK

- A. The Owner's Representative may inspect the work at any time.

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56.1.11 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1. The following Contractors shall attend the preconstruction conference:

- a. General Contractor.
- b. Consulting Arborist.
- c. Subcontractor assigned to install Tree and Plant Protection measures.
- d. Earthwork Contractor.
- e. All site utility Contractors that may be required to dig or trench into the soil.
- f. Landscape subcontractor.
- g. Irrigation subcontractor

B. Prior to this meeting, mark all trees and plants to remain and or be removed as described in this specification for review and approval by the Owner's Representative.

56.1.12 QUALITY ASSURANCE

A. Contractor qualifications:

1. All pruning, branch tie back, tree removal, root pruning, and fertilizing required by this section shall be performed by or under the direct supervision of an ISA Certified Arborist. Submit aforementioned individual's qualifications for approval by the Owner's Representative.
2. All applications of pesticide or herbicide shall be performed by a person maintaining a current state license to apply chemical pesticides valid in the jurisdiction of the project. Submit copies of all required state licensing certificates including applicable chemical applicator licenses.

56.1.13 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

- A. Specimen trees within or adjacent to construction areas will be identified by the Owner's Representative and the Architect, and marked with green tags. Loss of any of these trees will result in fines assessed at a minimum of \$10,000 (or higher appraised amount that may be determined by the University prior to construction) per tree. Damage to all other trees on the property will be assessed at the rate of \$200 per diameter inch of the tree measured 4.5' above grade.
- B. Any trees or plants designated to remain and which are damaged by the Contractor shall be replaced in kind by the Contractor at their own expense in addition to fines and penalties.

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Tree(s) shall be replaced with a tree(s) of similar species and equivalent trunk diameter to the tree(s) being replaced. For example, if a 20" diameter tree is to be replaced, the Contractor can provide ten (10) two inch diameter trees. Depending on site accommodations and landscape design, the replacement trees may be installed outside of the project site as directed by the Owner's Representative. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available whichever is less. Where replacement plants are to be less than the size of the plant that is damaged, the Owner's Representative shall approve the size and quality of the replacement plant.

1. All trees and plants shall be installed per the requirements of Specification Section Planting.
- C. Plants that are damaged shall be considered as requiring replacement or appraisal in the event that the damage affects more than 25 % of the crown, 25% of the trunk circumference, or root protection area, or the tree is damaged in such a manner that the tree could develop into a potential hazard. Trees and shrubs to be replaced shall be removed by the Contractor at his own expense.
1. The Owner's Representative may engage an independent arborist to assess any tree or plant that appears to have been damaged to determine their health or condition.
- D. Any tree that is determined to be dead, damaged or potentially hazardous by the Owner's arborist and upon the request of the Owner's Representative shall be immediately removed by the Contractor at no additional expense to the owner. Tree removal shall include all clean-up of all wood parts and grinding of the stump to a depth sufficient to plant the replacement tree or plant, removal of all chips from the stump site and filling the resulting hole with topsoil.
- E. Any remedial work on damaged existing plants recommended by the Consulting Arborist shall be completed by the Contractor at no cost to the owner. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators (TGR). Any remedial work is to be performed by an ISA Certified Arborist, ISA Board Certified Master Arborist or a Registered Consulting Arborist.
- F. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

56.1.14 LOSS OF TREES DUE TO CONSTRUCTION FOOT PRINT

- A. Any trees or plants designated as removals to accommodate construction shall be replaced. Tree(s) shall be replaced with a tree(s) of similar species and equivalent trunk diameter to the tree(s) removed. For example, if a 20" diameter tree is removed, the Contractor can provide ten (10) two inch diameter trees. Depending on site accommodations and landscape design, the replacement trees may be installed outside of the project site as

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directed by the Owner's Representative. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available whichever is less.

PART 2 –PRODUCTS

56.2.1 MULCH

The coarse grade Mulch specified here is considered superior for its water retention and soil building properties in areas of tree and shrub roots when irrigation is drip, bubblers or flood methods.

