



# University of Connecticut Campus Tree Care Plan

## Storrs, CT 2014

- 1. Purpose:** The purpose of the University of Connecticut campus tree care plan is to identify the policies, procedures, and practices that are used in establishing, protecting, maintaining, and removing trees at the Storrs Campus for the University of Connecticut. The overall goal of the plan is to ensure a safe, attractive, and sustainable campus forest that is consistent with the historic image and character of the University and is visually compatible with the agrarian and woodland character of the central Connecticut landscape. The specific objectives of the plan are:

  - Ensure proper species selection, high quality nursery stock acquisition, and industry consensus planting procedures
  - Promote species diversity and proper age structure in the tree population
  - Protect high value campus trees during construction and renovation projects
  - Promote tree health and safety by utilizing ISA's best management practices when maintaining campus trees
  - Ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, or construction displacement
  - Encourage campus community members to respect and value the campus urban forest
- 2. Responsible Party:** The University of Connecticut Tree Warden and the Office of Planning, Architectural, and Engineering Services Department and Facilities Operations will be responsible for the provisions of the Campus Tree Care Plan.
- 3. Tree Advisory Committee:** The University's Arboretum Committee serves as the Campus Tree Advisory Committee. The arboretum committee is comprised of faculty, staff, and students from a wide variety of disciplines as well as representatives from the town of Mansfield.



4. **Tree Care:** University policies and procedures for tree maintenance, planting, work within the drip lines of trees, and removal are included in Appendixes 1, 2, and 3. Lists of recommended plant species are included in two lists (Appendix 4,5).
5. **Protection and Preservation:** Tree Protection and Preservation Policies including a step-by-step implementation process is included within Appendix 1.
6. **Goals and Targets:** In addition to the establishment , protection, and maintenance of trees at the University of Connecticut the Campus Tree Care Plan specifically aims to:
  - Ensure the protection of mature canopy trees while the newer canopy develops.
  - Maintain and update the campus-wide tree inventory to reflect new development, conservation, and planting efforts
  - Further integrate tree protection and educational opportunities with on campus student life. Currently, the University has educational opportunities in the form of a Campus Tree Touring Guide ([http://www.uconnarboretum.uconn.edu/content/TREE\\_GUIDE\\_CAMPUS\\_WALK.pdf](http://www.uconnarboretum.uconn.edu/content/TREE_GUIDE_CAMPUS_WALK.pdf)), virtual plant walks (<http://www.hort.uconn.edu/plants/campus/uconn/uconn.html>), as well as a plant database (<http://www.hort.uconn.edu/plants/>).
  - The Landscape Framework Plan of the 2015 Master Plan now recommends “reconnecting the campus to its broader ecological context through a series of woodland corridors.” These woodland corridors tie the UConn “natural” landscapes, such as the farmland and managed forests, with the core of the campus. To align this new direction with the Campus Tree Care Plan, UConn will focus on woodland, storm water, and native plantings in the areas of the proposed woodland corridors.
7. **Tree Damage Assessment:** Assessment on low profile trees is performed via the Arboretum Committee. Higher profile trees are assessed by an outside consultant. Enforcement of protection measures is performed by arborist consultants, construction project managers and the University Tree Warden.



**8. Prohibited Practices:** In 2010 the University created the position of Tree Warden who enforces all new tree plantings and removals as well as ensure the proper care of campus tree resources. As part of the overall goal to ensure a safe, attractive, and sustainable campus forest the University has identified the following prohibited practices:

- The University of Connecticut prohibits the parking of vehicles within the drip line of trees.
- Motor Bikes, Mopeds, and Motor Scooters are prohibited from being locked to trees (UConn Parking Regulations 6.3.1)
- Bikes shall not be locked, chained, or otherwise attached to trees (UConn Parking Regulations 7.3)
- Construction processes within the drip line of trees is standardized in Division One specifications.

**9. Definitions:**

- Caliper - The diameter or thickness of the main stem of a young tree or sapling as measured at six (6") inches above ground level. This measurement is used for nursery-grown trees having a diameter of four inches or less.
- Clearing - The removal of trees or other vegetation of two inches DBH or greater.
- Critical Root Zone - The minimum area surrounding a tree that is considered essential to support the viability of the tree and is equal to a radius of one foot per inch of trunk diameter (DBH).
- Development - The act, process or state of erecting buildings or structures, or making improvements to a parcel or tract of land.
- Diameter, breast height (DBH) - The diameter or width of the main stem of a tree as measured 4.5 feet above the natural grade at its base. Whenever a branch, limb, defect or abnormal swelling of the trunk occurs at this height, the DBH shall be measured at the nearest point above or below 4.5 feet at which a normal diameter occurs.



- Drip Line- The area defined by the outermost circumference of a tree canopy where water drips from and onto the ground
- Green space - Any area retained as permeable unpaved ground and dedicated on the site plan to supporting vegetation.
- Impervious surface - A solid base underlying a container that is nonporous, unable to absorb hazardous material, free of cracks or gaps and is sufficient to contain leaks, spills and accumulated precipitation until collected material is detected and removed.
- University of Connecticut at Storrs Landscape Master Plan and Design Guidelines (2010)- A planning and design tool whose purpose is to guide and bring consistency to the decisions made with respect to the campus landscape.
- Mature canopy trees - A tree that will grow to a mature height of at least 40 feet with a spread of at least 30 feet.
- Native tree - Any tree species which occurs naturally and is indigenous within the region.
- Root Pruning- Action indicated on Drawings to provide a more suitable cut for protected tree roots to minimize ripped or torn roots during excavations and grading with standard construction equipment. Various methods may be used.
- Site/Landscape plan - A map and supporting documentation which describes for a particular site where vegetation, is to be retained or provided in compliance with the requirements of this policy. The landscape plan shall include any required buffer elements.
- Species Diversity- The effective number (species richness and species evenness) of different species that are represented in a collection of individuals (tree inventory)
- Species Evenness- Refers to how equal the abundances of species within a collection are.



- Species Richness- A count of the number of species represented in a collection of individuals.
- Tree establishment plan - A map and supporting documentation which describes, for a particular site where existing trees are to be planted in compliance with the requirements of these regulations, the types of trees and their corresponding trees for reforestations.
- Tree protection plan - A map and supporting documentation which describes for a particular site where existing trees are to be retained in compliance with the requirements of the regulations, the types of trees and their corresponding tree for reforestations. All trees must be identified by Latin name and tree inventory tag #.
- Tree protection area- The area surrounding a preserved or planted tree that is essential to the tree's health and survival, and is protected within the guidelines of these regulations.
- Underrepresented species- Species which have low relative abundance within the UConn campus and landscape.

**10. Communication Strategy:** After the adoption of the Campus Tree Care Plan, the document will be posted on the websites for the Office of Environmental Policy, Arboretum Committee, and Facilities Operations' Landscape Department. There will also be articles in the Daily Campus (student newspaper) and UConn Today (online magazine).



## Appendix 1: Tree Care, Protection, and Preservation

### SECTION 015639

#### TREE PROTECTION AND PRESERVATION

##### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I Specifications Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the protection and stress reduction of existing trees and vegetation that interfere with, or are affected by, execution of the Work, whether temporary or permanent. Work is to be coordinated with Site & Landscape Improvements and Tree Preservation and Transplant Plans.
- B. The following specifications apply to work of the Contract Arborist related to Protection and Stress Reduction Measures and coordination and oversight of the Tree Protection and Preservation Program by the Project Arborist. This work includes but is not limited to the following:
  - 1. Coordination of Temporary Tree and Plant Protection
  - 2. Selective tree removals for "Removal By Arborist" (RBA) (Contract Arborist) within Tree Protection Areas (TPAs).
  - 3. Crown Pruning and Supportive cabling.
  - 4. Root Pruning
  - 5. Temporary Site and Tree protection fencing and temporary sign installation
  - 6. Root Protection Matting for temporary construction access in TPAs
  - 7. Root Aeration Matting for permanent grade fills
  - 8. Composted Mulching
  - 9. Liquid subsurface fertilization
  - 10. Tree Growth Regulator (Paclobutrazol)
  - 11. Soil Nutrient Testing
  - 12. Super Silt Fence / Silt Fence "Trenchless Attachment" to Root Protection Matting (RPM) and Root Aeration Matting (RAM)
  - 13. Temporary Limb Guying or Clearance Pruning for construction access
  - 14. Seasonal Supplemental Watering
  - 15. Monitoring and Treatment of Tree Health
  - 16. Soil Decompaction with SuperSonic Air Tool (SSAT) within CRZs of Designated Trees



17. Supersonic Air Tool (SSAT) and Hand Excavation within the Critical Root Zones (CRZs)

### 1.3 DEFINITIONS

- A. Certified Arborist: Credential of an individual arborist issued and administered by the International Society of Arboriculture. This credential must be current and valid to qualify to use the copyrighted designation of "Certified Arborist". Refer to [www.isa-arbor.com](http://www.isa-arbor.com) for additional information.
- B. Project Arborist: Arboricultural firm contracted to provide planning and design services, technical assistance and advice to the owner and design team. Duties include but are not limited to the following: site investigation and documentation (design phase inventories, assessments, root investigations, etc.); develop tree preservation plans, methods, details and specifications; and provide final document review and monitoring of the Contract Arborist. Project Arborist is contracted directly to the owner or owner representative and acts specifically on behalf of the owner concerning tree related issues. Project Arborist shall have authority over the Contract Arborist and any disputes shall be decided by the Project Arborist and Engineer.
- C. Contract Arborist: Arboricultural firm contracted to implement the approved tree preservation plans on site. All crews conducting arboricultural operations on site shall consist of at least one Certified Arborist who directly oversees all work by that crew. Arboricultural operations include, but are not limited to, pruning, tree protection device installation and maintenance (fence, matting, etc.), root pruning, air tool root excavation/exploration (SSAT), soil care activities, soil testing, mulch application, tree inspections, pesticide/chemical applications and tree removal. Special qualifications submittal is required for review and approval below. Contract Arborist will be sub-contracted by the general contractor.
- D. Tree Protection Area (TPA): Area indicated on Drawings surrounding individual trees or groups of trees to be protected during construction.
- E. Critical Root Zone (CRZ): Area shown on Drawings for all trees within scope of this project with a circle. Estimated area is based upon an industry standard "rule of thumb" of 1.5 feet of radius per inch of diameter at breast height (DBH). CRZ is described as the minimum area of tree roots required to be protected to maintain tree health. Any impacts within the CRZ must be mitigated based on severity up to and including tree removal if the impact is severe.
- F. Tree Protection Action Key (TPAK): Matrix provided on Plan sheets for each tree indicating designated protection and stress reduction measures specified in this document.
- G. Supersonic Air Tool (SSAT): Hand held tool designed to focus highly compressed air (90-125 psi) provided from a large air compressor (185-375 cfm) at speeds close to 1400 mph at the tip of the tool. Widely used by arboricultural firms and consultants for multiple purposes including but not limited to: root collar investigation, CRZ investigation, root pruning (especially large roots > 1.5" diameter or were existing underground cables or conduits are located), radial mulching and restoration of compacted soils, excavation for utilities within protected CRZs to minimize root damage from constriction.
- H. Tree Removal by Arborist: Action whereby the Contract Arborist removes trees designated for "Removal by Arborist" selected from inside the TPAs. Trees shall be taken down by hand sectionally, or directionally felled to minimize damage to adjacent tree



canopies, root systems, or adjacent structures. Work shall be completed by a qualified Contract Arborist.

- I. Crown Pruning: Action by the Contract Arborist of pruning specific tree limbs to improve tree health, reduce hazard, and / or provide construction clearance.
- J. Supportive Cabling: Installation of supportive cabling for designated tree branches due to weak branch attachments.
- K. Root Pruning: Action indicated on Drawings to provide a more suitable cut for protected tree roots to minimize ripped or torn roots during excavations and grading with standard construction equipment. Various methods may be used.
- L. Mulching of Trees: Application of a wood mulch product to areas surrounding designated trees. Mulch increases moisture-holding capacity, helps mitigate soil compaction, and increases needed soil organic composition.
- M. Soil Amendments: Various product components applied to existing soil environment of protected trees, as indicated on Plan notes.
- N. Tree Growth Regulator (*Paclobutrazol*): Products applied to designated trees used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the tree. For highly impacted trees, more energy may be made available for fibrous root growth (to combat root loss), thicker darker leaves (allowing for increased photosynthesis, and increased drought tolerance), and pest tolerance (often an issue with construction stressed trees); among other potential benefits.
- O. Limits of Disturbance (LOD) (also called Limits of Construction): Specific outer limits of all construction activities for the entire project.
- P. DBH (Diameter at Breast Height): Tree trunk diameter measured at 4.5 feet above grade.
- Q. Soil Decompaction with SuperSonic Airtool (SSAT) within CRZs of Designated Trees: This work is typically prescribed for urban park or campus trees where existing compacted soils and associated trees will benefit. It involves pneumatic de-compaction in the upper soils using Supersonic Air tools (SSAT) by trained and qualified arborists. Amendments as specified are mixed into the soils.
- R.

#### 1.4 SUBMITTALS

The Contract Arborist shall provide submittals as follows:

- A. Product Data: For each type of product indicated.
- B. Certification: For each phase, the Contract Arborist shall certify for each tree designated to remain has been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged. Damages to tree crowns, trunk, and root system shall be noted. Damages to include incursion of vehicles, staging, or stockpile within designated Tree Protection Areas without authorization.
- C. Qualification Data: For Contract Arborist Firm Qualifications, submit firm and individual qualifications as follows.



1. Submit a minimum of two resumes and detailed qualifications from staff or team individuals assigned to this project as detailed under Quality Assurance below. Due to the complexity of this project, standard arboricultural experience may not qualify.
  2. Provide references for above from a minimum of three commercial, nongovernmental or governmental projects for whom similar tree preservation programs have been successfully implemented. Include the following information:
    - a. Project name, size and scope
    - b. Number and species of trees involved
    - c. Relevant photos or aerials
    - d. Tree preservation budget
    - e. Scope of services provided
    - f. Name and contact for project owner, designer, or contractor
- D. Pedestrian/Property Protection Plan: Contract Arborist to submit a written plan describing all protective measures proposed to be used to minimize potential impact to pedestrians, parked cars, workers and other public and private property. Protection measures shall be required for all on-site tree care activities including but not limited to Supersonic Air Tool excavation, root pruning, canopy pruning, etc.
- E. Maintenance Prescription: Contract Arborist shall submit for care and protection of trees as a result of construction, changes in weather patterns or events, and response in health from individual trees during and after completing the Work.
- F. Soil Samples: Submit soil sample for analysis during site work phase of this project. Take the samples during April through October. Take representative soil samples from all areas of protected trees (landscape areas and street tree planting pits). Samples and procedures per local cooperative extension shall be followed. Forward reports to Engineer and Project Arborist.
- G. Soil Amendments: Contract Arborist shall submit specific fertilizer formulations, application rates and methods for review by Project Arborist. All fertilization and soil amendments shall be in conformance with soil test results.
- H. Site Documentation: Submit weekly reports to owner and Project Arborist containing complete documentation of all tree impacts and tree preservation activities including but not limited to: root pruning, tree protection fencing, excavation within critical root zones, tree fertilization or other treatments, etc. Documentation shall include tree numbers of trees impacted and/or treated. Complete daily photographic record is also required.
- I. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
1. Use sufficiently detailed photographs or videotape.
  2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

