

SECTION 32 9300

TREES, PLANTS, AND GROUND COVERS

PART 1 GENERAL

1.00 RELATED DOCUMENTS

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

1.01 WORK INCLUDED

- A. Provide all materials and equipment, and do all work required to complete the planting, as indicated on the Drawings and as specified.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 01 45 00, QUALITY CONTROL; Topsoil and other planting materials testing.
 - 2. Section 31 23 00, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill and establishment of subgrade elevations.
 - 4. Section 32 91 19, LANDSCAPE GRADING.
 - 5. Section 32 92 00, LAWNS AND GRASSES.

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. All standards shall include the latest additions and amendments as of the date of advertisement for bids.

- 1. American National Standards Institute, Inc. (ANSI):

Z60.1	American Standard for Nursery Stock (Sponsor: American Nursery and Landscape Association)
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A 300	American National Standards for Tree Care Operations
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- 2. American Society for Testing and Materials (ASTM):

C 136	Sieve Analysis of Fine and Coarse Aggregates
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D 422	Particle-Size Analysis of Soils
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E 11	Wire-Cloth Sieves for Testing Purposes
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F 405	Corrugated Polyethylene (Pe) Tubing and Fittings
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3. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New York, NY.

1.04 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- D. Finish Grade: Elevation of finished surface of planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Area: Areas to be planted.
- H. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- J. Root Flare: Also called "trunk flare." The area at the base of the plant'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.
- K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- L. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- M. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- N. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.05 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
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- B. Manufacturer's Product Data: Manufacturer's product data and manufacturer's application instructions specific to the Project shall be submitted for the following materials:

Aluminum sulfate
Antidessicant
Fertilizer
Fungicide
Herbicide
Insecticide
Compost
Tree wrap

- C. Plant Photographs: Include color photographs in [digital] [3- by 5-inch (76- by 127-mm) print] format of each required species and size of plant material as it will be furnished to the Project.

1. Take photographs from an angle depicting true size and condition of the typical plant to be furnished.
2. Include a scale rod or other measuring device in each photograph.
3. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

- D. Certificates: Labels from the manufacturer certifying that the product meets the specified requirements shall be submitted for the following materials:

Commercial fertilizer
Limestone
Compost

- E. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for topsoil and any other materials designated by the Architect.

1.06 OWNER'S INSPECTION AND TESTING

- A. Work will be subject to inspection at all times by the Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 01 40 00 QUALITY REQUIREMENTS to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
2. Testing equipment will be provided by and tests performed by the testing laboratory.

1.07 CONTRACTOR'S INSPECTION AND TESTING

- A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.

1. Particle size analysis shall include the following gradient of mineral content:

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm

2. Chemical analysis shall include the following:
 - a. pH and buffer pH
 - b. percentage of organic content by oven-dried weight
 - c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for ornamental horticultural plants. Recommendations shall include rates at which additives are to be applied.
 - d. Soluble salt by electrical conductivity of a 1:2 soil/water sample.

1.08 SOURCE QUALITY CONTROL

- A. Identification of plant names shall be as listed in "Hortus Third".
- B. Selection of Plant Materials: Submit to the Architect the names and locations of nurseries and/or re-wholesalers or distributors proposed as sources of acceptable plant material. Inspect all plant materials to determine that they meet the requirements of this section. Proposed materials shall be flagged at the nurseries by the Contractor prior to viewing by the Architect.
1. Schedule with the Architect a time for viewing plant material at the nursery and/or re-wholesaler or distributor facilities. Trips shall be efficiently arranged to allow Architect to maximize viewing time. A minimum of four weeks shall be allowed for this viewing prior to time that plants are to be transported to the project site.
 2. Architect may choose to attach a seal to each plant, or representative samples.
 1. If requested by the Architect, photographs of plant material or representative samples of plants shall be submitted by the Contractor.
 4. If re-wholesalers or distributors are proposed as sources of plant material, the Contractor shall supply the Architect with names and locations of nurseries from which plants were obtained.

5. Viewing and/or sealing of plant materials by the Architect prior to shipping does not preclude the Architect's right to reject material for non-conformance to specifications at the site of planting.

1.09 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants. Installer shall provide evidence of the following credentials:
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
- B. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 1. Certified Landscape Technician - Exterior, with installation and maintenance specialty area(s), designated CLT-Exterior.
 2. Certified Landscape Technician - Interior, designated CLT-Interior.
 3. Certified Ornamental Landscape Professional, designated COLP.
- C. Pesticide Applicator: State licensed, commercial.
- D. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

1.10 PLANT MATERIAL QUANTITIES

- A. In the event of a discrepancy in plant material quantities between the Drawings and the Plant List(s), the larger quantity shall be required.