A. Mulch shall be coarse, ground, from tree and woody brush sources. The minimum range of fine particles shall be 3/8 inch or less in size and a maximum size of individual pieces shall be approximately 1 to 1-1/2 inch in diameter and maximum length of approximately 4 to 8 inches. No more than 25% of the total volume shall be fine particles and no more than 20% of total volume be large pieces. Mulch will be applied to a depth of 3 to 5 inches. Mulch shall not come into contact with the tree trunk.

1. It is understood that Mulch quality will vary significantly from supplier to supplier and region to region. The above requirements may be modified to conform to the source material from locally reliable suppliers as approved by the Owner's Representative.

B. Submit supplier's product data that product meets the requirements and two-gallon sample for approval.

56.2.2 WOOD CHIPS

A. Wood Chips from an arborist chipping operation with less than 20% by volume green leaves. Chips stockpiled from the tree removal process may be used. Mulch will be applied to a depth of 5 to 8 inches. Mulch shall not come into contact with the tree trunk.

56.2.3 TREE PROTECTION FENCING

A. Chain link fencing shall be installed around all existing trees to remain. Fencing shall be 6' tall galvanized nine gauge, with 3" end and line post and 1" minimum top rails, and bottom tension wire a maximum of 3" off the ground. Post shall be driven into the ground and spacing shall not exceed 8 feet.

6 feet tall metal chain link fence set in metal frame panels on movable core drilled concrete blocks of sufficient size to hold the fence erect in areas of existing paving to remain.

B. Orange plastic fencing shall be installed on the outside of the chain link fencing to provide high visibility.

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C. GATES: For each fence type and in each separate fenced area, provide a minimum of one 3-foot-wide gate. Gates shall be lockable. The location of the gates shall be approved by the Owner's Representative.

D. Submit supplier's product data that product meets the requirements for approval.

56.2.4 TREE PROTECTION SIGN

A. Heavy-duty laminated or all weather signs, 11 inches x 17 inches, white colored background with black 2 inch high or larger block letters. The signs shall be attached to the tree protection fence every 50 feet. The tree protection sign shall read:

"Tree Protection Area - Keep Out"

The following information shall also be included on the sign:

- i. Genus and species
- ii. Tree diameter
- iii. Tree height
- iv. Appraised value of tree
- v. Benefits provided
 1. Storm water interception in gallons
 2. Carbon sequestration in pounds
 3. Energy Savings

56.2.5 TREE (Plant) GROWTH REGULATOR (TGR/PGR)

A. Active ingredient Paclobutrazol i.e. (ShortStop, Cambistat 25C, Profile 2SC or other)

B. Submit supplier's product data that product meets the requirements for approval.

56.2.6 SOIL & ROOT PROTECTION

On projects where the tree protection fencing cannot be installed to create the desired protection zone.

A. Matting for vehicle and work protection shall be heavy duty matting designed for vehicle loading over tree roots, Altarnamats as manufactured by Altarnamats, Inc. Franklin, PA 16323 or approved equal.

B. 1/2" Steel plates - Following the recommendations of the project arborist steel plates shall be installed to protect the roots from Construction activities.

C. Submit suppliers' product data that product meets the requirements for approval.

56.2.7 GEOGRID

A. Geogrid shall be woven polyester fabric with PVC coating, Uni-axial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, acids.

Manufacturers: GSE Environmental, TenCate, Terram

B. Submit suppliers' product data that product meets the requirements for approval.

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56.2.8 GEOTEXTILE

A. Geotextile shall be nonwoven polypropylene fibers, inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

Manufacturers: GSE Environmental, TenCate, Terram

B. Submit supplier's product data that product meets the requirements for approval.

PART 3 –EXECUTION

56.3.1 SITE EXAMINATION

A. Examine the site, tree, plant and soil conditions. Notify the Owner's Representative in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

56.3.2 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of Work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines currently present on the irrigation plan, heads or the conduits of other utility lines or structures that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

56.3.3 TREE AND PLANT PROTECTION AREA

A. The Tree and Plant Protection Area is defined as all areas indicated on the tree protection plan. Where no limit of the Tree and Plant Protection area is defined on the drawings, the limit shall be the drip line (outer edge of the branch spread) of each tree.