## 1.5 QUALITY ASSURANCE



- A. On-site Arborist (individual) Qualifications: An arborist certified by the International Society of Arboriculture (ISA) and licensed in the jurisdiction where project is located. All work performed by Contract Arborist including any oversight and documentation work, shall be performed or directly supervised by at least one on-site arborist with these minimum qualifications.
- B. Contract Arborist Firm Qualifications:
1. Contract Arborist Firm shall comply with the following:
    - a. Established business with documented experience of at least five years.
    - b. Experience working on a minimum of three commercial, nongovernmental or governmental projects where similar tree preservation programs have been successfully implemented.
    - c. Properly licensed and insured to perform arboricultural work in the jurisdiction where the project is located.
  2. Provide names of each individual to comply with the following:
    - a. Minimum BS degree in forestry, arboriculture, or related field
    - b. Certification by ISA (Certified Arborist or Board Certified Master Arborist)
    - c. Resumes should reflect combined 10 years full time experience on similar tree preservation projects.
    - d. Provide individual(s) names, certifications, and each anticipated role in this project. "Role(s)" shall be defined as one or more of the following:
      - i. Project Manager
      - ii. Technical oversight
      - iii. Field Arborist / Technician
  3. For each staff member, list a minimum of three construction projects and a minimum three years experience in the following technical applications:
    - a. Soil amendment prescriptions and applications
    - b. Supersonic Air Tool Excavations for underground utilities exceeding 24" depth
    - c. Root Protection Matting or similar applications
    - d. Root Aeration Matting or similar applications
    - e. Construction oversight and monitoring on large projects
    - f. Coordination of arboricultural activities with construction project managers on large projects
- C. Publications listed herein are part of this work to extent referenced:
1. ANSI A300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance
  2. Part 1-2001, Tree Pruning;
  3. Part 2-3004, Fertilization;



4. Part 3-2000, Cabling, Bracing, Guying of Established Trees;
  5. Part 4-2002, Lightning Protection Systems.
  6. ANSI Z133.1 - 1994 and most recent updates, Tree Care Operations - Safety Requirements
- D. Fertilizer and pesticides will be applied in strict accordance with the manufacturers label instructions and applicable federal, state, and local requirements. Fertilizer, soil conditioners, and pesticide applications must be approved by the owner prior to application. Material Safety Data Sheets (MSDS) will be available for fertilizers and pesticides in the Contract Arborists' possession while on the site.
- E. Pre-Construction Meeting: Conduct meeting at the project site prior to commencement of any project related site activities.
1. Contract Arborist, Project Arborist, Project Design Team, Owner and Contractors shall attend.
  2. Review methods and procedures related to tree protection and preservation including, but not limited to, the following:
    - a. Construction schedule - verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
    - b. Enforcement of requirements for tree protection areas
    - c. Responsibilities of all parties, including coordination, access and timing requirements
    - d. Field quality control

## 1.6 PROJECT CONDITIONS

- A. The following practices are prohibited within all tree protection areas except as specifically indicated herein:
1. Storage or stockpiling of construction materials, fuels, chemicals, debris, or excavated materials
  2. Parking vehicles, trailers, generators or equipment
  3. Foot traffic
  4. Erection of sheds or structures
  5. Impoundment or discharge of water
  6. Excavation or other digging unless otherwise indicated
  7. Attachment of signs or other materials to, or wrapping materials around trees or plants unless otherwise indicated
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

## PART 2 - PRODUCTS

### 2.1 MATERIALS



- A. Temporary Root Protection Matting (RPM): geocomposite material comprised of a tri-planar geonet structure with thermally bonded nonwoven geotextiles on both sides.
1. Material shall be SynTec ROADRAIN T-7 or approved equivalent.
  2. AlturnaMATS® or 1" thick steel plates may be used in lieu of RPM.
  3. Submit shop drawings / cut sheets and material samples for review by Project Arborist and project civil.
  4. Wood chip mulch and/or gravel is required with these materials.
- B. Temporary Trunk/Limb Protection Wrap: to provide specific protection to tree trunks when construction activities are expected to be in close proximity.
1. Material shall be SynTec ROADRAIN T-7 or approved equivalent.
  2. Alternative methods and materials may be submitted for review.
- C. Permanent Root Aeration Matting (RAM): geocomposite material comprised of a tri-planar geonet structure with thermally bonded nonwoven geotextiles on both sides.
1. Material shall be SynTec ROADRAIN T-7 or approved equivalent.
  2. Submit shop drawings / cut sheets and material samples for review by Project Arborist and project civil.
- D. Temporary Tree Protection Fence
1. Chain-Link Fence: Galvanized steel chain-link fence fabric of 10- 11 gauge wire fabric; 6 feet high; with 1.9-inch- diameter line posts; 2-3/8-inch- diameter terminal and corner posts; with tie wires, hog ring ties, gates, and other accessories for a temporary fence system.
  2. Welded Wire Fence: 48" ht, 14 gauge, 4"x2" galvanized fabric with 6' steel T-posts, metal wire clips, tree protection signs.
- E. Silt Soxx - Woven Silt Tube-three-dimensional tubular sediment control and storm water runoff filtration device typically used for perimeter control of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.
1. Refer to manufacturer's instructions for materials and installation: [www.filtrexx.com](http://www.filtrexx.com) or equivalent.
- F. Wood Chip Mulch
1. Double ground hardwood, aged a minimum 6 months from production, free from deleterious materials. Green chips, chips from alien invasive species, or mulch aged less than 6 months shall not be used. Walnut mulch shall not be used. Submittal shall include original material source(s), number and type of grindings / chippings, duration of aging, timing of turning /aeration.
- G. Hardwood Destructive Borer /Beetle Control: Bifenthrin, such as *Onyx* or equivalent. Applied per label.
- H. Tree Growth Regulator (*Paclobutrazol*)
1. Paclobutrazol is a compound used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the tree. For highly impacted trees, this means more energy may be made available for fibrous root growth (to combat root loss), thicker darker leaves (allowing for increased photosynthesis, and increased drought tolerance), and



pest suppression (often an issue with construction stressed trees); among countless other potential benefits. Trade name Cambistat® or equal.

I. Soil Care/Soil Amendments

1. Fertilizer and soil amendment selection shall be based upon soil test results and recommendations.

J. Mycorrhizal fungi:

1. Soil conditioner, beneficial mycorrhizal fungi and bacteria with the following minimum live spore or live bacteria count:
  - a. VA Endomycorrhizal Fungi: 300 spores Vesicular Arbuscula fungi/ 60z
  - b. Pt Ectomycorrhizal Fungi: 40 million spores Pisolithus tinctorius fungi/ 6 0z
  - c. Nitrogen fixing bacteria: Approximately 100 million per pound
  - d. Phosphorous Solubilizing bacteria: Approximately 100 million per pound
  - e. Growth Promoting Bacteria: Approximately 100 million per pound
2. Soil conditioners shall include humic acid (30% by weight), complex carbohydrates, dried yeast, amino acids, yucca plant extract, sea kelp and Terra-Sorb.
3. Mycorrhiza shall be Mycor Tree, Root Saver, as manufactured by Plant Health Care, Inc. Pittsburgh, PA; 800 421 9051 or approved equal.

K. Expanded Shale:

1. Rotary kiln expanded shale or slate, ASTM C-330-89. No by-product slags or cinders permitted.
2. Non-corrosive with less than 100 PPM chloride.
3. Sieve Size: 3/8" - #8

<u>Sieve Designation</u>	<u>Percent Passing</u>
3/8 inch	100%
#4	77%
#8	47%
#16	30%

4. Dry loose unit weight shall be less than 55 Lb./cf. (880 kg/m<sup>3</sup>)
5. Expanded shale shall be "Solite" as manufactured by Solite Corporation, Richmond, Va., or approved equal.

L. Organic Matter:

1. Leaf matter and yard waste composted sufficiently to break down all woody fibers, seeds and leaf structures, free of toxic and non-organic matter. Organic Matter shall be commercially prepared compost "Uaja Compost" by Bluemont Quarry or "Leaf Gro Compost" or approved equal. Submit a one-pound sample and supplier's literature for approval.

M. Soil Decompaction Backfill Mix:



1. A mixture of two parts Expanded Shale, one part Organic matter. To the mix, add Mycorrhiza and fertilizer at rates as recommended by the Mycorrhiza manufacturer. Mycorrhiza and fertilizer shall be added to the mix just prior to pouring the mixture into the vertical mulch hole.

## PART 3 - EXECUTION

### 3.1 TREE REMOVAL

- A. All trees and shrubs or hedges designated for removal shall be marked in red for review and approval by Engineer.
- B. All trees designated for removal, shall be taken down sectionally, or directionally felled to minimize damage to adjacent tree canopies or root systems by a qualified Contract Arborist. Gouges in turf from impacts shall be filled with topsoil and seeded at the direction of the Owner. Damage to adjacent trees shall be reviewed by Project Arborist and Owner for remedial recommendations or replacement.
- C. All work shall be done by hand, bucket truck or crane operated equipment.
- D. Motorized equipment shall operate on existing pavement and not enter tree preservation areas without prior approval. Temporary root protection matting may be required for such access to prevent rutting and compaction.
- E. Stumps shall be ground to 8" below grade and grindings raked and removed from site; backfill holes with approved topsoil and mulch or seed per Owner. Coordinate with underground utilities locators prior to grinding. All stump grinding shall be performed by the Contract Arborist.
  1. For tree pits where a new tree is proposed, the stump may be ground out completely (as determined by the Contract Arborist) to allow the proposed tree to be planted. Backfill as above.
  2. Only trees with stumps within deep excavations may have stumps removed by excavator. Stump excavation to be performed by Site Contractor and under the direct supervision of the Contract Arborist.
- F. Removal of shrubs and hedges designated for removal for each phase shall be cut and stumps ground out or hand dug to remove stumps. Prior to removal, verify with Engineer.
- G. Remove all wood debris from site promptly. All wood debris shall be removed by each day unless directed otherwise by Owner.

### 3.2 TREE PROTECTION AND STRESS REDUCTION MEASURES

- A. General
  1. Refer to the TPAK for specific measures determined for each tree.
  2. Installation/implementation of the following measures shall be performed in the field by an ISA Certified Arborist as provided by the Contract Arborist.
  3. All work, substitutions and/or modifications shall be subject to review and approval by the Owner and Project Arborist.
  4. All work shall conform to applicable federal, state and local regulations and industry standards.
  5. The Contract Arborist shall be responsible for all items in this section.



- B. Coordination of Temporary Tree and Plant Protection and Transplants. The work of the Contract Arborist coordination to include but not limited to the following:
1. Existing underground utility marker conflicts brought to the attention of the Contractor for resolution as well uncovered underground utilities as a result of work.
  2. Coordinate necessary survey layout of proposed construction elements in order to provide accurate locations for tree protection measures.
  3. Layout location of designated tree protection based upon proposed construction and methods of construction for that area.
  4. Site walk with Project Arborist and Site Superintendent to verify location of all tree protection measures prior to execution.
  5. Notify Site Superintendent and Project Arborist if construction adjacent to tree protection does not appear to follow specifications or prior agreement or conflicts with tree protection seem eminent.
  6. Coordinate with Site Superintendent, Construction Managers, Owner, and Security for access of deliveries, crews, equipment, start up, and clean up of each item of work.
  7. Provide "as built" of any change to location of tree protection.
  8. Attend progress meetings as requested.
  9. Provide submittals as required.
  10. Notify Superintendent and Project Arborist of any breach or damage to tree protection requiring attention
- C. Pruning and Supportive Cabling
1. Specific canopy pruning for tree health, risk reduction, and construction clearance per Plan documents.
  2. Size, health, species, and impact from proposed construction will be taken into consideration in determining pruning type for each designated tree. Risk Reduction Pruning will remove dead, dying, and declining limbs 2" diameter and larger. No interior green branching including sprouts will be removed unless approved by Project Arborist.
  3. Contractor, Contract Arborist, and Engineer shall meet at site to determine overhead clearance conflicts between trees and construction equipment/activities to prevent breakage, impacts, or aesthetic concerns. Project Arborist may be consulted if questions arise.
  4. All work shall conform to ANSI A-300 arboricultural standards. An aerial assessment shall be made for all trees climbed to report any structural weakness of concern to the Project Arborist and Owner.
  5. Prior to climbing any tree a risk assessment will be performed using visual, sounding, or basic drilling as needed by the Contract Arborist. Trees deemed high risk should not be climbed; alternative methods should be used and the tree reported to the Project Arborist and Owner immediately.
  6. Supportive Cabling of weak unions may be recommended by the Contract Arborist if the need is discovered during pruning operations. ANSI Standards



apply. Cabling may be included only if submitted to the Engineer and Add Alts approved by the Owner.

D. Root Prune

1. Purpose of the root pruning is to provide a more suitable cut so as to not rip or tear roots during excavations and grading with standard construction equipment. The exact location and depth along the LOD or edge of utility excavation will be determined during the layout by an ISA Certified Arborist.
2. Root Pruning for urban sites with specimen trees or for transplanting requires the use of SSAT excavation for hand pruning. Refer to SSAT specifications in this section.
3. Sufficient moisture is necessary for reducing the level of dust, increase work efficiency, and provide a hospitable environment for the tree roots and pedestrians.
4. At a pre-work site inspection by the Contract Arborist more than 72 hours in advance of work start, subsurface probing to 24-36" with a tile probe or similar method will determine if sufficient soil moisture exists. If sufficient moisture is not found, immediate coordination with the site managers shall be made to irrigate the proposed work areas. Methodology may be soaker hose, sprinklers, soaker cans with small drilled holes to release water slowly or other methods. A second follow up inspection shall be made to determine final sufficiency to begin.
5. All root pruning operations shall be performed by the Contract Arborist and directed in the field by an ISA Certified Arborist with documented experience in similar SSAT excavation and root pruning.

E. Temporary Tree Protection Fence

1. Type and placement of fence to be designated on Plans and Details.
2. Attach tree protection area signs @ 30' spacing facing construction LOD. For fence lower than 6' in height, attach minimum 3 strips glow-flagging 2' long for each fence panel.
3. Tree protection area signs shall be high visibility and all weather to last the duration of the project / phase. Phone number of responsible contact person shall be included on sign.
4. Install after root pruning if shown, and prior to demolition, clearing & excavation.
5. Install at 6"-12" outside (construction side) of the Root Prune line or within the Root Prune trench.
6. Silt fence will be outside (construction side) the tree protection fence, unless super silt fence is used in lieu of tree protection. Trenchless installation method shall be employed per Detail if Root Protection Matting is designated.
7. Exact placement of fence will be determined in walk through with Contractor, Project Arborist, Contract Arborist, Engineer and Owner.
8. Sequencing of the tree protection fence will be determined during the initial site walk. In any case, no construction activities shall occur in each phase or section until approved protection is installed.

F. Root Protection Mat (RPM)



1. The purpose of the RPM is to reduce compaction, rutting, and contamination of soils and root systems of trees to be retained should staging, temporary stockpile, or equipment access be required within the CRZ areas due to extreme site constraints.
2. RPM shall be used for all access within CRZ areas of trees to remain. Matting is not required where existing pavement or concrete will remain undisturbed.
3. Trees anticipated receiving temporary or repetitive materials staging, footing traffic, or equipment access within protected root zone are to receive RPM. Wood chip mulch 4-6" shall be installed under matting to further protect soils and roots.
4. If short duration access is needed, such as one day or less, the use of "AlturnaMATS", 1" steel plate, or approved equal may be needed to avoid rutting and compaction. These materials may be shifted and re-used as work progresses.
5. All-weather staging, stockpile, or other repetitive construction operations may require 12" stone layer over RPM to allow heavy vehicles have the potential to cause dynamic compaction yet without rutting original surface soils and roots. In this situation, the stone may be contained by silt fence or super silt fence where adjacent to or within a TPA.
6. All temporary RPM areas to be used beyond a single day or beyond continuous on site supervision of the Contract Arborist shall be surrounded by temporary tree protection fence as per specifications. For temporary staging of soils beyond 24 hours "trenchless" silt fence fabric shall be installed on the lower / downhill side or as directed by the Project Arborist.
7. If Silt Fence is required for Erosion Control in RPM areas, installation of silt fence shall be coordinated with the Contract Arborist and must be performed by the Contract Arborist to prevent damage to tree roots from trenching operations. Erosion control socks may be used in lieu of silt fabric if approved by the Engineer.

