

015639 Tree and Plant Protection

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INSTRUCTIONS TO THE SPECIFICATION WRITER:

The following document is intended as a general specification to guide the writing of a project-specific specification. Each project is unique and it is required that the specification be developed accordingly. DO NOT USE THE FOLLOWING SPECIFICATION WITHOUT MAKING IMPORTANT ADJUSTMENTS to reflect local conditions, regulations, market standards, project schedules and local and regional practices. The following are specific items that need to be addressed.

1. General instructions for using this specification: *These instructions are intended to guide the specification writer (the specifier) through the process of editing this document into a Tree and Plant Protection specification. Be sure to delete these instructions (i.e. all the text in red displayed above the paragraph) before issuing the specifications.*

2. General Requirements - Division 01 (Construction Specification Institute) specifications and other contract elements: *This specification is designed to be used in conjunction with standard Division 01 specifications, which cover project general conditions and project wide contract elements. THIS IS NOT A STAND-ALONE SPECIFICATION and should not be used as a contract for the protection of plants. Important issue of project ownership, liability, insurance, contract language, project controls, Instructions to bidders, change orders and review and approval of the work are normally in the Division 01 specifications.*

3. The construction team: *A construction project is a team effort where the Owner, in effect, creates an agreement with all the Contractors to build a project. As with any good contract there are protections for both sides; that the Owner will get the quality of project that they desire within the time limits and budget available; and the Contractor will be paid for the work satisfactorily completed. In between the initial bidding and the final completion there will be many places where parts of the construction do not work out as originally intended. This is normal and a good contract should allow for these changes in a manner that is equitable to both the Owner and the Contractor. To get there, a team approach and spirit must prevail. Both sides must assume that each is operating in the best interest of the project goals. The clearer the goals and description of the project, the smoother the flow of a successful project. **The more each of the team members can trust the other members, the better the project.** This should be a critical principle in approaching interpretation of the specification.*

4. Unique aspects of Tree and Plant Protection: *Most specification sections describe how a particular trade or sub contractor should proceed to accomplish certain tasks to construct a specific part of the project. There is an assumption in almost all specifications that if the subcontractor damages the work of another they must provide a remedy to fix the damage. With plants, particularly large trees, there is not effective remedy if significant damage occurs to the plant. Often the damage particularly to the root system of a tree may not be readily apparent and may not express itself as decline in the tree till after the construction project is finished. For this reason Tree and Plant Protection specification is as much about preventing damage as it is instructions to the subcontractor related to what to build. It is also unique specification section in that it applies to all Contractors working on the site effecting where they can park, store equipment and perform excavations by making certain areas off limits except for the activities permitted by the specification. Conflicts between this specification and other requirements must be resolved prior to the start of work. The Tree and Plant Protection requirements begin at the very beginning of construction and are enforce for the entire construction contract period.*

5. Other project documents: *This specification is intended to be used in conjunction with other project documents including the bid forms, the construction contract, Division 1 specifications, other specifications directly related to this section; other specifications that are not directly related to this work and most critically the Project*

construction drawings. It is very critical that all these documents be prepared with consistent terminology and that they be coordinated. The terms used for the parts of trees and other plants, different soil types, drainage features, irrigation features and structures such as paving, walls and planters must be consistent across disciplines.

6. Related specification sections: This specification requires additional specification sections to describe several important related parts of the Tree and Plant Protection process.

Planting: This specification assumes that there is a separate specification section and separate plans and details for installation of plants.

Planting Soil: This specification assumes that there is a separate specification section and separate plans and details for installation of planting soils.

Irrigation: This specification assumes that there is a separate specification section for Irrigation that might be associated with the project planting.

Other sections: such as plumbing, electric, excavation, paving site structures.

7. Reviewing and approval authority: Each specification identifies a certain entity as responsible for the review and approval of the work, project submittals, changes to the work and acceptance of the work. The entity with this authority is normally identified in Division 1. For the purposes of this specification, the term the "Owner's Representative" has been used as a placeholder for this entity. Once the proper term is defined for example another term such as; Contracting Officer, The Architect, The Landscape Architect, The Engineer etc.; this term should replace the words "Owner's Representative" wherever it appears in this specification.

8. Header and footer requirements: Change the header/footer language to meet the project requirements.

9. Notes to specifier: Before issuing the document, be sure to remove all "Notes to specifier" incorporated into this document after you have read them and responded to the recommendations.