56.3.4 PREPARATION

A. Prior to the preconstruction meeting, layout the limits of the Tree and Plant Protection Area and then alignments of required Tree and Plant Protection Fencing and root pruning. Obtain the Owner's Representative's approval of the limits of the protection area and the alignment of all fencing and root pruning.

B. Flag all trees and shrubs to be removed by wrapping blue plastic ribbon around the trunk and obtain the Owner's Representative's approval of all trees and shrubs to be removed prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with blue paint in a band completely around the base of the shrub(s) and around the trunk of the tree(s) 4.5 feet above the ground.

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C. Flag all trees and shrubs to remain with green plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the Owner's Representative's approval of all trees and shrubs to remain prior to the start of tree and shrub removal.

D. Prior to any construction activity at the site including utility work, grading, storage of materials, or installation of temporary construction facilities, install all tree protection fencing, Geotextile Fabric, silt fence, tree protection signs, Geogrid, Mulch and or Wood Chips as shown on the drawing.

56.3.5 SOIL MOISTURE

A. Volumetric soil moisture level, in all soils within the Tree and Plant Protection Area shall be maintained above permanent wilt point to a depth of at least 8 inches. No soil work or other activity shall be permitted within the Tree and Plant Protection Area when the volumetric soil moisture is above field capacity. The permanent wilt point and field capacity for each type of soil texture shall be defined as follows (numbers indicate percentage volumetric soil moisture).

Soil Type	Permanent wilt point v/v	Field Capacity v/v
Sand, Loamy sand, Sandy Loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

1. Volumetric soil moisture shall be measured with a digital, electric conductivity meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent meter.

B. The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend operations until the soil moisture drains to below field capacity.

56.3.6 ROOT PRUNING

A. Prior to any excavating into the existing soil grade within 25 feet of the limit of the Tree and Plant Protection Area or trees to remain, root prune all existing trees to a depth of 24 inches below existing grade in alignments following the edges of the Tree and Plant Protection Area or as directed by the Owner's Representative. Root pruning shall be in conformance with ANSI A300 Root Management Standard (part 8) latest edition.

1. Using an air excavation tool to expose roots within 2 feet of the limit of grading.

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2. After completion of excavation, make clean cuts with a lopper, saw or pruner to sever roots so they will not be torn, ripped or damaged by the excavation, and backfill the trench immediately with existing soil, filling all voids.

56.3.7 INSTALLATION OF GEOGRIDS, GEOTEXTILE FABRICS, MATTING, WOOD CHIPS AND OR MULCH

A. Install geogrids, geotextile fabric, matting, wood chips and or mulch in areas and depths shown on the plans and details or as directed by the Owner's representative. In general, it is the intent of this specification to provide the following levels of protection:

1. All areas within the Tree and Plant Protection area provide a minimum of 5 inches of wood chips or mulch.
2. Areas where foot traffic or storage of lightweight materials is anticipated to be unavoidable provide a layer of Filter Fabric under the 5 inches of wood chips or mulch.
3. Areas where occasional light vehicle traffic is anticipated to be unavoidable, provide approved matting or a layer of geogrids under 8 inches of wood chips or mulch.
4. Areas where heavy vehicle traffic is unavoidable provide approved matting or a layer of geogrids under 8 -12 inches of wood chips or mulch and a layer of matting over the wood chips or mulch.

B. The Owner's Representative shall approve the appropriate level of protection.

C. In the above requirements, light vehicle is defined as a track skid steer with a ground pressure of 4 psi or lighter. A heavy vehicle is any vehicle with a tire or track pressure of greater than 4 psi. Lightweight materials are any packaged materials that can be physically moved by hand into the location. Bulk materials such as soil, or aggregate shall never be stored within the Tree and Plant Protection Area.