G. Root Aeration Matting (RAM)

1. The purpose of the RAM is to reduce compaction of existing soils and tree roots from permanent grade fills and provide separation from newly placed and compacted materials. It also provides an opportunity for air and water exchange to the existing soils where roots exist.
2. Areas to receive RAM shall be protected from disturbance prior to the specific RAM and fill placement. Temporary Tree Protection Fence shall be used for this purpose.
3. If temporary access is needed within RAM areas prior to the time of RAM and fill placement, a temporary placement of Root Protection Matting (RPM) with mulch shall be made to prevent soil compaction. Steel Plates or other temporary protection methods for short-term use may be used. Refer to "Root Protection Matting" in this section for additional detail.
4. Sites shall be prepared by the Contract Arborist. Any debris shall be removed by hand. Existing soils shall remain undisturbed and un-compacted unless otherwise approved. If site preparation (grading, excavation, etc.) is needed, all work shall be done in accordance with this section. Refer to "Excavation for Proposed Sidewalk within Tree Protection Areas" in this section.



5. RAM material shall be placed on undisturbed and un-compacted soil except as described herein. RAM placement shall be made by the Contract Arborist.
6. RAM material shall extend to the toe of the proposed slope and "daylight".
7. RAM shall be pinned to the ground to prevent it from moving during fill placement. Pins shall be 12" "landscape nails" or approved alternative.
8. Seams within the RAM placement shall overlap by at least 2' or be connected or installed as designated by the manufacturer.
9. Fill materials (aggregate, soil, or other approved fill) shall be placed directly on the RAM and compacted only to the minimum necessary as directed by the Engineer.
10. RAM shall remain in place permanently and shall not be removed or disturbed by the contractor.
11. Filter fabric (silt fence fabric) shall be installed in 2 layers as shown in the detail (not trenched) to protect the RAM core from contamination. Installation of silt fence for erosion control shall be coordinated with the Contract Arborist and must be performed by the Contract Arborist to prevent damage to tree roots from trenching operations. Erosion control socks may be used in lieu of silt fabric if approved by the Engineer.

#### H. Temporary Tree Trunk and Limb Protection Wrap

1. Temporary trunk protection to cover the root flare and up to 12' height, or to the scaffold branches, or as determined for the situation.
2. Tree trunk (or limbs, as determined by Project Arborist) shall be wrapped with geocomposite material. More than one layer may be installed to reach suitable protection from the equipment or operations designated for work in the area. Attach with banding or strong tape that will not girdle the tree during the project timeframe. No nails or other devices are to penetrate the trunk.
3. Wrap shall be removed promptly after construction is complete.

#### I. Hand Excavation within Tree Protection Areas

1. For excavation within CRZ areas of trees to remain, the intent is to minimize tree and root damage from excavation activities.
2. Excavation shall be performed using SSAT, hand tools (shovels, etc), or other approved non-damaging method. Roots shall not be damaged by the excavation except for approved root pruning.
3. Refer to "Supersonic Air Tool Excavation" and "Construction Oversight by Arborist" specifications in this section for additional requirements.
4. All work shall be directly supervised by ISA Certified Arborist (provided by the Contract Arborist) in collaboration with the Owner's trades and sub-contractors.
5. RPM shall be installed along trench sides to allow for temporary soil stockpile and access.
6. Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.
7. Contract Arborist shall prune the exposed roots. Excavation shall not extend beyond the line where roots were pruned.



8. Contractor may proceed with conventional excavation methods or with hand excavation methods if clearance to the tree is inadequate for equipment access.
  9. No roots may be cut by the contractor.
- J. Supersonic Air Tool (SSAT) Excavation
1. Refer to “Hand Excavation within Tree Protection Areas” specification in this section for additional requirements.
  2. At a minimum, all SSAT work shall include the use of a barrier system such as temporary walls or tents to protect property and pedestrians from flying debris.
  3. Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.
  4. Excavation shall proceed per the “Hand Excavation within Tree Protection Areas” specification in this section.
- K. Special Demolition of Hardscape within Tree Protection Areas
1. Sidewalks and other hardscape items to be removed from within Tree Protection Areas (TPAs) shall be removed under direct supervision of the Contract Arborist. Site restoration, if required, shall also be supervised by the Contract Arborist.
  2. No mechanized equipment shall enter the TPAs. All work shall be either done by hand (with hand-operated equipment such as jackhammers) or with equipment staged outside the TPA. Alternatives for specific situations shall be reviewed by Project Arborist and Engineer.
  3. Sequence of work shall be reviewed and coordinated with the work of the Contract Arborist by the construction manager, contractor, Contract Arborist, Project Arborist, Engineer, and owner as appropriate for the project. Methods of protection of overhead branches, trunks, and roots shall be reviewed. Refer to specifications for approved methods of temporary wrapping, or selective pruning.
  4. Small equipment may operate upon existing hardscape or upon designated root protection matting if approved by the Project Arborist and Engineer. All staging or stockpiling of materials shall occur outside the TPA.
  5. Demolition of paving shall not damage protected roots outside the limit of work nor below existing hardscape. Approved options include jackhammer and pick up by hand or break up by small excavator operating upon existing hardscape. Once hardscape is removed, no equipment shall operate upon stone base unless inspected and approved by arborist as roots may have grown into base below hardscape.
  6. Refer to “Hand Excavation within Tree Protection Areas” and “Supersonic Airtool Excavation” specifications in this section.
- L. Excavation for Proposed Sidewalk within Tree Protection Areas
1. Excavation for site preparation shall be done by SSAT or by hand.
  2. Excavation shall be done by the Contract Arborist or with direct supervision by the Contract Arborist.



3. Excavation for base preparation shall not damage tree roots, trunks or branches. Areas shall be assessed for overhead clearance prior to commencement.
4. Excavation shall be the minimum necessary to achieve the required grades for the new sidewalk section. Sidewalk section and required grades shall be determined by the Engineer.
5. Root Aeration Matting (RAM) shall be installed once lowest grade is reached and aggregate base for sidewalk section shall be placed on this RAM. Ram must "daylight" out at the toe of the final proposed fill slope. Refer to "Root Aeration Matting" specifications in this section.
6. Compaction of the new aggregate base shall be the minimum necessary as dictated by the Engineer.
7. Refer to "Hand Excavation within Tree Protection Areas" and "Supersonic Airtool Excavation" specifications in this section.

M. Wood chip mulch

1. Mulching for the duration of construction for protection and stress reduction. Mulching will increase moisture-holding capacity, minimize soil compaction, and increase needed organic composition.
2. Mulch area options:
  - a. For individual trees designated on the TPAK within the TPA or curvilinear TPA install mulch to a radius equal to trunk diameter inches equated to mulch ring diameter in feet (24" trunk diameter = 24' diameter mulch ring). Where planting pit areas are restricted by hardscape or other restrictions, mulch the greatest area possible.
  - b. For linear TPAs along LOD Install mulch strips a minimum 10' wide the length of critical root zones along the outside of the LOD/ Root Prune line (just inside the Tree Protection Zone) for designated significant trees impacted by proposed construction.
  - c. Either option may be used as appropriate for the area.
3. For privately owned trees, any installation is contingent upon receipt of owner's permission. Owners may decline.
4. Motorized equipment shall not enter the TPA unless specifically approved by the Project Arborist and specific conditions met (RPM, AlturnaMATS, etc). Any such motorized equipment shall be operated by a certified arborist while inside the TPA.
5. Do not allow mulch to contact trunk/ root flare.
6. Mulch depth shall be 3" – 4".
7. Mulch shall remain for the duration of construction and may remain permanently if the owner approves.
8. If the mulch is to be removed after construction, it must be removed by hand only. No equipment may be used.

N. Tree Growth Regulator (*Paclobutrazol*)

1. Paclobutrazol is a compound used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the



tree. For highly impacted trees, this means more energy may be made available for fibrous root growth (to combat root loss), thicker darker leaves allowing for increased photosynthesis, and increased drought tolerance.

2. Specific methods and dosages are contained on the label and are determined by size and species, and applied by a state licensed pesticide applicator. Designated trees are shown on the TPAK.

O. Supplemental Watering

1. This action is for high impact trees of significance during seasonal drought times of project construction. Based upon the number and size of trees various strategies can be considered to maintain adequate soil moisture during these times. These strategies may include but are not limited to the following:
  - a. Fire hydrant connection battery powered timer and drip irrigation hose / tubing
  - b. Water tank truck and hand applied as directed;
  - c. Temporary above grade poly tank with battery-powered timers for drip or soaker hoses at each TPA.
  - d. 30-50 gallon watering cans with 6-8 drilled holes in bottom to allow slow seeping of water; spacing and rotation to reach desired gallons. Equivalent means of effectively watering trees as approved by Engineer or Project Arborist
2. Trees requiring this treatment are indicated in the TPAK. Other trees will not receive this treatment.
3. Drought times shall be defined as:
  - a. Periods during the growing season of two weeks or longer, where daytime high temperatures reach 80 degrees Fahrenheit or higher and less than  $\frac{3}{4}$ " rainfall is recorded per week. Or,
  - b. Periods during the growing season designated as "abnormally dry" or "drought" of any severity, by the U.S. Drought Monitor: (<http://www.drought.unl.edu/dm/monitor.html>). Or,
  - c. Any period of extraordinary circumstance, as determined by the Project Arborist or Owner.
4. A prescription for the number of gallons and strategy for watering designated trees will be developed. Large mature trees with impacts to root systems require as much as 100- 250 gallons per week during 90 degree days during summer drought times.
5. Periodic inspections by an ISA Certified Arborist (provided by the Contract Arborist) at this time are critical. Depth of moisture in soils shall be determined by soil sample tube or other exploratory means.
6. Minimum watering shall be considered to be 6 applications per growing season typically July thru October with the exact timing and duration to be determined by the ISA Arborist in conjunction with the Engineer. Additional unit costs per watering designated trees at prescribed rates one time.

P. Overhead Clearance



1. Trees to remain shall be assessed prior to construction for overhead clearance for construction activities. Contract Arborist shall recommend either canopy pruning, temporary guying/tying of select limbs, or alternative construction methods.
2. Pruning for clearance shall not remove branches above 12' or over 6" diameter.
3. All pruning proposed by the Contractor and/or Contract Arborist shall first be reviewed and approved by the Owner and Project Arborist.
4. Equipment exhaust should be directed away from trees as much as possible. Stationary equipment shall not exhaust directly under or towards trees.
5. Contractor shall use appropriate equipment near trees to ensure that trees are not damaged by construction. Contractor shall provide any specialized equipment needed at no additional cost to the owner.
6. Any pruning shall also conform to the pruning specifications in this section.

Q. Soil Tests and Soil Care/Fertilization

1. Initial soil testing within tree protection areas is required. Conduct individual soil tests for separate tree protection areas (small adjacent areas may be tested together). Soil test shall be a representative sample from each area. Soil testing shall include a texture analysis (sand, silt, and clay percentages), soluble salts, and sodium tests.
2. Treatments to the tree protection areas for specified trees (see TPAK) shall be based on the results of the soil analysis. Fertilization should be consistent with the recommendations of the ANSI A-300 (Part 2) Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Fertilization) 2004, except as described herein.
3. Application rates shall not exceed a rate of 1 pound of actual nitrogen per 1,000 square feet annually.
4. Fertilizer used should include humic acids, soluble seaweed extracts and soil biological inoculants (mycorrhizae, etc.). Applications to confined areas (i.e. street tree planting pits) should be made by soil injection. In areas where adequate application rates cannot be achieved, injection should be made to the point of refusal.

R. Soil Decomposition with SuperSonic Airtool (SSAT) within CRZs of Designated.

1. This work is typically prescribed for urban park or campus trees where existing compacted soils and associated trees will benefit. It involves pneumatic de-compaction in the upper soils using Supersonic Air tools (SSAT) by trained and qualified arborists.
2. This work may be also prescribed as "Contingency or Remedial Work" due to unwarranted construction incursion into the protected TPAs.
3. This work has several benefits:
  - a. Allows prior root damage open to examination.
  - b. Allows the arborist get a "feel" for the soil layers, level of quality, contamination, and composition.
  - c. Provides vertical and horizontal aeration to compacted soils



- d. Allows backfill of suitable organic compost and aggregate amendments
  4. Refer to plan drawings for indicated area / trees for this work. The Contract Arborist shall layout the boundaries with wire flagging for review by the Architect and Project Arborist. The Architect and Project Arborist shall review the startup of work and determine any adjustments to the width, depth, or approach.
  5. The work consists of using the SSAT in a parallel series of linear trenches to fracture the upper soil layers down to significant root zones. The size of the trench is generally 12-15" deep and 9-12" wide, although fracturing of horizontal soil layers may extend beyond this dimension. .
  6. Do not perform this operation during drought months without adequate supplemental moisture in order to reach a minimum of 50% field capacity prior to the work. Pre-start up testing of soil shall be done using a sharp probe, surveyors pin or long screwdriver. Penetration should meet 10" depth with hand probing only.
  7. Do not dispose of the excavated soils. Dispose of exposed trash or debris encountered. Mark exposed utilities and irrigation lines.
  8. Soil amendments shall be worked into the trenches during the SSAT work to mix and distribute the material or spread and then "stirred" with the SSAT to mix into existing soils. Backfill each trench prior to the end of workday unless approved otherwise by the Architect and Project Arborist.
  9. Rough grading with hand rakes shall be done by the Landscape Contractor unless otherwise directed by the Architect or Owner.
  10. Refer to the MATERIALS section for the amended backfill.
- S. SSAT Landscape Planting Excavation
1. Proposed landscape planting of B&B plants within critical root zones within TPAs shall be reviewed by the Contract Arborist, contractor, and owner in the field to determine potential for damage to priority roots of select trees and layout the limit of work.
  2. Pre-watering of the proposed areas of excavation during summer and fall months is recommended to maintain root / soil moisture.
  3. The Contract Arborist shall provide a qualified arborist crew experienced with the SSAT and landscape planting excavation to protect adjacent natural resources and construction work, open the excavation, hand prune minor roots, and identify and protect priority roots to remain. Coordination with the appropriate sub-contractor shall be made to determine appropriate width, depth, and sequencing.

### 3.3 FIELD QUALITY CONTROL AND MONITORING

#### A. Tree Condition Monitoring

1. An ISA Certified Arborist (provided by the Contract Arborist) shall perform monitoring twice per month year round to monitor insects, disease, soil moisture levels, weather, and health changes on all trees designated on Tree Protection Action Key.
2. The monitoring will include a report that details problematic areas that have been addressed, treatments provided to reduce the problem, and anticipated



treatments forecast for 30 days. This report will be forwarded to the Project Arborist, Engineer and Owner for documentation.

3. Any treatments recommended by the Contract Arborist not already included in the project scope shall be noted in the reports for review by the Project Arborist, Engineer and Owner. No additional work is to be performed unless approved in writing by the Owner.

B. Construction Oversight by Contract Arborist

1. Any work within CRZs of retained trees shall be directly supervised by the Contract Arborist.
2. If roots are encountered during excavations, work shall progress as directed by the Contract Arborist. Contract Arborist, in coordination with the construction and design teams, shall determine appropriate means and methods to address the roots. Options may include, but not be limited to, severing the roots, hand or SSAT excavation. Contractor shall not cut roots.
3. Refer to "Hand Excavation within Tree Protection Areas" specification in this section.
4. All work shall be documented thoroughly, including photo documentation. Refer to site documentation submittal requirements.

### 3.4 CONTRACTOR DAMAGES AND PENALTIES

A. Remedial Measures

1. Any damage caused to the trees by the work of this contract through negligence by the contractor shall be immediately remedied by the contractor. Contractor shall be responsible for any associated costs.
2. Remedial work may include pruning, cabling, or any other measures up to and including removal and replacement, as determined by the Project Arborist and Engineer.
3. Remedial work shall be performed by the Contract Arborist, as approved by the Project Arborist and Engineer.
4. All required remedial work shall be performed to the satisfaction of the Project Arborist and Engineer, at no additional cost to the owner.