10. Submittals: Submittals are a critical part of any construction contract. This is where all products and materials are reviewed and approved in advance of the work. Tree and Plant Protection quality control is in this section. Including very specific requirements for approval of submittals while a good practice assumes that the reviewing authority has the skills needed to make these reviews and interpret the results. A common practice is to make very specific requirements but not have the time or expertise to enforce them. Lack of review of submittals does not automatically transfer quality control to the Contractor. In fact, lack of review or inappropriate review can make the reviewing authority responsible for having accepted the submittal even if it was not acceptable. Take great care in putting into the specification submittal requirements that you do not have the time or knowledge to enforce.

11. Specification modifications: There are locations in this specification where additional information is required to reflect project region or contract conditions. Please insert the requested information.

015639
TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.1 SUMMARY

Note to specifier: Remove parts of this work description that do not apply.

- 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
 - 2. Provide tree and plant protection fencing.
 - 3. Provide protection of root zones and above ground tree and plants
 - 4. Provide pruning of existing trees and plants.
 - 5. Coordinate with the requirements of Section Planting Soil for modifications to the soil within the root zone of existing trees and plants.
 - 6. Provide all insect and disease control.
 - 7. Provide maintenance of existing trees and plants including irrigation during the construction period as recommended by the arborist report.
 - 8. Provide maintenance of existing trees and plants including irrigation during the post construction plant maintenance period.
 - 9. Remove tree protection fencing and other protection from around and under trees and plants.
 - 10. Clean up and disposal of all excess and surplus material.

1.2 CONTRACT DOCUMENTS

- A. Shall consist of specifications and 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.

1.3 RELATED DOCUMENTS AND REFERENCES

- A. Related Documents:

Note to specifier: Coordinate this list with the other related specification sections. Add or delete sections as appropriate.

- 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 the

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, most current editions.
2. Pruning practices shall conform with recommendations “Structural Pruning: A Guide For The Green Industry”; Published by Urban Tree Foundation, Visalia, California; most current edition.
3. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign Il, most current edition.

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.

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.

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.

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.

1.8 CORRECTION OF WORK

- A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner’s Representative, at the soonest possible time that can be coordinated with other work and seasonal weather demands.

1.9 DEFINITIONS

Note to specifier: Delete any words below that are not used in the final specification.

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 review

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 profession 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, including palms with anticipated mature height approximately greater than 25 feet or any plant identified on the plans as a tree.

1.10 SUBMITTALS

Note to specifier: *The arborist report, described below is to provide a current assessment of all trees to remain and serve as the basis for determining if trees are damaged. The Contractor is made responsible for the preparation of this report with the Owner's Representative responsible for approval of the report so that both sides of the contract are satisfied that the condition of these trees is accurately reported before any work has started. Add or delete any portions that do not apply.*

- 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 remain indicating its genus and species, condition including any visible damage to the root system or soil within the root zone, tree diameter at breast height (dbh) and approximate height, size and any visible disease, insect infestations and or branch and trunk structural deficiencies.
 - 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 hazard 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.

Note to specifier: *Confirm submittal time is appropriate for project schedule.*

- 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.

1.11 OBSERVATION OF THE WORK

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

1.12 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.

1.13 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 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.

PART 2 – PRODUCTS

2.1 MULCH

Note to specifier: *Revise this paragraph to reflect regionally available mulch materials or project specific mulch quality or type requirements where appropriate. 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 that 25% of the total volume shall be fine particles and no more than 20% of total volume be large pieces.
 - 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 suppliers product data that product meets the requirements and two gallon sample for approval.

2.2 WOOD CHIPS:

Note to specifier: *Woodchips if available may be a suitable and more sustainable alternative to other types of Mulch. Consider permitting Mulch or Wood Chips; however be sure to coordinate requirements with the drawings. Remove this paragraph if Wood Chips are not to be permitted.*

- 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.

2.3 TREE PROTECTION FENCING:

Note to specifier: *Two fencing options are provided. The more robust chain link fencing is often*

required at urban sites where there are significant conflicts between tree preservation and other work tasks. Amend this specification and the tree protection details to be clear as to the required fencing. Remove the paragraph of the fence type that is not to be used. If both types are to be permitted coordinate with the drawings so that use is correctly identified.