56.3.8 PROTECTION

A. Protect the Tree and Plant Protection Area at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves and roots of all plants; and contamination of the soil, bark or leaves with construction materials, debris, silt, fuels, oils, and any chemicals substance. Notify the Owner's Representative of any spills, compaction or damage and take corrective action immediately using methods approved by the Owner's Representative.

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56.3.9 GENERAL REQUIREMENTS AND LIMITATIONS FOR OPERATIONS WITHIN THE TREE AND PLANT PROTECTION AREA:

A. The Contractor shall not engage in any construction activity within the Tree and Plant Protection Area without the approval of the Owner's Representative including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks. Permitted activity, if any, within the Tree and Plant Protection Area may be indicated on the drawings along with any required remedial activity as listed below.

B. In the event that construction activity is unavoidable within the Tree and Plant Protection Area, notify the Owner's Representative and submit a detailed written plan of action for approval. The plan shall include: a statement detailing the reason for the activity including why other areas are not suited; a description of the proposed activity; the time period for the activity, and a list of remedial actions that will reduce the impact on the Tree and Plant Protection Area from the activity. Remedial actions shall include but shall not be limited to the following:

1. In general, demolition and excavation within the drip line of trees and shrubs shall proceed with extreme care either by the use of hand tools, directional boring and or air excavation where indicated or with other low impact equipment that will not cause damage to the tree, roots or soil.
2. When encountered, exposed roots, 1 inches and larger in diameter shall be worked around in a manner that does not break the outer layer of the root surface (bark). These roots shall be covered in Wood Chips and shall be maintained above permanent wilt point at all times. Roots one inch and larger in diameter shall not be cut without the approval of the Owner's Representative. Excavation shall be tunneled under these roots without cutting them. In the areas where roots are encountered, work shall be performed and scheduled to close excavations as quickly as possible over exposed roots.
3. Tree branches that interfere with the construction may be tied back or pruned to clear only to the point necessary to complete the work. Other branches shall only be removed when specifically indicated by the Owner's Representative. Tying back or trimming of all branches and the cutting of roots shall be in accordance with accepted arboricultural practices (ANSI A300, parts 1 and 8) and be performed by or direct under supervision of an ISA Certified Arborist.
4. Matting: Install temporary matting over the Wood Chips or Mulch to the extent indicated. Do not permit foot traffic, scaffolding or the storage of materials within the Tree and Plant Protection Area to occur off of the temporary matting.
5. Trunk Protection: Protect the trunk of each tree to remain by covering it with a ring of 8-foot-long 2-inch x 6 -inch planks loosely banded onto the tree with 3 steel bands.

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Staple the bands to the planks as necessary to hold them securely in place. Trunk protection may be kept in place no longer than 12 months. If construction requires work near a particular tree to continue longer than 12 months, the steel bands shall be inspected every six months and loosened if they are found to have become tight.

6. Air Excavation Tool: If excavation for footings or utilities is required within the Tree and Plant Protection Area, air excavation tool techniques shall be used where practical or as designed on the drawings.

a. Remove the Wood Chips from an area approximately 18 inches beyond the limits of the hole or trench to be excavated. Cover the Wood Chips for a distance of not less than 15 feet around the limit of the excavation area with Filter Fabric, tarp plastic sheeting to protect the Wood Chips from silt. Mound the Wood Chips so that the plastic slopes towards the excavation.

b. Using a sprinkler or soaker hose, apply water slowly to the area of the excavation for a period of at least 4 hours, approximately 12 hours prior to the work so that the ground water level is at or near field capacity at the beginning of the work. For excavations that go beyond the damp soil, rewet the soil as necessary to keep soil moisture near field capacity.

c. Using an air excavation tool specifically designed and manufactured for the intended purpose, and at pressures recommended by the manufacturer of the equipment, fracture the existing soil to the shape and the depths required. Work at rates and using techniques that do not harm tree roots. Air pressure shall be a maximum of 90-100 psi.

i. The air excavation tool shall be either the "Air-Spade" as manufactured by Division of Guardair Corporation 47 Veterans Drive Chicopee, MA 01022 (800)-482-7324, or Supersonic Air Knife as manufactured by Easy Use Air Tools, Inc. Allison Park, Pa (866) 328-5723 or approved equal.