B. Tree Replacement

1. If damage to any tree is severe, because of negligence by the contractor as determined by the Project Arborist and Engineer, it shall be replaced with a new tree of equal size caliper and species as that of the damaged tree.
2. If a replacement tree of equal size caliper is not possible as determined by the Project Arborist and Engineer, it shall be replaced on an inch for inch basis with new trees of a minimum caliper size of 2-3".
3. Replacement trees shall be supplied and installed at no additional costs to the owner, including all incidental costs including the costs of inspection of the tree at the nursery and any other incidental costs associated with tree replacement.

## PART 4 - MEASUREMENT AND PAYMENT



#### 4.1 TREE PROTECTION AND STRESS REDUCTION MEASURES

The following items will be paid for at the contract unit price for completed and/or installed units, based on the units outlined below. Unit prices shall include all materials, equipment, tools, labor, transportation, traffic control, operations and all work incidental thereto, including the removal of debris, except as specifically noted.

- A. Mulching: per cubic yard installed
- B. Tree Protection Fence: per lineal foot installed, including appropriate signage and markings
- C. Root Pruning:
  - 1. Mechanical root pruning: per lineal foot completed
  - 2. SSAT root pruning: per lineal foot completed
- D. Tree Canopy and Clearance Pruning: per each tree completed – each individual tree will be priced independently
  - 1. Support Cables: per each tree requiring cables
- E. Tree Growth Regulator: per caliper inch treated
- F. Construction Oversight by Contract Arborist: per each man-hour for arborist onsite
- G. Tree Condition Monitoring: per inspection completed, including required reporting and treatment
- H. Supplemental Watering:
  - 1. System installation: per system installed, if applicable
  - 2. System maintenance and operation: per month of operation and maintenance
- I. Hand and SSAT Excavation within Tree Protection Areas: per lineal foot of trench completed or per square foot of other excavations completed
- J. Root Protection Mat: per square foot installed
- K. Trunk Protection Wrap: per tree completed – each tree may be priced independently
- L. Tree Removal: per tree removed – each individual tree will be priced independently

END OF SECTION



## Appendix 2: Tree Transplanting

### SECTION 32 9001 - TRANSPLANTING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. Section includes transplanting non-nursery-grown trees by tree spade or digging and boxing.
- B. Related Requirements:
  - 1. Division 1 Section "Tree Protection and Trimming" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
  - 2. Division 2 Section "Planting" for new trees from nursery-grown sources.

##### 1.3 DEFINITIONS

- A. General: See definitions in ANSI A300 (Part 6) and in ANSI Z60.1 pertaining to field-grown trees, except as otherwise defined in this Section.
- B. Caliper: Diameter of a trunk as measured by a diameter tape at a height **6 inches (150 mm)** above the root flare for trees up to, and including, **4-inch (100-mm)** size at this height; and as measured at a height of **12 inches (300 mm)** above the root flare for trees larger than **4-inch (100-mm)** size.
- C. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height **54 inches (1372 mm)** above the ground line for trees with caliper of **8 inches (200 mm)** or greater as measured at a height of **12 inches (300 mm)** above the root flare.
- D. Root-Ball Depth: Measured from bottom of trunk flare to the bottom of root ball.
- E. Root-Ball Width: Measured horizontally across the root ball with an approximately circular form or the least dimension for non-round root balls, not necessarily centered on the tree trunk, but within tolerance according to ANSI Z60.1.
- F. Root Flare: Also called "trunk flare." The area at the base of the tree's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.



#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to transplanting work include, but are not limited to, the following:
    - a. Construction schedule. Verify availability of materials, personnel, equipment, and unimpeded access needed to make progress and avoid delays.
    - b. Tree and plant protection.
    - c. Tree maintenance.
    - d. Arborist's responsibilities.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each of the following:
  - 1. Proprietary Root-Ball-Stabilization Device: One unit.
  - 2. Slow-Release Watering Device: One unit of each size required.
- C. Pruning Schedule: Written schedule prepared by arborist detailing scope and extent of pruning each tree in preparation for and subsequent to transplanting.
  - 1. Species and size of plant.
  - 2. Location on site plan.
  - 3. Reason for pruning.
  - 4. Seasonal limitations on pruning.
  - 5. Preparatory Pruning: Time schedule and description of preparatory pruning to be performed.
  - 6. Description of root and crown pruning during and subsequent to transplanting.
  - 7. Description of maintenance following pruning.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified tree-service firm and arborist.
- B. Certification: From arborist, certifying that transplanted trees have been protected during construction and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance Recommendations: From arborist, recommended procedures to be established by Owner for care and protection of trees after completing the Work.
  - 1. Submit before completing the Work.



- D. Existing Conditions: Documentation of existing trees indicated to be transplanted, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
  - 1. Use sufficiently detailed color photographs or video recordings. Color shall accurately depict hue condition of foliage and bark.
  - 2. Include drawings and notations to indicate specific wounds and damage conditions of each tree designated to be transplanted.
- E. Tree-Transplanting Program: Submit before work begins.
- F. Sample Warranties: For special warranties.
- G. Tree-maintenance reports.

#### 1.7 QUALITY ASSURANCE

- A. Tree-Service Firm Qualifications: An experienced landscaping contractor or tree-moving firm that has successfully completed transplanting work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
  - 1. Arborist Qualifications: Certified Arborist as certified by ISA, Licensed arborist in jurisdiction where Project is located.
- B. Tree-Transplanting Program: Prepare a written plan by arborist for transplanting trees for the whole Project, including each phase or process, tree maintenance, and protection of surrounding materials during operations. Describe in detail the materials, methods, and equipment to be used for each phase of the transplanting work.
  - 1. Include transplanting times appropriate for each species at the Project location unless otherwise indicated on Drawings or directed by arborist.
  - 2. Include a transplanting schedule for each species to be transplanted, coordinated with the Project schedule.
  - 3. Show details of temporary protective barriers where needed.
  - 4. Include care and maintenance provisions and eventual removal of tree stabilization.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or trees.



2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery with appropriate certificates.
- C. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees in such a manner as to destroy their natural shape.
- D. Handle trees by root ball. Do not drop trees.
- E. Move trees after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after moving, set trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

#### 1.9 FIELD CONDITIONS

- A. Field Measurements: Verify final grade elevations and final locations of trees and construction contiguous with trees by field measurements before proceeding with transplanting work. Perform transplanting only after finish grades are established.
- B. Seasonal Restrictions: Transplant trees during the following in-season periods:
1. Spring: Prior to leaves.
- C. Weather Limitations: Proceed with transplanting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Do not transplant during excessively wet or frozen conditions. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- D. Coordination with Turf Areas (Lawns): Perform transplanting before planting turf areas unless otherwise indicated.
1. When transplanting in existing planting turf areas, protect turf areas, and promptly repair damage caused by transplanting operations.

#### 1.10 WARRANTY

- A. Installer's Special Warranty: Tree-service firm agrees to repair or replace trees and related materials that fail within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.



- b. Death and unsatisfactory growth is defined as more than 25 percent dead or in an unhealthy condition or failure to meet general performance requirements at end of warranty period.
  - c. Structural failures including trees falling or blowing over.
  - d. Faulty performance of materials and devices related to tree plantings including tree stabilization and watering devices.
2. Warranty Periods from Date of Transplanting Completion:
- a. Trees: 12 months.
3. Include the following remedial actions as a minimum:
- a. Remove dead trees and trees with unsatisfactory growth at end of warranty period; replace when directed.
  - b. A limit of one replacement of each tree will be required except for losses or replacements due to failure to comply with requirements.
  - c. Replace materials and devices related to tree plantings.
  - d. Provide extended warranty for period equal to original warranty period, for replaced trees.

#### 1.11 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide tree maintenance by skilled employees of tree-service firm and as required in Part 3. Begin maintenance immediately after trees are installed and continue until plantings are healthy and well established but for not less than maintenance period below.
  - 1. Maintenance Period: 12 months from date of transplanting completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Transplanted trees shall be healthy and resume vigorous growth within one year of transplanting without dieback due to defective extracting, handling, planting, maintenance, or other defects in the Work.

#### 2.2 PLANTING MATERIALS

- A. Backfill Soil: Excavated soil of suitable moisture content and granular texture for placing and compacting in planting pit around tree, and free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.



## 2.3 TREE-STABILIZATION MATERIALS

### A. Root-Ball-Stabilization Materials:

1. Proprietary Root-Ball-Stabilization Devices: Proprietary below-grade stabilization systems to secure each new planting by root ball; sized according to manufacturer's written instructions unless otherwise indicated.
  - a. Products: Subject to compliance with requirements, provide the following:
    - 1) Border Concepts, Inc.; Tomahawk Tree Stabilizers.
    - 2) Foresight Products, LLC; Duckbill Rootball Fixing System.
    - 3) Tree Staple, Inc.; Tree Staples.
    - 4) Platypus Tree Stabilizer.

## 2.4 WATERING DEVICES

### A. Slow-Release Watering Device: Standard product manufactured for drip-irrigation of plants and emptying its water contents over a period of 9 hours; manufactured from UV-light stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Spectrum Products, Inc.; Treegator (Original) or Treegator Jr. Pro.
  - b. Turf Chemicals Plus, Inc.; Tree Ring (Regular) or] Tree Ring Jr..

## 2.5 MISCELLANEOUS PRODUCTS

- A. Organic Mulch: as specified in Division 2 Section "Landscape Work."
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Pesticides: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended in writing by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
  1. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
  2. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.



- E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
  - 1. Size: 5-gram tablets.
  - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross transplanting areas.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to transplanting work and tree protection and health.
- C. Proceed with transplanting only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, other facilities, turf areas, and other plants and planting areas from damage caused by transplanting operations.
- B. Utility Locator Service: Notify utility locator service or Dig Safe for area where Project is located before beginning excavation.
- C. Locate and clearly identify trees for transplanting. Flag or Tie a 1-inch (25-mm) vinyl tape around each tree at 54 inches (1372 mm) above the ground.
- D. Lay out individual transplant locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before transplanting. Make minor adjustments as required.
- E. Apply antidesiccant to trees uniformly, using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during extracting, handling, and transportation.
  - 1. If deciduous trees are moved in full leaf, spray with antidesiccant before extracting and again two weeks after transplanting.
- F. Wrap trees with burlap fabric over trunks, branches, stems and twigs to protect from wind and other damage during extracting, handling, and transporting.



### 3.3 PREPARATORY PRUNING

- A. Crown Pruning (Tip Pruning):
  - 1. Perform preparatory crown pruning as directed by arborist.

### 3.4 EXCAVATION AND PLANTING EQUIPMENT

- A. Tree Spade: Track-mounted mechanized tree mover; sized according to manufacturer's size recommendation for each tree being transplanted.

### 3.5 EXCAVATING PLANTING PITS

- A. General: Excavate under supervision of the arborist.
  - 1. Excavate planting pits with sides sloping. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil. Scarify sides of planting pit smeared or smoothed during excavation.
  - 2. Excavate approximately two times as wide as root ball.
  - 3. Keep excavations covered or otherwise protected until replanting trees.
- B. Subsoil and topsoil removed from excavations may be used as planting soil.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees are encountered in excavations.
  - 1. Hardpan Layer: Drill **6-inch- (150-mm-)** diameter holes, **24 inches (600 mm)** apart, into free-draining strata or to a depth of **10 feet (3 m)**, whichever is less, and backfill with free-draining material.
- D. Seepage: Notify Architect if subsoil conditions evidence unexpected water seepage into tree-planting pits.
- E. Drainage: Fill planting pit or trench with **6 inches (152 mm)** of water and time the infiltration rate of the soil. If the drainage rate is less than **0.25 inch (6 mm)** per hour, notify Architect to determine need for subsurface drainage.
- F. Saline or Sodic Soils: Completely fill excavations with water and allow to percolate away before positioning trees.

### 3.6 EXTRACTING TREES

- A. General: Extract trees under supervision of the arborist.



- B. Orientation Marking: Mark the north side of each tree with non-permanent paint before extracting.
- C. Root-Ball Width: Minimum **10 inches (250 mm)** of root-ball diameter, or least dimension for non-round root balls, for each **inch (25 mm)** of tree caliper being transplanted.
- D. Root-Ball Depth: As determined by the arborist for each species and size of tree and for site conditions at original and planting locations.
- E. Digging:
  - 1. Dig and clear a pit by hand or with tree spade to the depth of the root system. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
  - 2. Use narrow-tine spading forks to comb soil to expose roots with minimal damage to root system.
  - 3. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking.
  - 4. Cut exposed roots manually with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not paint or apply sealants on cut root ends.
  - 5. Construct box tight against root system sides and bottom as pit is dug. Brace and support box to prevent breaking of root ball.
  - 6. Temporarily support and protect exposed roots from damage until they are permanently redirected and covered with soil. Cover roots with burlap and keep them moist until planted.
- F. Extracting with Tree Spade: Use the same tree spade to extract the tree as will be used to transport and plant the tree.
  - 1. Do not use tree spade to move trees larger than the manufacturer's maximum size recommendation for the tree spade being used.
  - 2. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

### 3.7 PLANTING

- A. Planting Standard: Perform planting according to ANSI A300 (Part 6) unless otherwise indicated.
- B. Before planting, verify that root flare is visible at top of root ball. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- C. Ensure that root flare is visible after planting.
- D. Remove injured roots by cutting cleanly; do not break. Do not paint or apply sealants on cut root ends.



- E. Orientation: Position the tree so that its north side, marked before extracting, is facing north in its new location.
- F. Set tree plumb and in center of planting pit with **bottom** of root flare **1 inch (25 mm)** above adjacent finish grades.
  - 1. Use specified backfill soil for backfill.
  - 2. If area under the tree was initially dug too deep, add backfill to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  - 3. After placing some backfill around root ball to stabilize plant, begin backfilling.
  - 4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - 5. Redirect exposed root ends downward in backfill areas where possible. Hand-expose roots as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately **3 inches (75 mm)** back from new construction and as required for root pruning.
  - 6. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended by arborist. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
  - 7. Continue backfilling process. Water again after placing and tamping final layer of soil.
- G. Planting with Tree Spade: Use the same tree spade for planting as was used to extract and transport the tree. Do not use tree spade for trees larger than the manufacturer's maximum size recommendation for the tree spade being used.
- H. Slopes: When planting on slopes, set the tree so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.8 CROWN PRUNING

- A. Prune branches as directed by arborist.
  - 1. Prune to remove only injured, broken, dying, or dead branches. Do not prune for shape.
  - 2. Do not remove or reduce living branches to compensate for root loss caused by cutting root system or to improve natural tree form.
  - 3. Pruning Standards: Perform pruning according to ANSI A300 (Part 1).
- B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance during Contract period as recommended by arborist.



### 3.9 TREE STABILIZATION

- A. Root-Ball Stabilization: Install below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated on Drawings.
  - 1. Proprietary Root-Ball-Stabilization Device: Install root-ball-stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

### 3.10 MULCHING

- A. Organic Mulch: Apply 3-inch (75-mm) average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

### 3.11 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Place device on top of the mulch at base of tree and fill with water according to manufacturer's written instructions.

### 3.12 TREE MAINTENANCE

- A. Perform tree maintenance as recommended by arborist. Maintain arborist observation of transplanting work.
- B. Maintain trees by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Treat as required to keep trees free of insects and disease.
- C. From time of tree extraction measure soil moisture adjacent to edge of each root ball weekly. Record findings and weather conditions.
- D. Fill areas of soil subsidence with backfill soil. Replenish mulch materials damaged or lost in areas of subsidence.
- E. Apply treatments as required to keep tree materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- F. Pesticide Application: Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written instructions. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.



1. Pre-Emergent Herbicides (Selective and Non-Selective): Apply in accordance with manufacturer's written instructions. Do not apply to seeded areas.
2. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written instructions.

G. Reports: Have arborist prepare monthly inspection reports.

### 3.13 REPAIR AND REPLACEMENT

A. General: Repair or replace transplanted trees that are damaged by construction operations, in a manner recommended by the arborist and approved by Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced.
2. Species of Replacement Trees: Same species being replaced.