- A. PLASTIC MESH FENCE: Heavy - duty orange plastic mesh fencing fabric 48 inches wide. Fencing shall be attached to metal “U” or “T” post driven into the ground of sufficient depth to hold the fabric solidly in place with out sagging. The fabric shall be attached to the post using attachment ties of sufficient number and strength to hold up the fabric without sagging. The Owner’s Representative may request, at any time, additional post, deeper post depths and or additional fabric attachments if the fabric begins to sag, lean or otherwise not present a sufficient barrier to access.
 - B. CHAIN LINK FENCE: 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.
 - 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 suppliers product data that product meets the requirements for approval.
- 2.4 TREE PROTECTION SIGN:
- A. Heavy-duty cardboard signs, 8.5 inches x 11 inches, white colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the tree protection fence every 50 feet o.c. The tree protection sign shall read “Tree and Plant Protection Area- Keep Out”.
- 2.5 TREE GROWTH REGULATOR (TGR)
- A. Cambistat 25C.
 - B. Submit suppliers product data that product meets the requirements for approval.
- 2.6 MATTING
- A. Matting for vehicle and work protection shall be heavy duty matting designed for vehicle loading over tree roots, Alturnamats as manufactured by Alturnamats, Inc. Franklin, PA 16323 or approved equal.
 - B. Submit suppliers product data that product meets the requirements for approval.
- 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.
 - 1. Geogrid shall be Miragrid 2XT as manufactured by Ten Cate Nicolon, Norcross, GA. <http://www.tencate.com> or approved equal.
 - B. Submit suppliers product data that product meets the requirements for approval.
- 2.8 FILTER FABRIC
- A. Filter Fabric shall be nonwoven polypropylene fibers, inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.
 - 1. Mirafi 135 N as manufactured by Ten Cate Nicolon, Norcross, GA. <http://www.tencate.com> or approved equal.
 - B. Submit suppliers product data that product meets the requirements for approval.

PART 3 – EXECUTION

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.

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.

3.3 TREE AND PLANT PROTECTION AREA: 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 crown) of each tree.

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 orange 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 orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.
- C. Flag all trees and shrubs to remain with white 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 be 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, Filter Fabric, silt fence, tree protection signs, Geogrid, Mulch and or Wood Chips as shown on the drawings.

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.

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 (part 8) latest edition.

1. Using a rock saw, chain trencher or similar trenching device, make a vertical cut within 2 feet of the limit of grading.
2. After completion of the cut, make clean cuts with a lopper, saw or pruner to remove all torn root ends on the tree side of the excavation, and backfill the trench immediately with existing soil, filling all voids.

3.7 INSTALLATION OF GEOGRIDS, FILTER FABRIC, MATTING, WOOD CHIPS AND OR MULCH

- A. Install Geogrids, Filter 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 a layer of Geogrids under 8 inches of Wood Chips or Mulch.
 4. Areas where heavy vehicle traffic is unavoidable provide 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.

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.

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 maybe 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 Knife 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 owners 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, part 8) and be performed under supervision of the 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. Staple the bands to the planks as necessary to hold them securely in place. Trunk protection must 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 or 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.
 - 1.) The air excavation tool shall be "Air-Spade" as manufactured by Concept Engineering Group, Inc., Verona, PA (412) 826-8800, or 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.
 - 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 over night, 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 previously

required for the area.

3.10 TREE REMOVAL:

- A. 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.
- B. 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.
- C. 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. 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.
- D. 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.
- E. 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 which ever 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.

3.11 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 8 feet vertically of the proposed walk elevation.
 - 2. Parking areas - within 12 feet vertically of the proposed parking surface elevation.
 - 3. Streets and drives - within 14 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.

3.12 TREE GROWTH REGULATOR INJECTION (TGR)

Note to specifier: Confirm that Tree Growth Regulator is appropriate for the project. If not remove this paragraph and the TGR product in Part 2. If appropriate, be sure that the specific trees to be treated are labeled on the Tree and Plant Protection Plan. There is little data on the effectiveness of

TGR treatments. Use your own judgment on including it in the requirements.

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

3.13 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.

3.14 WEED REMOVAL

- A. 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.
- B. At the end of the construction period provide one final weeding of the Tree and Plant Protection Area.

3.15 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.

3.16 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.

3.17 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 Filter Fabric, trunk protection and or any other Tree and Plant Protection material.

3.18 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

Note to specifier: This clause is not written to cover high value heritage trees. A specification to address high value heritage trees should be added here if any exist on the project.

- A. 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. Trees shall be replaced with a tree of similar species and of equal size or 6 inch caliper which ever is less. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available which ever 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.
- B. 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.
- C. 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.
- D. 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).
- E. 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.

END OF SECTION 015639