d. Using a commercial, high-powered vacuum truck if required, remove the soil from the excavation produced by the Air Knife excavation. The vacuum truck should generally operate simultaneously with the hose operator, such that the soil produced is picked up from the excavation hole, and the exposed roots can be observed and not damaged by the ongoing operation. Do not drive the vacuum truck into the Tree and Plant Protection Area unless the area is protected from compaction as approved in advance by the Owner's Representative.

e. Remove all excavated soil and excavated wood chips, and contaminated soil at the end of the excavation.

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- f. Schedule the work so that foundations or utility work is completed immediately after the excavation. Do not let the roots dry out. Mist the roots several times during the day. If the excavated area must remain open overnight, mist the roots and cover the excavation with black plastic.
- g. Dispose of all soil in a manner that meets local laws and regulations.
- h. Restore soil within the trench as soon as the work is completed. Utilize soil of similar texture to the removed soil and lightly compact with hand tools. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.
- i. Restore any geogrids, filter fabric, wood chips or mulch and or matting that was required for the area.

56.3.10 GRADING AND FILLING AROUND TREES

- A. Maintain existing grade within drip line of trees. Any variance to this will be executed only after consultation and recommendation from the Campus Arborist.
- B. Where existing grade is above new finish grade shown around trees, carefully hand excavate within drip line to new grade. Cut exposed roots approximately 3" below elevation of new finish grade. Engage an ISA certified Arborist to recommend procedures to compensate for loss of roots and to provide initial services such as pruning of branches and stimulation of root growth. Provide subsequent maintenance during contract period as recommended by the arborist. Provide Grounds Superintendent with typed instructions for recommended long range maintenance procedures to be followed after completion of construction operations.
- C. For minor fills where the existing grade is 4" or less below elevation of finish grade shown, use a topsoil type fill material rich in organic matter and loamy in texture. Place in single layers not more than two inches at a time and do not compact.
- D. Fills greater than four inches shall only be attempted after consultation with the Campus Arborist. Detailed shop drawings of proposed work shall be submitted and approved by the Campus Arborist prior to any work. A progress schedule shall be established to monitor the work.

56.3.11 TREE REMOVAL:

- A. Tree removals shall be performed by ISA Certified Arborists and companies shall have appropriate licenses and insurance for tree removal operations.
- B. Remove all trees indicated by the drawings and specifications, as requiring removal, in a manner that will not damage adjacent trees or structures or compacts the soil.

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- C. Remove trees that are adjacent to trees or structures to remain, in sections, to limit the opportunity of damage to adjacent crowns, trunks, ground plane elements and structures.
- D. Do not drop trees with a single cut unless the tree will fall in an area not included in the Tree and Plant Protection Area and there are no underground utilities that may be damaged. No tree to be removed within 50 feet of the Tree and Plant Protection Area shall be pushed over or up-rooted using a piece of grading equipment.
- E. Protect adjacent paving, soil, trees, shrubs, ground cover plantings and understory plants to remain from damage during all tree removal operations, and from construction operations. Protection shall include the root system, trunk, limbs, and crown from breakage or scarring, and the soil from compaction.
- F. Remove stumps and immediate root plate from existing trees to be removed. Grind trunk bases and large buttress roots to a depth of the largest buttress root or at least 18 inches below the top most roots whichever is less and over the area of three times the diameter of the trunk (DBH).
1. For trees where the stump will fall under new paved areas, grind roots to a total depth of 18 inches below the existing grade. If the sides of the stump hole still have greater than approximately 20% wood visible, continue grinding operation deeper and or wider until the resulting hole has less than 20% wood. Remove all wood chips produced by the grinding operation and back fill in 8 inch layers with controlled fill of a quality acceptable to the site engineer for fill material under structures, compacted to 95% of the maximum dry density standard proctor. The Owner's Representative shall approve each hole at the end of the grinding operation.
 2. In areas where the tree location is to be a planting bed or lawn, remove all woodchips and backfill stump holes with planting soil as defined in Specification Section Planting Soil, in maximum of 12 inch layers and compact to 80-85% of the maximum dry density standard proctor.
- G. Wood salvaged for up cycling will be identified by the Owner's Representative.
1. Sections of salvaged wood shall have a clean, flat cut across both ends.
 2. Ends of wood sections shall be sealed with AnchorSeal after being cut and before being loaded. Branch cuts on the length of wood sections shall be sealed with AnchorSeal.
 3. Care shall be taken when loading wood and logs not to damage the bark connection to the wood.
 4. Wood and logs shall be stored so there is no contact with the ground. Wood and logs should be elevated from the ground by placing on cross beams of wood, concrete or steel. Wood and logs may also be stored on a gravel, concrete or asphalt pad.