### 3.14 CLEANUP AND PROTECTION

A. During transplanting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect trees from damage due to transplanting operations and operations of other contractors and trades. Maintain protection during transplanting and maintenance periods. Treat, repair, or replace damaged plantings.

C. After planting and before Substantial Completion, remove tags, markings, tie tape, labels, wire, burlap, and other debris from transplanted trees, planting areas, and Project site.

### 3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Except for materials indicated to be recycled, remove surplus soil, excess excavated material, waste materials, displaced plants, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.



1. Except for materials indicated to be retained on Owner's property or recycled, remove excess excavated material, waste materials, displaced plants, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION



## Appendix 3: Tree Planting

### SECTION 32 9000 - PLANTING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:

1. Tree, shrub, groundcover, perennial and bulb installation.
2. Fertilizing, mulching, trimming, guying, wrapping and edging.
3. Maintenance of installed plant material.
4. Warranty.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
2. Division 2 Section "Turf and Grasses" for coordination with lawn establishment.
3. Division 2 Section "Landscape Maintenance" for plant material maintenance.

##### 1.3 REFERENCES

- A. American Joint Committee on Horticultural Nomenclature Publication: Standardized Plant Names.
- B. ANSI Z60.1 - American Standard for Nursery Stock.
- C. ASTM D2607 - Classification of Peats, Mosses, Humus and Related Products.
- D. FS 0-F-241 - Fertilizers, Mixed, Commercial.

##### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit complete list of plant material growers 4 weeks prior to digging of plants. List is to include names of individuals to contact, phone numbers, addresses and latest possible date for completion of tagging.
- C. Submit waterproof tags prior to tagging trip. Tags to contain following information:



1. Contractor's name.
  2. Plant genus, species and cultivar/variety.
  3. Plant common name.
  4. Name of nursery.
  5. Size of plant.
  6. Quantity of plant (i.e. 2 of 10)
- D. Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons of delay.
- E. Submit schedule of arrival of "specimen plant material".
- F. Submit instructions for continuing Owner maintenance. Include pruning and trimming methods and types, application frequency and recommended coverage of fertilizer; and water requirements for year-round care of installed plants. Document is to be in bound 8 ½" x 11" format. Submit prior to expiration of required maintenance period(s).
- G. Submit for approval a proposed maintenance procedure and schedule of the storage of plant materials. Trees, shrubs, groundcover and perennials stored on and off site shall be maintained by watering, fertilizing, mulching, and spraying for infestation and disease to maintain these plants in a healthy condition. Plants stored off site shall be available for inspection by the Landscape Architect.
- H. Samples of each of the following:
1. 5 lb (2 kg) of mulch for each type required for the Project, in labeled plastic bags.
  2. Edging materials and accessories to verify color selected.
- I. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Landscape Architects and Owners, and other information specified.
- 1.5 QUALITY ASSURANCE
- A. Prior to being approved, the successful bidder will be required to submit to the Landscape Architect a statement of qualifications listing the names of contact references for at least three jobs of similar scope that have been completed in the last five years. Attention is called to the fact that the installation will not be awarded to a firm that does not possess the required technical expertise and construction organization.
- B. Allow Landscape Architect option of traveling to growers facility to select trees from available stock.
- C. Allow four weeks, after receipt of list of growers, to finish tagging trees.



- D. Trees dug prior to tagging by Landscape Architect are subject to rejection.
- E. Landscape Architect will confirm the trees satisfy the requirements of ANSI Z60.1 and all special conditions stated in project manual and drawings.
- F. Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300-mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- G. Unacceptable trees will not be tagged and a different Grower will be selected by Contractor at no expense to Owner. A second tagging trip will then be scheduled.
- H. Decision by Landscape Architect to forego tagging trip does not release Contractor from responsibility of obtaining plant material which meets standards and conditions stated in project manual and drawings.
- I. Minimum three years experience installing plant material of this type required of Installer.
- J. Minimum five years experience specializing in growing and cultivating the specified material is required by of Grower.

#### 1.6 REGULATORY REQUIREMENTS

- A. Comply with regulatory requirements for fertilizer and herbicide composition.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Plant material is to be covered with tarpaulin during transport.
- B. Deliver soil conditioners and fertilizer in unopened waterproof bags showing weight, chemical analysis, and name of manufacturer. Keep materials in dry storage away from contaminants.
- C. Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Landscape Architect. Do not bend or bind tie trees or shrubs in such a manner as to damage bark, break branches, or destroy natural shape. Do not drop balled and burlapped stock during delivery. Protect plants until planted to prevent damage to root balls or desiccation of leaves.
- D. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
- E. Provide water to staged material as required to keep root balls moist.
- F. Do not remove container-grown stock from containers until planting time.

#### 1.8 ENVIRONMENTAL REQUIREMENTS



- A. Do not install plant life when ambient temperatures may drop below 30 degrees F or above 90 degrees F.
- B. Do not install plants when wind velocity exceeds 30 mph.
- C. Planting shall be done when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting.
- D. Conduct planting operations during recommended planting seasons. Preferable planting season is March 15 to May 30 and October 15 to December 1, inclusive.
- E. At the Subcontractor's option and full responsibility, planting operations may be conducted under unseasonable conditions without additional compensation.

#### 1.9 JOB CONDITIONS

- A. Locate above grade and underground utilities and perform Work in manner which will avoid damage. Hand excavate, as required.
- B. Maintain grade stakes set by others until removal is mutually agreed upon by concerned parties.
- C. Notify Landscape Architect, before proceeding, when conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions.
- D. Install plants after final grades are established and prior to establishment of lawns, unless otherwise approved by Landscape Architect. If planting occurs in undisturbed lawn areas or after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

#### 1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the Work of this Section with installation of underground utilities, sodding and remainder of Work associated with this Project.
- B. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations.

#### 1.11 MAINTENANCE

- A. Contractor shall maintain plant material until completion of two year guarantee period and Final Acceptance of work, as described in Part 3 of this Section

#### 1.12 GUARANTEE

- A. Plants shall be guaranteed for a period of two years after the date of Acceptance by the Owner.
  - 1. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.



- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size and color.
- C. Replace dead plants and all plants not in vigorous, thriving condition, as determined by the Architect during and at the end of the guarantee period, without cost to the Owner as soon as weather conditions permit and within the specified planting window.
  - 1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
  - 2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
  - 3. The guarantee of all replacement plants shall extend for an additional one year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.
- E. All bulbs shall be guaranteed to bloom vigorously the first respective blooming season after planting. Bulbs that do not bloom shall be replaced. Replacement costs shall be borne by the Landscape Contractor.

#### 1.13 FINAL INSPECTION AND FINAL ACCEPTANCE

- A. At the end of the two year guarantee period, the Architect will, upon written notice of the end of the guarantee period inspect the work for Final Acceptance. Requests shall be received at least ten calendar days before the anticipated date for Final Inspection.
- B. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

### PART 2 - PRODUCTS

#### 2.1 TREES, SHRUBS, GROUND COVER AND BEDDING PLANTS

- A. Plant material to be nursery grown stock conforming to ANSI Z60.1.
- B. Publication for Standardized Plant Names will govern nomenclature issues.
- C. Plans will supersede planting material schedule where a discrepancy in quantity occurs.



- D. Provide plant material which is well branched and formed, sound, vigorous, healthy, and free from disease, sun-scald, windburn, abrasion, and harmful insects, eggs, larvae and such defects as knots sun scald, injuries, abrasions and disfigurement, and shall have healthy, normal, and unbroken root systems.
- E. Provide symmetrically developed plant material, of uniform habit with straight boles and free from objectionable disfigurements. Tree leader shoots shall not be cut or broken.
- F. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
- G. Provide vigorous ground covers and vines with number and length of runners and clump size specified and proper age for the grade of plants specified. Use only vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections.
- H. Plants shall have been grown in the same or colder climatic zone of this project.
- I. Provide plants according to measurements indicated. Measure sizes before pruning and with branches in normal position. Plants larger in size than specified may be used as approved.
- J. Spray plants, budding into leaf or having soft growth, with an anti-desiccant at the nursery or collecting field before digging.

## 2.2 SOIL AMENDMENT MATERIALS

- A. Shrub and Tree Fertilizer: Tightly compressed, slow release planting tablets. Provide 50% of Nitrogen as water insoluble. The following or equal is acceptable:
  - 1. AGRIFORM Planting Tablets by:  
The Scott's Company  
1-800-492-8255
- B. Ground Cover Fertilizer: FS-0-F-241, Type 1, Class 1 with fifty percent of the elements derived from organic sources. Use fertilizer with N.P.K. ratio of 1:2:1 for Ground Cover Beds and 2:1:1 for Bedding Plant Beds.
- C. Peat Moss: Shredded, loose, sphagnum moss peat conforming to ASTM D2607; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight; 4 to 5 pH range; moisture content of 30 percent.
- D. Sphagnum Peat Moss: Sphagnum peat moss shall be imported Canadian Sphagnum peat moss, brown, low in content of woody materials, and be free of mineral matter harmful to plant life. Peat shall have an acid reaction of about 4.5 pH, and have a water absorbing capacity of 1100 to 2000 percent by weight. Peat moss shall be thoroughly pulverized before use. No native or sedge peats shall be approved.
- E. Topsoil: Topsoil for backfill shall be as specified in Section 329002 - Landscape Grading.



- F. Soil Filter Mix: 50% sand, 20% compost and 30% topsoil.
- G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- H. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- I. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.
- J. Herbicide: Comply with all applicable State and Federal Laws.
- K. Pesticide: Comply with all applicable State and Federal Laws.

### 2.3 MULCH MATERIALS

- A. Mulching Material: Shredded, dark brown/black, native hemlock mulch free of growth or germination inhibiting ingredients.
- B. Mineral Mulch: Hard durable stone, washed free of loam, sand, clay and other foreign substances, of following type, size range and color:
  - 1. Type: Rounded, natural tan/beige color.
    - a. Size Range: 1"-2"

### 2.4 MISCELLANEOUS MATERIALS

- A. Filter Fabric: Filter fabric shall be Trevira 1115, or equal approved by Landscape Architect. Trevira is manufactured by Hoechst Fibers Industries, P.O. Box 5887, Spartanburg, SC 29304 (1-800-845-7597 or 1-800-579-5479).
- B. Anti-Desiccant: Emulsion type, film-forming agent, designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
- C. Erosion Control Blanket: The following products or approved equal are acceptable:
  - 1. S75 as manufactured by North American Green for 3:1 slopes.
  - 2. C125 as manufactured by North American Green for 2:1 slopes or steeper.
- D. Aluminum Edging: Edging shall be 3/16" x 4" aluminum painted black . Edging shall be installed according to manufacturer's instructions.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify site is ready to accept Work of this section.
- B. Test drainage of plant beds and pits by filling with water twice in succession. Notify Landscape Architect of conditions permitting the retention of water in planting beds for more than twenty-four (24) hours.
- C. Prior to the excavation of planting pits, or placing tree stakes, the Contractor shall ascertain the location of utility lines, electric cables and conduits, so that proper precautions may be taken not to disturb or damage subsurface improvements. Should obstructions be found, the Contractor shall promptly notify the Landscape Architect.
- D. Beginning of installation means acceptance of existing conditions.

### 3.2 PREPARATION OF PLANT PITS AND BEDS

- A. Plant Pits: Dig to produce vertical sides and flat, undisturbed bottoms. Scarify glazed side surfaces of pits. Size plant pits as shown on drawings.

- B. Shrub masses, hedges, groundcover and perennial beds shall be entirely excavated edge to edge and backfilled with specified backfill mixture; they shall not be treated as individual planting pits.
- C. Remove all sticks, stones, roots and other objectionable materials during tilling operations larger than one inch in diameter.
- D. Damage to paving, sidewalks or other materials shall be removed and replaced at the Contractor's expense and to the satisfaction of the Landscape Architect.

### 3.3 LAYOUT

- A. Stake tree and shrub locations with 3/4" x 2" x 18" wood stakes driven into the soil at center points of plants. Paint tops of stakes representing tree locations a color different from the stakes locating shrubs. Contractor may stake continuous uninterrupted straight runs of shrubs at each end. Outline ground cover beds.
- B. Mark all underground utilities.
- C. Notify Owner's Representative, in writing, of portions of plant material which have been staked. Allow one week for Landscape Architect to review and adjust stake locations.
- D. Plants which are planted prior to contractor receiving Landscape Architect's approval of staking and bed outlines are subject to being relocated at no cost to Owner.

### 3.4 PLANTING

- A. Setting Plants: Handle balled and burlapped and container-grown plants by ball or container. Set plants and hold in plumb position until sufficient soil has been firmly placed around roots or ball. Set plants in relation to surrounding grade so that they are even with depth at which they were grown in nursery, collecting field, or container.
- B. Place fertilizer prior to backfilling and in accordance with the manufacturer's recommendations. Ground cover plants may be planted after mulch is in place. Take care to avoid contaminating mulch with planting soil.
- C. Backfill excavations for balled and burlapped stock with planting soil mixture to approximately half the depth of the ball and then tamp and water. Carefully remove, open or fold back burlap and tying materials. Completely remove plastic wrap before the placement of backfill. Finish backfilling and tamp. Form earth saucers around isolated plants of size ample enough to hold at least 2-1/2 gallons for shrubs or 5 gallons for trees. Do not use planting stock if ball is cracked or broken before or during planting operation.
- D. Bulbs shall be planted in the locations and at the spacing indicated on the Drawings. Plant bulbs at the depths and orientation recommended by the Supplier. Do not remove the leaves until after they have lost their green color. Remove leaves by cutting.

3.5 FERTILIZATION, WATERING, EDGING, AND MULCHING

- A. Trees, Shrubs and perennials: Fertilize according to manufacturer's recommendations.
- B. Ground Cover Beds: Topdress beds with .12 lbs of actual phosphoric acid per cubic yard of Planting Bed Mix.
- C. Watering: Provide uniform coverage which will not cause erosion or damage to the finished surface. Water sufficiently to penetrate the planting bed to a depth of 4 inches.
- D. Uniformly edge beds or individual plants using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn. Refer to drawings for bed shape. Provide plant pits circular in shape for individual pits.
- E. Mulch within 24 hours after planting. Spread to uniform thickness of 3 inches.

3.6 PLANT SUPPORT

- A. Tree Anchors: Playtpus Tree Anchoring System - Rootball Fixing or approved equal. Size anchors based on tree caliper size. Install per manufacturer's instructions.

3.7 PRUNING AND REPAIR

- A. Plants shall be neatly pruned and or clipped to preserve the natural character of the plants (with exception to clipped shrub hedges); in a manner appropriate to the particular requirements of each plant and to the satisfaction of the Landscape Architect. Unless otherwise directed by Landscape Architect, do not cut tree leaders; remove only injured or dead branches.
- B. Remove broken or badly bruised branches with a clean cut. All pruning shall be done with sharp tools in accordance with instructions of the Owner. Accidental damage to trees occurring during the course of planting operations which is not so great as to necessitate removal of a branch or replacement of a plant shall promptly be treated as required in accordance with recognized horticultural practices.

3.8 CLEANING

- A. Keep worksite in clean and orderly condition as Work progresses. Leave worksite "broom clean" at end of Work.

3.9 MAINTENANCE

- A. See Section 32 9353 Landscape Maintenance

END OF SECTION  
SECTION 32 9000 - PLANTING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Tree, shrub, groundcover, perennial and bulb installation.
  - 2. Fertilizing, mulching, trimming, guying, wrapping and edging.
  - 3. Maintenance of installed plant material.
  - 4. Warranty.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 2 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
  - 2. Division 2 Section "Turf and Grasses" for coordination with lawn establishment.
  - 3. Division 2 Section "Landscape Maintenance" for plant material maintenance.

### 1.3 REFERENCES

- A. American Joint Committee on Horticultural Nomenclature Publication: Standardized Plant Names.
- B. ANSI Z60.1 - American Standard for Nursery Stock.
- C. ASTM D2607 - Classification of Peats, Mosses, Humus and Related Products.
- D. FS 0-F-241 - Fertilizers, Mixed, Commercial.

### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit complete list of plant material growers 4 weeks prior to digging of plants. List is to include names of individuals to contact, phone numbers, addresses and latest possible date for completion of tagging.
- C. Submit waterproof tags prior to tagging trip. Tags to contain following information:
  - 1. Contractor's name.
  - 2. Plant genus, species and cultivar/variety.
  - 3. Plant common name.

4. Name of nursery.
  5. Size of plant.
  6. Quantity of plant (i.e. 2 of 10)
- D. Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons of delay.
- E. Submit schedule of arrival of "specimen plant material".
- F. Submit instructions for continuing Owner maintenance. Include pruning and trimming methods and types, application frequency and recommended coverage of fertilizer; and water requirements for year-round care of installed plants. Document is to be in bound 8 ½" x 11" format. Submit prior to expiration of required maintenance period(s).
- G. Submit for approval a proposed maintenance procedure and schedule of the storage of plant materials. Trees, shrubs, groundcover and perennials stored on and off site shall be maintained by watering, fertilizing, mulching, and spraying for infestation and disease to maintain these plants in a healthy condition. Plants stored off site shall be available for inspection by the Landscape Architect.
- H. Samples of each of the following:
1. 5 lb (2 kg) of mulch for each type required for the Project, in labeled plastic bags.
  2. Edging materials and accessories to verify color selected.
- I. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Landscape Architects and Owners, and other information specified.
- 1.5 QUALITY ASSURANCE
- A. Prior to being approved, the successful bidder will be required to submit to the Landscape Architect a statement of qualifications listing the names of contact references for at least three jobs of similar scope that have been completed in the last five years. Attention is called to the fact that the installation will not be awarded to a firm that does not possess the required technical expertise and construction organization.
- B. Allow Landscape Architect option of traveling to growers facility to select trees from available stock.
- C. Allow four weeks, after receipt of list of growers, to finish tagging trees.
- D. Trees dug prior to tagging by Landscape Architect are subject to rejection.

- E. Landscape Architect will confirm the trees satisfy the requirements of ANSI Z60.1 and all special conditions stated in project manual and drawings.
- F. Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300-mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- G. Unacceptable trees will not be tagged and a different Grower will be selected by Contractor at no expense to Owner. A second tagging trip will then be scheduled.
- H. Decision by Landscape Architect to forego tagging trip does not release Contractor from responsibility of obtaining plant material which meets standards and conditions stated in project manual and drawings.
- I. Minimum three years experience installing plant material of this type required of Installer.
- J. Minimum five years experience specializing in growing and cultivating the specified material is required by of Grower.

#### 1.6 REGULATORY REQUIREMENTS

- A. Comply with regulatory requirements for fertilizer and herbicide composition.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Plant material is to be covered with tarpaulin during transport.
- B. Deliver soil conditioners and fertilizer in unopened waterproof bags showing weight, chemical analysis, and name of manufacturer. Keep materials in dry storage away from contaminants.
- C. Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Landscape Architect. Do not bend or bind tie trees or shrubs in such a manner as to damage bark, break branches, or destroy natural shape. Do not drop balled and burlapped stock during delivery. Protect plants until planted to prevent damage to root balls or desiccation of leaves.
- D. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
- E. Provide water to staged material as required to keep root balls moist.
- F. Do not remove container-grown stock from containers until planting time.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install plant life when ambient temperatures may drop below 30 degrees F or above 90 degrees F.

- B. Do not install plants when wind velocity exceeds 30 mph.
- C. Planting shall be done when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting.
- D. Conduct planting operations during recommended planting seasons. Preferable planting season is March 15 to May 30 and October 15 to December 1, inclusive.
- E. At the Subcontractor's option and full responsibility, planting operations may be conducted under unseasonable conditions without additional compensation.

#### 1.9 JOB CONDITIONS

- A. Locate above grade and underground utilities and perform Work in manner which will avoid damage. Hand excavate, as required.
- B. Maintain grade stakes set by others until removal is mutually agreed upon by concerned parties.
- C. Notify Landscape Architect, before proceeding, when conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions.
- D. Install plants after final grades are established and prior to establishment of lawns, unless otherwise approved by Landscape Architect. If planting occurs in undisturbed lawn areas or after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

#### 1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the Work of this Section with installation of underground utilities, sodding and remainder of Work associated with this Project.
- B. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations.

#### 1.11 MAINTENANCE

- B. Contractor shall maintain plant material until completion of two year guarantee period and Final Acceptance of work, as described in Part 3 of this Section

#### 1.12 GUARANTEE

- B. Plants shall be guaranteed for a period of two years after the date of Acceptance by the Owner.
  - 2. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.

- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size and color.
- C. Replace dead plants and all plants not in vigorous, thriving condition, as determined by the Architect during and at the end of the guarantee period, without cost to the Owner as soon as weather conditions permit and within the specified planting window.
  - 4. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
  - 5. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
  - 6. The guarantee of all replacement plants shall extend for an additional one year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.
- E. All bulbs shall be guaranteed to bloom vigorously the first respective blooming season after planting. Bulbs that do not bloom shall be replaced. Replacement costs shall be borne by the Landscape Contractor.

#### 1.13 FINAL INSPECTION AND FINAL ACCEPTANCE

- C. At the end of the two year guarantee period, the Architect will, upon written notice of end of guarantee period inspect the work for Final Acceptance. Requests shall be received at least ten calendar days before the anticipated date for Final Inspection.
- D. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

### PART 2 - PRODUCTS

#### 2.1 TREES, SHRUBS, GROUND COVER AND BEDDING PLANTS

- A. Plant material to be nursery grown stock conforming to ANSI Z60.1.
- B. Publication for Standardized Plant Names will govern nomenclature issues.
- C. Plans will supersede planting material schedule where a discrepancy in quantity occurs.

- D. Provide plant material which is well branched and formed, sound, vigorous, healthy, and free from disease, sun-scald, windburn, abrasion, and harmful insects, eggs, larvae and such defects as knots sun scald, injuries, abrasions and disfigurement, and shall have healthy, normal, and unbroken root systems.
- E. Provide symmetrically developed plant material, of uniform habit with straight boles and free from objectionable disfigurements. Tree leader shoots shall not be cut or broken.
- F. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
- G. Provide vigorous ground covers and vines with number and length of runners and clump size specified and proper age for the grade of plants specified. Use only vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections.
- H. Plants shall have been grown in the same or colder climatic zone of this project.
- I. Provide plants according to measurements indicated. Measure sizes before pruning and with branches in normal position. Plants larger in size than specified may be used as approved.
- J. Spray plants, budding into leaf or having soft growth, with an anti-desiccant at the nursery or collecting field before digging.

## 2.2 SOIL AMENDMENT MATERIALS

- A. Shrub and Tree Fertilizer: Tightly compressed, slow release planting tablets. Provide 50% of Nitrogen as water insoluble. The following or equal is acceptable:
  - 1. AGRIFORM Planting Tablets by:  
The Scott's Company  
1-800-492-8255
- B. Ground Cover Fertilizer: FS-0-F-241, Type 1, Class 1 with fifty percent of the elements derived from organic sources. Use fertilizer with N.P.K. ratio of 1:2:1 for Ground Cover Beds and 2:1:1 for Bedding Plant Beds.
- C. Peat Moss: Shredded, loose, sphagnum moss peat conforming to ASTM D2607; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight; 4 to 5 pH range; moisture content of 30 percent.
- D. Sphagnum Peat Moss: Sphagnum peat moss shall be imported Canadian Sphagnum peat moss, brown, low in content of woody materials, and be free of mineral matter harmful to plant life. Peat shall have an acid reaction of about 4.5 pH, and have a water absorbing capacity of 1100 to 2000 percent by weight. Peat moss shall be thoroughly pulverized before use. No native or sedge peats shall be approved.
- E. Topsoil: Topsoil for backfill shall be as specified in Section 329002 - Landscape Grading.

- F. Soil Filter Mix: 50% sand, 20% compost and 30% topsoil.
- G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- H. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- I. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.
- J. Herbicide: Comply with all applicable State and Federal Laws.
- K. Pesticide: Comply with all applicable State and Federal Laws.

## 2.3 MULCH MATERIALS

- A. Mulching Material: Shredded, dark brown/black, native hemlock mulch free of growth or germination inhibiting ingredients.
- B. Mineral Mulch: Hard durable stone, washed free of loam, sand, clay and other foreign substances, of following type, size range and color:
  - 1. Type: Rounded, natural tan/beige color.
    - a. Size Range: 1"-2"

## 2.4 MISCELLANEOUS MATERIALS

- A. Filter Fabric: Filter fabric shall be Trevira 1115, or equal approved by Landscape Architect. Trevira is manufactured by Hoechst Fibers Industries, P.O. Box 5887, Spartanburg, SC 29304 (1-800-845-7597 or 1-800-579-5479).
- B. Anti-Desiccant: Emulsion type, film-forming agent, designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
- C. Erosion Control Blanket: The following products or approved equal are acceptable:
  - 1. S75 as manufactured by North American Green for 3:1 slopes.
  - 2. C125 as manufactured by North American Green for 2:1 slopes or steeper.
- D. Aluminum Edging: Edging shall be 3/16" x 4" aluminum painted black . Edging shall be installed according to manufacturer's instructions.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify site is ready to accept Work of this section.
- B. Test drainage of plant beds and pits by filling with water twice in succession. Notify Landscape Architect of conditions permitting the retention of water in planting beds for more than twenty-four (24) hours.
- C. Prior to the excavation of planting pits, or placing tree stakes, the Contractor shall ascertain the location of utility lines, electric cables and conduits, so that proper precautions may be taken not to disturb or damage subsurface improvements. Should obstructions be found, the Contractor shall promptly notify the Landscape Architect.
- D. Beginning of installation means acceptance of existing conditions.

#### 3.2 PREPARATION OF PLANT PITS AND BEDS

- A. Plant Pits: Dig to produce vertical sides and flat, undisturbed bottoms. Scarify glazed side surfaces of pits. Size plant pits as shown on drawings.

- B. Shrub masses, hedges, groundcover and perennial beds shall be entirely excavated edge to edge and backfilled with specified backfill mixture; they shall not be treated as individual planting pits.
- C. Remove all sticks, stones, roots and other objectionable materials during tilling operations larger than one inch in diameter.
- D. Damage to paving, sidewalks or other materials shall be removed and replaced at the Contractor's expense and to the satisfaction of the Landscape Architect.

### 3.3 LAYOUT

- A. Stake tree and shrub locations with 3/4" x 2" x 18" wood stakes driven into the soil at center points of plants. Paint tops of stakes representing tree locations a color different from the stakes locating shrubs. Contractor may stake continuous uninterrupted straight runs of shrubs at each end. Outline ground cover beds.
- B. Mark all underground utilities.
- C. Notify Owner's Representative, in writing, of portions of plant material which have been staked. Allow one week for Landscape Architect to review and adjust stake locations.
- D. Plants which are planted prior to contractor receiving Landscape Architect's approval of staking and bed outlines are subject to being relocated at no cost to Owner.

### 3.4 PLANTING

- A. Setting Plants: Handle balled and burlapped and container-grown plants by ball or container. Set plants and hold in plumb position until sufficient soil has been firmly placed around roots or ball. Set plants in relation to surrounding grade so that they are even with depth at which they were grown in nursery, collecting field, or container.
- B. Place fertilizer prior to backfilling and in accordance with the manufacturer's recommendations. Ground cover plants may be planted after mulch is in place. Take care to avoid contaminating mulch with planting soil.
- C. Backfill excavations for balled and burlapped stock with planting soil mixture to approximately half the depth of the ball and then tamp and water. Carefully remove, open or fold back burlap and tying materials. Completely remove plastic wrap before the placement of backfill. Finish backfilling and tamp. Form earth saucers around isolated plants of size ample enough to hold at least 2-1/2 gallons for shrubs or 5 gallons for trees. Do not use planting stock if ball is cracked or broken before or during planting operation.
- D. Bulbs shall be planted in the locations and at the spacing indicated on the Drawings. Plant bulbs at the depths and orientation recommended by the Supplier. Do not remove the leaves until after they have lost their green color. Remove leaves by cutting.

### 3.5 FERTILIZATION, WATERING, EDGING, AND MULCHING

- A. Trees, Shrubs and perennials: Fertilize according to manufacturer's recommendations.

- B. Ground Cover Beds: Topdress beds with .12 lbs of actual phosphoric acid per cubic yard of Planting Bed Mix.
- C. Watering: Provide uniform coverage which will not cause erosion or damage to the finished surface. Water sufficiently to penetrate the planting bed to a depth of 4 inches.
- D. Uniformly edge beds or individual plants using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn. Refer to drawings for bed shape. Provide plant pits circular in shape for individual pits.
- E. Mulch within 24 hours after planting. Spread to uniform thickness of 3 inches.

### 3.6 PLANT SUPPORT

- A. Tree Anchors: Playtpus Tree Anchoring System - Rootball Fixing or approved equal. Size anchors based on tree caliper size. Install per manufacturer's instructions.

### 3.7 PRUNING AND REPAIR

- A. Plants shall be neatly pruned and or clipped to preserve the natural character of the plants (with exception to clipped shrub hedges); in a manner appropriate to the particular requirements of each plant and to the satisfaction of the Landscape Architect. Unless otherwise directed by Landscape Architect, do not cut tree leaders; remove only injured or dead branches.
- B. Remove broken or badly bruised branches with a clean cut. All pruning shall be done with sharp tools in accordance with instructions of the Owner. Accidental damage to trees occurring during the course of planting operations which is not so great as to necessitate removal of a branch or replacement of a plant shall promptly be treated as required in accordance with recognized horticultural practices.

### 3.8 CLEANING

- A. Keep worksite in clean and orderly condition as Work progresses. Leave worksite "broom clean" at end of Work.

### 3.9 MAINTENANCE

- B. See Section 32 9353 Landscape Maintenance

END OF SECTION  
SECTION 32 9000 - PLANTING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Tree, shrub, groundcover, perennial and bulb installation.
  - 2. Fertilizing, mulching, trimming, guying, wrapping and edging.
  - 3. Maintenance of installed plant material.
  - 4. Warranty.
  
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 2 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
  - 2. Division 2 Section "Turf and Grasses" for coordination with lawn establishment.
  - 3. Division 2 Section "Landscape Maintenance" for plant material maintenance.

### 1.3 REFERENCES

- A. American Joint Committee on Horticultural Nomenclature Publication: Standardized Plant Names.
- B. ANSI Z60.1 - American Standard for Nursery Stock.
- C. ASTM D2607 - Classification of Peats, Mosses, Humus and Related Products.
- D. FS 0-F-241 - Fertilizers, Mixed, Commercial.

### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit complete list of plant material growers 4 weeks prior to digging of plants. List is to include names of individuals to contact, phone numbers, addresses and latest possible date for completion of tagging.
- C. Submit waterproof tags prior to tagging trip. Tags to contain following information:
  - 1. Contractor's name.
  - 2. Plant genus, species and cultivar/variety.
  - 3. Plant common name.
  - 4. Name of nursery.
  - 5. Size of plant.
  - 6. Quantity of plant (i.e. 2 of 10)
- D. Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons of delay.
- E. Submit schedule of arrival of "specimen plant material".

- F. Submit instructions for continuing Owner maintenance. Include pruning and trimming methods and types, application frequency and recommended coverage of fertilizer; and water requirements for year-round care of installed plants. Document is to be in bound 8 ½" x 11" format. Submit prior to expiration of required maintenance period(s).
- G. Submit for approval a proposed maintenance procedure and schedule of the storage of plant materials. Trees, shrubs, groundcover and perennials stored on and off site shall be maintained by watering, fertilizing, mulching, and spraying for infestation and disease to maintain these plants in a healthy condition. Plants stored off site shall be available for inspection by the Landscape Architect.
- H. Samples of each of the following:
  1. 5 lb (2 kg) of mulch for each type required for the Project, in labeled plastic bags.
  2. Edging materials and accessories to verify color selected.
- I. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Landscape Architects and Owners, and other information specified.