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56.3.12 PRUNING:

- A. Within six months of the estimated date of substantial completion, prune all dead or hazardous branches larger than 2 inch in diameter from all trees to remain.
- B. Implement all pruning recommendations found in the Arborist Report.
- C. Prune any low, hanging branches and vines from existing trees and shrubs that overhang walks, streets and drives, or parking areas as follows:
 - 1. Walks - within 7 feet vertically of the proposed walk elevation.
 - 2. Parking areas - within 10 feet vertically of the proposed parking surface elevation.
 - 3. Streets and drives - within 12 feet vertically of the proposed driving surface elevation.
- D. All pruning shall be done in accordance with ANSI A300 (part 1), ISA BMP Tree Pruning (latest edition, and the "Structural Pruning: A Guide for the Green Industry", Edward Gilman, Brian Kempf, Nelda Matheny and Jim Clark, 2013 Urban Tree Foundation, Visalia CA.
- E. Perform other pruning task as indicated on the drawings or requested by the Owner's Representative.
- F. Where tree specific disease vectors require, sterilize all pruning tools between the work in individual trees.

56.3.13 TREE (Plant) GROWTH REGULATOR APPLICATION (TGR/PGR)

- A. At the start of, or prior to, the construction contract period, treat all trees indicated on the Plan with Tree Growth Regulator at the recommended rates, time of year and methods indicated by the product distributor.

56.3.14 WATERING

- A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants to be preserved during the entire construction period. Adequate water is defined to be maintaining soil moisture above the permanent wilt point to a depth of 8 inches or greater.
- B. The Contractor shall adjust the automatic irrigation system, if available, and apply additional water, using hoses or water tanks as required.
- C. Periodically test the moisture content in the soil within the root zone to determine the water content.

56.3.15 TURF AND WEED MAINTENANCE

- A. Turf areas within the Tree and Plant Protection area shall be maintained in a manner that is consistent with University turf maintenance standards. This includes mowing, weed eating, edging, fertilization, weed control and leaf collection.

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B. During the construction period, control any plants that seed in and around the fenced Tree and Plant Protection area at least three times a year.

1. All plants that are not shown on the planting plan or on the Tree and Plant Protection Plan to remain shall be considered as weeds.

C. At the end of the construction period provide one final mowing and weeding of the Tree and Plant Protection Area.

56.3.16 INSECT AND DISEASE CONTROL

A. Monitor all plants to remain for disease and insect infestations during the entire construction period. Provide all disease and insect control required to keep the plants in a healthy state using the principles of Integrated Plant Management (IPM). All pesticides shall be applied by a certified pesticide applicator.

56.3.17 CLEAN-UP

A. During tree and plant protection work, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once tree protection work is complete, wash all soil from pavements and other structures. Ensure that Mulch is confined to planting beds.

C. Make all repairs to grades, ruts, and damage to the work or other work at the site.

D. Remove and dispose of all excess Mulch, Wood Chips, packaging, and other material brought to the site by the Contractor.

56.3.18 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION

A. At the end of the construction period or when requested by the Owner's Representative remove all fencing, Wood Chips or Mulch, Geogrids and Geotextile Fabric, trunk protection and or any other Tree and Plant Protection material.

END OF SECTION