#### 1.5 QUALITY ASSURANCE

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- B. Allow Landscape Architect option of traveling to growers facility to select trees from available stock.
- C. Allow four weeks, after receipt of list of growers, to finish tagging trees.
- D. Trees dug prior to tagging by Landscape Architect are subject to rejection.
- E. Landscape Architect will confirm the trees satisfy the requirements of ANSI Z60.1 and all special conditions stated in project manual and drawings.
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- G. Unacceptable trees will not be tagged and a different Grower will be selected by Contractor at no expense to Owner. A second tagging trip will then be scheduled.
- H. Decision by Landscape Architect to forego tagging trip does not release Contractor from responsibility of obtaining plant material which meets standards and conditions stated in project manual and drawings.
- I. Minimum three years experience installing plant material of this type required of Installer.

- J. Minimum five years experience specializing in growing and cultivating the specified material is required by of Grower.

#### 1.6 REGULATORY REQUIREMENTS

- A. Comply with regulatory requirements for fertilizer and herbicide composition.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Plant material is to be covered with tarpaulin during transport.
- B. Deliver soil conditioners and fertilizer in unopened waterproof bags showing weight, chemical analysis, and name of manufacturer. Keep materials in dry storage away from contaminants.
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- E. Provide water to staged material as required to keep root balls moist.
- F. Do not remove container-grown stock from containers until planting time.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install plant life when ambient temperatures may drop below 30 degrees F or above 90 degrees F.
- B. Do not install plants when wind velocity exceeds 30 mph.
- C. Planting shall be done when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting.
- D. Conduct planting operations during recommended planting seasons. Preferable planting season is March 15 to May 30 and October 15 to December 1, inclusive.
- E. At the Subcontractor's option and full responsibility, planting operations may be conducted under unseasonable conditions without additional compensation.

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- A. Locate above grade and underground utilities and perform Work in manner which will avoid damage. Hand excavate, as required.
- B. Maintain grade stakes set by others until removal is mutually agreed upon by concerned parties.
- C. Notify Landscape Architect, before proceeding, when conditions detrimental to plant growth are encountered, such as rubble fill or adverse drainage conditions.

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- A. Coordinate the Work of this Section with installation of underground utilities, sodding and remainder of Work associated with this Project.
- B. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations.

#### 1.11 MAINTENANCE

- C. Contractor shall maintain plant material until completion of two year guarantee period and Final Acceptance of work, as described in Part 3 of this Section

#### 1.12 GUARANTEE

- C. Plants shall be guaranteed for a period of two years after the date of Acceptance by the Owner.
  - 3. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.
- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size and color.
- C. Replace dead plants and all plants not in vigorous, thriving condition, as determined by the Architect during and at the end of the guarantee period, without cost to the Owner as soon as weather conditions permit and within the specified planting window.
  - 7. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
  - 8. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
  - 9. The guarantee of all replacement plants shall extend for an additional one year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.
- E. All bulbs shall be guaranteed to bloom vigorously the first respective blooming season after planting. Bulbs that do not bloom shall be replaced. Replacement costs shall be borne by the Landscape Contractor.

### 1.13 FINAL INSPECTION AND FINAL ACCEPTANCE

- E. At the end of the two year guarantee period, the Architect will, upon written notice of the end of the guarantee period inspect the work for Final Acceptance. Requests shall be received at least ten calendar days before the anticipated date for Final Inspection.
- F. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

## PART 2 - PRODUCTS

### 2.1 TREES, SHRUBS, GROUND COVER AND BEDDING PLANTS

- A. Plant material to be nursery grown stock conforming to ANSI Z60.1.
- B. Publication for Standardized Plant Names will govern nomenclature issues.
- C. Plans will supersede planting material schedule where a discrepancy in quantity occurs.
- D. Provide plant material which is well branched and formed, sound, vigorous, healthy, and free from disease, sun-scald, windburn, abrasion, and harmful insects, eggs, larvae and such defects as knots sun scald, injuries, abrasions and disfigurement, and shall have healthy, normal, and unbroken root systems.
- E. Provide symmetrically developed plant material, of uniform habit with straight boles and free from objectionable disfigurements. Tree leader shoots shall not be cut or broken.
- F. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
- G. Provide vigorous ground covers and vines with number and length of runners and clump size specified and proper age for the grade of plants specified. Use only vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections.
- H. Plants shall have been grown in the same or colder climatic zone of this project.
- I. Provide plants according to measurements indicated. Measure sizes before pruning and with branches in normal position. Plants larger in size than specified may be used as approved.
- J. Spray plants, budding into leaf or having soft growth, with an anti-desiccant at the nursery or collecting field before digging.

### 2.2 SOIL AMENDMENT MATERIALS

- A. Shrub and Tree Fertilizer: Tightly compressed, slow release planting tablets. Provide 50% of Nitrogen as water insoluble. The following or equal is acceptable:
  - 1. AGRIFORM Planting Tablets by:  
The Scott's Company

1-800-492-8255

- B. Ground Cover Fertilizer: FS-0-F-241, Type 1, Class 1 with fifty percent of the elements derived from organic sources. Use fertilizer with N.P.K. ratio of 1:2:1 for Ground Cover Beds and 2:1:1 for Bedding Plant Beds.
- C. Peat Moss: Shredded, loose, sphagnum moss peat conforming to ASTM D2607; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight; 4 to 5 pH range; moisture content of 30 percent.
- D. Sphagnum Peat Moss: Sphagnum peat moss shall be imported Canadian Sphagnum peat moss, brown, low in content of woody materials, and be free of mineral matter harmful to plant life. Peat shall have an acid reaction of about 4.5 pH, and have a water absorbing capacity of 1100 to 2000 percent by weight. Peat moss shall be thoroughly pulverized before use. No native or sedge peats shall be approved.
- E. Topsoil: Topsoil for backfill shall be as specified in Section 329002 - Landscape Grading.
- F. Soil Filter Mix: 50% sand, 20% compost and 30% topsoil.
- G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- H. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- I. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.
- J. Herbicide: Comply with all applicable State and Federal Laws.
- K. Pesticide: Comply with all applicable State and Federal Laws.

## 2.3 MULCH MATERIALS

- A. Mulching Material: Shredded, dark brown/black, native hemlock mulch free of growth or germination inhibiting ingredients.
- B. Mineral Mulch: Hard durable stone, washed free of loam, sand, clay and other foreign substances, of following type, size range and color:
  - 1. Type: Rounded, natural tan/beige color.
    - a. Size Range: 1"-2"

## 2.4 MISCELLANEOUS MATERIALS

- A. Filter Fabric: Filter fabric shall be Trevira 1115, or equal approved by Landscape Architect. Trevira is manufactured by Hoechst Fibers Industries, P.O. Box 5887, Spartanburg, SC 29304 (1-800-845-7597 or 1-800-579-5479).

- B. Anti-Desiccant: Emulsion type, film-forming agent, designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
- C. Erosion Control Blanket: The following products or approved equal are acceptable:
  - 1. S75 as manufactured by North American Green for 3:1 slopes.
  - 2. C125 as manufactured by North American Green for 2:1 slopes or steeper.
- D. Aluminum Edging: Edging shall be 3/16" x 4" aluminum painted black . Edging shall be installed according to manufacturer's instructions.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify site is ready to accept Work of this section.
- B. Test drainage of plant beds and pits by filling with water twice in succession. Notify Landscape Architect of conditions permitting the retention of water in planting beds for more than twenty-four (24) hours.
- C. Prior to the excavation of planting pits, or placing tree stakes, the Contractor shall ascertain the location of utility lines, electric cables and conduits, so that proper precautions may be taken not to disturb or damage subsurface improvements. Should obstructions be found, the Contractor shall promptly notify the Landscape Architect.
- D. Beginning of installation means acceptance of existing conditions.

#### 3.2 PREPARATION OF PLANT PITS AND BEDS

- A. Plant Pits: Dig to produce vertical sides and flat, undisturbed bottoms. Scarify glazed side surfaces of pits. Size plant pits as shown on drawings.



- B. Shrub masses, hedges, groundcover and perennial beds shall be entirely excavated edge to edge and backfilled with specified backfill mixture; they shall not be treated as individual planting pits.
- C. Remove all sticks, stones, roots and other objectionable materials during tilling operations larger than one inch in diameter.
- D. Damage to paving, sidewalks or other materials shall be removed and replaced at the Contractor's expense and to the satisfaction of the Landscape Architect.

### 3.3 LAYOUT

- A. Stake tree and shrub locations with 3/4" x 2" x 18" wood stakes driven into the soil at center points of plants. Paint tops of stakes representing tree locations a color different from the stakes locating shrubs. Contractor may stake continuous uninterrupted straight runs of shrubs at each end. Outline ground cover beds.
- B. Mark all underground utilities.
- C. Notify Owner's Representative, in writing, of portions of plant material which have been staked. Allow one week for Landscape Architect to review and adjust stake locations.
- D. Plants which are planted prior to contractor receiving Landscape Architect's approval of staking and bed outlines are subject to being relocated at no cost to Owner.

### 3.4 PLANTING

- A. Setting Plants: Handle balled and burlapped and container-grown plants by ball or container. Set plants and hold in plumb position until sufficient soil has been firmly placed around roots or ball. Set plants in relation to surrounding grade so that they are even with depth at which they were grown in nursery, collecting field, or container.
- B. Place fertilizer prior to backfilling and in accordance with the manufacturer's recommendations. Ground cover plants may be planted after mulch is in place. Take care to avoid contaminating mulch with planting soil.
- C. Backfill excavations for balled and burlapped stock with planting soil mixture to approximately half the depth of the ball and then tamp and water. Carefully remove, open or fold back burlap and tying materials. Completely remove plastic wrap before the placement of backfill. Finish backfilling and tamp. Form earth saucers around isolated plants of size ample enough to hold at least 2-1/2 gallons for shrubs or 5 gallons for trees. Do not use planting stock if ball is cracked or broken before or during planting operation.
- D. Bulbs shall be planted in the locations and at the spacing indicated on the Drawings. Plant bulbs at the depths and orientation recommended by the Supplier. Do not remove the leaves until after they have lost their green color. Remove leaves by cutting.



### 3.5 FERTILIZATION, WATERING, EDGING, AND MULCHING

- A. Trees, Shrubs and perennials: Fertilize according to manufacturer's recommendations.
- B. Ground Cover Beds: Topdress beds with .12 lbs of actual phosphoric acid per cubic yard of Planting Bed Mix.
- C. Watering: Provide uniform coverage which will not cause erosion or damage to the finished surface. Water sufficiently to penetrate the planting bed to a depth of 4 inches.
- D. Uniformly edge beds or individual plants using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn. Refer to drawings for bed shape. Provide plant pits circular in shape for individual pits.
- E. Mulch within 24 hours after planting. Spread to uniform thickness of 3 inches.

### 3.6 PLANT SUPPORT

- A. Tree Anchors: Playtpus Tree Anchoring System - Rootball Fixing or approved equal. Size anchors based on tree caliper size. Install per manufacturer's instructions.

### 3.7 PRUNING AND REPAIR

- A. Plants shall be neatly pruned and or clipped to preserve the natural character of the plants (with exception to clipped shrub hedges); in a manner appropriate to the particular requirements of each plant and to the satisfaction of the Landscape Architect. Unless otherwise directed by Landscape Architect, do not cut tree leaders; remove only injured or dead branches.
- B. Remove broken or badly bruised branches with a clean cut. All pruning shall be done with sharp tools in accordance with instructions of the Owner. Accidental damage to trees occurring during the course of planting operations which is not so great as to necessitate removal of a branch or replacement of a plant shall promptly be treated as required in accordance with recognized horticultural practices.

### 3.8 CLEANING

- A. Keep worksite in clean and orderly condition as Work progresses. Leave worksite "broom clean" at end of Work.

### 3.9 MAINTENANCE

- C. See Section 32 9353 Landscape Maintenance

END OF SECTION



## Appendix 4: UConn Landscape Master Plan List of Recommended Woody Plants

### Deciduous Trees

Freeman Maple (*Acer x freemanii*)  
Japanese Maple (*Acer palmatum*)  
Red Maple (*Acer rubrum*)  
Silver Maple (*Acer saccharinum*)  
Sugar Maple (*Acer saccharum*)  
Red Horse Chestnut (*Aesculus x carnea*)  
Ohio Buckeye (*Aesculus glabra*)  
Horse Chestnut (*Aesculus hippocastanum*)  
Bottlebrush Buckeye (*Aesculus parviflora*)  
Red Buckeye (*Aesculus pavia*)  
Juneberry (*Amelanchier arborea*)  
Shadblow Serviceberry (*Amelanchier canadensis*)  
Apple Serviceberry (*Amelanchier x grandiflora*)  
Allegheny Serviceberry (*Amelanchier laevis*)  
Yellow Birch (*Betula alleghaniensis*)  
Black Birch (*Betula nigra*)  
White Birch (*Betula papyrifera*)  
Ironwood (*Carpinus caroliniana*)  
Bitternut Hickory (*Carya condiformis*)  
Pignut Hickory (*Carya glabra*)  
Shagbark Hickory (*Carya ovata*)  
Sugar Hackberry (*Celtis laevigata*)  
Hackberry (*Celtis occidentalis*)  
Redbud (*Cercis canadensis*)  
Yellowwood (*Cladrastus kentuckea*)  
Alternate Leaf Dogwood (*Cornus alternifolia*)  
Flowering Dogwood (*Cornus florida*)  
Thornless Cockspur Hawthorn (*Crataegus crus-galli inermis*)  
American Beech (*Fagus grandifolia*)  
White Ash (*Fraxinus americana*)  
Green ash (*Fraxinus pensylvanica*)  
Ginkgo (*Ginkgo biloba*)  
Honeylocust (*Gleditsia triacanthos*)  
Kentucky coffee tree (*Gymnocladus dioicius*)  
Vernal Witchhazel (*Hamamelis virginiana*)  
Butternut (*Juglans cinerea*)  
Black Walnut (*Juglans nigra*)  
Tamarack (*Larix laricina*)  
European Larch (*Larix decidua*)

Japanese Larch (*Larix kaempferi*)  
Sweetgum (*Liquidambar styraciflua*)  
Tulip Tree (*Liriodendron tulipifera*)  
Cucumber magnolia (*Magnolia acuminata*)  
Crabapple (multiple species and *malus* cultivars)  
Dawn Redwood (*Metasequoia glyptostroboides*)  
Black Gum (*Nyssa sylvatica*)  
Hop Hornbeam (*Ostrya virginiana*)  
Sourwood (*Oxydendrum arborea*)  
London Planetree (*Platanus x acerifolia*)  
Sycamore (*Platanus occidentalis*)  
White Poplar (*Populus alba*)  
Cottonwood (*Populus deltoides*)  
Trembling Aspen (*Populus tremuloides*)  
Wild Black Cherry (*Prunus serotina*)  
Golden Larch (*Pseudolarix amabilis*)  
White Oak (*Quercus alba*)  
Swamp White Oak (*Quercus bicolor*)  
Scarlet Oak (*Quercus coccinea*)  
Shingle Oak (*Quercus imbricaria*)  
Bur Oak (*Quercus macrocarpa*)  
Pin Oak (*Quercus palustris*)  
Red Oak (*Quercus rubra*)  
Black Oak (*Quercus velutina*)  
Black Locust (*Robinia pseudoacacia*)  
Weeping White Willow (*Salix alba* 'Tristis')  
Sassafras (*Sassafras albidum*)  
Bald Cypress (*Taxodium distichum*)  
Basswood (*Tilia americana*)  
Littleleaf Linden (*Tilia cordata*)  
Pendant Silver Linden (*Tilia petiolaris*)  
Silver Linden (*Tilia tomentosa*)  
American Elm (*Ulmus americana* 'Valley Forge')

### Evergreen Trees

Balsam Fir (*Abies balsamea*)  
White Fir (*Abies concolor*)  
Fraser Fir (*Abies fraseri*)  
American Holly (*Ilex opaca*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Norway Spruce (*Picea abies*)



White Spruce (*Picea glauca*)  
Black Spruce (*Picea mariana*)  
Red Spruce (*Picea rubens*)  
White Pine (*Pinus strobus*)  
Douglas Fir (*Pseudotsuga menziesii*)  
Eastern White Cedar (*Thuja occidentalis*)  
Eastern Hemlock (*Tsuga canadensis*)

#### **Evergreen Shrubs**

Boxwood (*Buxus sempervirens*)  
Holly (*Ilex* - multiple species)  
Juniper (*Juniperus* - multiple species)  
Mountain Pieris (*Pieris floribunda*)  
Japanese Pieris (*Pieris japonica*)  
Rhododendron (*Rhododendron* - multiple species)  
Yew (*Taxus* - multiple species and cultivars)  
Arborvitae (*Thuja* - multiple species and cultivars)  
Mountain Laurel (*Kalmia latifolia*)

#### **Deciduous Shrubs**

Red Chokeberry (*Aronia arbutifolia*)  
Carolina Allspice (*Calycanthus florida*)  
Buttonbush (*Cephalanthus occidentalis*)  
Quince (*Chaenomeles speciosa*)  
Fringetree (*Chionanthus virginicus*)

Summersweet (*Clethra alnifolia*)  
Tatarian Dogwood (*Cornus alba*)  
Cornellian Cherry Dogwood (*Cornus mas*)  
Gray Dogwood (*Cornus racemosa*)  
Smoketree (*Cotinus coggygria*)  
Cotoneaster (*Cotoneaster* - multiple species)  
Redvein Enkianthus (*Enkianthus campanulatis*)  
Forsythia (*Forsythia* - multiple species)  
Dwarf Fothergilla (*Fothergilla gardenii*)  
Large Fothergilla (*Fothergilla major*)  
Hydrangea (*Hydrangea* - multiple species)  
Virginia Sweetspire (*Itea virginica*)  
Privet (*Ligustrum* - multiple species)  
Spicebush (*Lindera benzoin*)  
Bayberry (*Myrica pensylvanica*)  
Deciduous Azalea (*Rhododendron* - multiple species)  
Fragrant Sumac (*Rhus aromatica*)  
Staghorn Sumac (*Rhus typhina*)  
Rose (*Rosa* - multiple species and cultivars)  
Spirea (*Spirea* - multiple species and cultivars)  
Lilac (*Syringa* - multiple species and cultivars)  
Lowbush Blueberry (*Vaccinium angustifolium*)  
Highbush Blueberry (*Vaccinium corymbosum*)  
Viburnum (*Viburnum* - multiple species)



## Appendix 5: Absent or Underrepresented Plants (UConn Plant Science)

<i>Abeliophyllum distichum</i>	<i>Betula maximowicziana</i>	<i>Cornus Rutgers Hybrids</i>
<i>Abies balsamea</i>	<i>Betula pendula</i>	<i>Cornus sericea/alba</i>
<i>Abies concolor</i>	<i>Betula platyphylla</i>	<i>Corylopsis glabrescens</i>
<i>Abies fraseri</i>	<i>Betula populifolia</i>	<i>Corylus avellana</i>
<i>Abies holophylla</i>	<i>Betula utilis</i>	<i>Corylus colurna</i>
<i>Abies homolepis</i>	<i>Buddleia davidii</i>	<i>Corylus americana</i>
<i>Abies koreana</i>	<i>Buxus microphylla</i>	<i>Cotinus coggygia</i>
<i>Abies nordmanniana</i>	<i>Buxus sempervirens</i>	<i>Cotinus obovatus</i>
<i>Abies procera</i>	<i>Callicarpa sp.</i>	<i>Cotoneaster acutifolius</i>
<i>Abies veitchii</i>	<i>Calluna vulgaris</i>	<i>Cotoneaster apiculatus</i>
<i>Acer buergerianum</i>	<i>Calycanthus floridus</i>	<i>Cotoneaster dammeri</i>
<i>Acer carpinifolium</i>	<i>Calycanthus hybrids</i>	<i>Cotoneaster horizontalis</i>
<i>Acer cissifolium</i>	<i>Campsis radicans</i>	<i>Cotoneaster lucidus</i>
<i>Acer davidii</i>	<i>Caragana arborescens</i>	<i>Cotoneaster multiflorus</i>
<i>Acer ginnala</i>	<i>Carpinus caroliniana</i>	<i>Cotoneaster salicifolius</i>
<i>Acer japonicum</i>	<i>Carpinus japonica</i>	<i>Crataegus crusgalli</i>
<i>Acer negundo</i>	<i>Carya cordiformis</i>	<i>Crataegus laevigata</i>
<i>Acer nikoense</i>	<i>Carya glabra</i>	<i>Crataegus mollis</i>
<i>Acer pensylvanicum</i>	<i>Carya ovata</i>	<i>Crataegus monogyna</i>
<i>Acer pseudosieboldianum</i>	<i>Carya tomentosa</i>	<i>Crataegus phaenopyrum</i>
<i>Acer saccharinum</i>	<i>Caryopteris x clandonensis</i>	<i>Crataegus viridis</i>
<i>Acer tataricum</i>	<i>Castanea mollissima</i>	<i>Crataegus x lavalleyi</i>
<i>Acer triflorum</i>	<i>Catalpa speciosa</i>	<i>Cryptomeria japonica</i>
<i>Acer truncatum</i>	<i>Ceanothus americanus</i>	<i>Cydonia oblonga</i>
<i>Actinidia arguta</i>	<i>Cedrus atlantica</i>	<i>Daphne caucasica</i>
<i>Actinidia kolomikta</i>	<i>Celastrus scandens</i>	<i>Daphne cneorum</i>
<i>Aesculus flava</i>	<i>Celtis laevigata</i>	<i>Daphne mezereum</i>
<i>Aesculus glabra</i>	<i>Celtis occidentalis</i>	<i>Daphne x burkwoodii</i>
<i>Aesculus hippocastanum</i>	<i>Cephalanthus occidentalis</i>	<i>Davidia involucrata</i>
<i>Aesculus parviflora</i>	<i>Cercidiphyllum magnificum</i>	<i>Deutzia gracilis</i>
<i>Aesculus pavia</i>	<i>Cercis canadensis</i>	<i>Deutzia scabra</i>
<i>Aesculus x carnea 'Briotii'</i>	<i>Chaenomeles japonica</i>	<i>Deutzia x lemoinei</i>
<i>Ailanthus altissima (male)</i>	<i>Chaenomeles speciosa</i>	<i>Diervilla sessilifolia</i>
<i>Akebia quinata</i>	<i>Chamaecyparis nootkatensis</i>	<i>Diospyros virginiana</i>
<i>Alnus glutinosa</i>	<i>Chamaecyparis pisifera</i>	<i>Dirca palustris</i>
<i>Amelanchier stolonifera</i>	<i>Chamaecyparis thyoides</i>	<i>Elaeagnus angustifolia</i>
<i>Aralia elata</i>	<i>Chionanthus retusus</i>	<i>Eleutherococcus sieboldianus</i>
<i>Aralia spinosa</i>	<i>Chionanthus virginicus</i>	<i>Enkianthus campanulatus</i>
<i>Aristolochia macrophylla (durior)</i>	<i>Cladrastis kentuckea</i>	<i>Erica carnea</i>
<i>Aronia arbutifolia</i>	<i>Clematis hybrids</i>	<i>Eucommia ulmoides</i>
<i>Aronia melanocarpa</i>	<i>Clematis terniflora</i>	<i>Euonymus bungeanus</i>
<i>Asimina triloba</i>	<i>Clematis virginiana</i>	<i>Euonymus europaeus</i>
<i>Berberis julianae</i>	<i>Clethra alnifolia</i>	<i>Evodia daniellii</i>
<i>Berberis koreana</i>	<i>Clethra barbinervis</i>	<i>Exochorda hybrids</i>
<i>Berberis x mentorensis</i>	<i>Comptonia peregrina</i>	<i>Exochorda racemosa</i>
<i>Betula alleghaniensis</i>	<i>Cornus alternifolia</i>	<i>Fagus grandifolia</i>
<i>Betula davurica</i>	<i>Cornus amomum</i>	<i>Forsythia dwarf cultivars</i>
<i>Betula lenta</i>	<i>Cornus mas</i>	<i>Forsythia mandschurica</i>
	<i>Cornus racemosa</i>	<i>Forsythia ovata</i>



Forsythia suspensa var. sieboldii  
Forsythia viridissima  
Fothergilla major  
Franklinia alatamaha  
Fraxinus excelsior  
Fraxinus ornus  
Fraxinus pennsylvanica  
Fraxinus quadrangulata  
Gymnocladus dioicus  
Hamamelis mollis  
Hamamelis virginiana  
Heptacodium miconioides  
Hibiscus syriacus  
Hippophae rhamnoides  
Hovenia dulcis  
Hydrangea anomala subsp.  
petiolaris  
Hydrangea arborescens  
Hydrangea paniculata  
Hypericum frondosum  
Hypericum prolificum  
Ilex decidua  
Ilex opaca  
Ilex pedunculosa  
Itea virginica  
Juglans cinerea  
Juglans nigra  
Juniperus communis  
Juniperus horizontalis  
Juniperus rigida  
Juniperus sabina  
Juniperus scopulorum  
Juniperus squamata  
Juniperus virginiana  
Kalmia latifolia  
Kalopanax pictus  
Kerria japonica  
Koelreuteria paniculata  
Kolkwitzia amabilis  
Laburnum alpinum  
Laburnum anagyroides  
Laburnum x watereri  
Larix decidua  
Larix kaempferi  
Larix laricina  
Leucothoe axillaris  
Leucothoe fontanesiana  
Leucothoe racemosa  
Lindera benzoin  
Lonicera fragrantissima  
Lonicera sempervirens  
Lonicera x heckrottii  
Maackia amurensis  
Maclura pomifera  
Magnolia acuminata  
Magnolia tripetala  
Mahonia aquifolium  
Metasequoia glyptostroboides  
Microbiota decussata  
Morus alba  
Morus nigra  
Morus Pendula  
Morus rubra  
Myrica gale  
Myrica pennsylvanica  
Neviusia alabamensis  
Nyssa sylvatica  
Ostrya virginiana  
Oxydendrum arboreum  
Parrotia persica  
Philadelphus coronarius  
Philadelphus hybrids  
Photinia villosa  
Physocarpus opulifolius  
Picea engelmannii  
Picea glauca  
Picea omorika  
Picea orientalis  
Picea pungens  
Pieris floribunda  
Pinus albicaulis  
Pinus aristata  
Pinus bungeana  
Pinus densiflora  
Pinus flexilis  
Pinus koraiensis  
Pinus mugo  
Pinus nigra  
Pinus parviflora  
Pinus ponderosa  
Pinus resinosa  
Pinus rigida  
Pinus sylvestris  
Pinus virginiana  
Platanus occidentalis  
Platycladus orientalis  
Polygonum aubertii  
Populus alba  
Populus deltoides  
Populus grandidentata  
Populus nigra  
Populus tremuloides  
Potentilla fruticosa  
Prinsepia sinensis  
Prunus americana  
Prunus avium  
Prunus cerasifera  
Prunus glandulosa  
Prunus laurocerasus  
'Schipkaensis'  
Prunus maackii  
Prunus maritima  
Prunus nigra  
Prunus pennsylvanica  
Prunus sargentii  
Prunus serotina  
Prunus serrula  
Prunus serrulata  
Prunus triloba var. multiplex  
Prunus virginiana  
Prunus x cistena  
Prunus x incam  
Prunus x yedoensis  
Pseudocyonia sinensis  
Pseudolarix amabilis  
(kaempferi)  
Pseudotsuga menziesii  
Ptelea trifoliata  
Pterocarya fraxinifolia  
Pterostyrax hispida  
Pyracantha coccinea  
Pyrus communis  
Pyrus salicifolia 'Silver Frost'  
Quercus acutissima  
Quercus bicolor  
Quercus coccinea  
Quercus illicifolia  
Quercus imbricaria  
Quercus macrocarpa  
Quercus muehlenbergii  
Quercus phellos  
Quercus prinus  
Quercus robur  
Quercus shumardii  
Quercus velutina  
Rhododendron arborescens  
Rhododendron atlanticum  
Rhododendron bakeri  
Rhododendron calendulaceum  
Rhododendron carolinianum  
Rhododendron dauricum  
Rhododendron 'Exbury hybrids'  
Rhododendron maximum  
Rhododendron obtusum  
Rhododendron periclymenoides  
Rhododendron schlippenbachii  
Rhododendron vaseyi  
Rhododendron yakusimanum



Rhododendron yedoense	Syringa patula 'Miss Kim'	Viburnum x rhytidophylloides
poukhanense	Syringa reticulata	Weigela florida
Rhodotypos scandens	Syringa villosa	Weigela middendorffiana
Rhus aromatica	Syringa vulgaris	Wisteria floribunda
Rhus copallina	Syringa x chinensis	Wisteria sinensis
Rhus glabra	Tamarix parviflora	Xanthoceras sorbifolium
Rhus typhina	Taxodium ascendens	Xanthorrhiza simplicissima
Ribes alpinum	Taxodium distichum	Zanthoxylum americanum
Ribes odoratum	Taxus baccata 'Repandens'	Zenobia pulverenta
Robinia hispida	Taxus canadensis	
Robinia pseudoacacia	Thuja plicata	
Rosa glauca	Tilia americana	
Rosa hugonis	Tilia heterophylla	
Rosa hybrids	Tilia mongolica	
Rosa moyesii	Tilia platyphyllos	
Rosa rugosa	Tilia tomentosa	
Rosa virginiana	Tilia x euchlora	
Salix alba	Tilia x europaea	
Salix caprea	Tsuga caroliniana	
Salix matsudana	Tsuga chinensis	
Salix melanostachys	Tsuga diversifolia	
Salix purpurea	Tsuga heterophylla	
Salix sachalinensis 'Sekka'	Ulmus americana 'Valley Forge'	
Salix x blanda	Ulmus carpinifolia	
Sambucus canadensis	Ulmus glabra	
Sambucus pubens	Ulmus parvifolia	
Sambucus racemosa	Ulmus rubra	
Sassafras albidum	Ulmus x hollandica	
Schizophragma hydrangeoides	Vaccinium angustifolium	
Shepherdia argentea	Vaccinium corymbosum	
Shepherdia canadensis	Viburnum acerifolium	
Sinocalycanthus chinensis	Viburnum alnifolium	
Sophora japonica	Viburnum carlesii	
Sorbaria sorbifolia	Viburnum cassinoides	
Sorbus alnifolia	Viburnum dentatum	
Sorbus americana	Viburnum dilatatum	
Sorbus aucuparia	Viburnum farreri	
Spiraea japonica	Viburnum lantana	
Spiraea prunifolia	Viburnum lentago	
Spiraea x arguta	Viburnum opulus	
Spiraea x bumalda	Viburnum plicatum var.	
Spiraea x vanhouttei	tomentosum	
Staphylea trifolia	Viburnum prunifolium	
Stephandra incisa	Viburnum rhytidophyllum	
Styrax americanus	Viburnum sargentii	
Styrax japonicus	Viburnum setigerum	
Styrax obassia	Viburnum sieboldii	
Symphoricarpos albus	Viburnum trilobum	
Symphoricarpos orbiculatus	Viburnum wrightii	
Symplocos paniculata	Viburnum x burkwoodii	
Syringa laciniata	Viburnum x carlcephalum	
Syringa meyeri	Viburnum x juddii	
Syringa oblata	Viburnum x pragense	