1.11 UNAVAILABILITY OF PLANT MATERIALS

- A. Before changes or substitutions can be made due to unavailability of plant material, submit satisfactory evidence that the Contractor has advertised for a one month period in a trade journal such as the "American Nurseryman", (Tel. 312-427-7339 and Fax: 312-427-7346), with no response, or has undertaken other methods of locating plant material acceptable to the Landscape Architect.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Transportation of Plant Material: Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Trees shall not be transported when daytime air temperatures are below 20°.
 1. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.

2. Unless otherwise authorized by the Architect, notify the Architect at least two working days in advance of the anticipated delivery date of any plant material. A legible copy of the bill of lading, showing the quantities, kinds, and sizes of materials included for each shipment shall be furnished to the Architect, if requested.
 - B. Storage: Unless specific authorization is obtained from the Architect, unprotected plants shall not remain on the site of work longer than three days prior to being planted.
 1. Plants that are not planted immediately shall be protected as follows:
 - a. Earth balls shall be kept moist, not be allowed to freeze, and their solidity carefully preserved.
 2. Bareroot plants may remain on the site of the work only 24 hours before being planted or placed in storage. During this 24 hour period, prevent injury and desiccation of plants on-site.
 - a. Roots of plants in storage shall first be puddled in a paste solution of prepared planting soil and then watered.
 - b. Plants shall then be protected and kept moist by "heeling-in" the roots or by placing the plant in a cool moist storage building. The "heeling-in" procedure shall require the plants to be separated and the roots heeled in a suitable moist soil. If plants are stored in a building, the roots shall be covered with a suitable moist mulch.
 3. Both the duration and method of storage of plant materials shall be subject to the approval of the Architect.
 - C. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress.
- 1.13 REJECTION OF MATERIALS
- A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
 - B. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Plants with roots dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn shall be subject to rejection by the Architect.
 - C. Rejected plants shall be removed from the area of work and replaced with same species of the required size and quality.
- 1.14 DIGGING/PLANTING SEASONS
- A. Spring Digging: Spring digging of plant materials may commence as soon as the ground has thawed and weather conditions make it practicable to dig at the nursery.
 1. Deciduous plants shall not be dug after they have leafed out.
 2. Broadleaf evergreens and conifers shall not be dug after new growth or candle push is visible.
 - B. Fall Digging: Fall digging of plant materials may commence after dormancy has begun and shall continue until such time as the ground has frozen or weather conditions make it impractical to work.
 1. Fall digging hazards shall conform to American National Standards Institute, Inc. (ANSI) species and guidelines.

- C. Planting Seasons: Planting shall only be performed when weather and soil conditions are suitable for planting the material specified, in accordance with locally accepted practice, approval of the Architect, and to maintain the Contractor's guarantee.

1.15 ACCEPTANCE FOR SUBSTANTIAL COMPLETION

- A. The Architect shall inspect all work of this Section for Acceptance for Substantial Completion upon receipt of written notice of completion by the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
- B. Acceptance of plant material by the Architect shall be for general conformance to specified size, character, and quality, and shall not diminish responsibility for full conformance to the Contract Documents.
- C. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect shall recommend that Acceptance for Substantial Completion of the work of this Section be given by the Owner.
- D. Acceptance in Part
 - 1. The work may be Accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.
 - 2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

1.16 MAINTENANCE

- A. The Contractor shall maintain plant material until the completion of the guarantee period and Final Acceptance of work, as described in paragraph 1.15 of this Section.

1.17 GUARANTEE

- A. Plants shall be guaranteed for a period of one year 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 a 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 period.
 - 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.

1.18 FINAL INSPECTION AND FINAL ACCEPTANCE

- A. At the end of the guarantee period, the Architect shall, upon receipt of written notice of end of guarantee period, inspect the work for Final Acceptance. Request 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 shall recommend to the Owner that Final Acceptance of the work of this Section be given.

1.19 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 - 1. Notify Architect / Construction Manager, and Owner no fewer than three days in advance of proposed interruption of each service or utility.
 - 2. Do not proceed with interruption of services or utilities without Architect's, Construction Manager's, and Owner's written permission.
- C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: May - June
 - 2. Fall Planting: Sept - October
- D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

PART 2 PRODUCTS

2.01 PLANTS

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on

Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and/or budded, and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement. Plants shall have outstanding symmetrical form; heavily branched with an even branch distribution and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance for the species between height and spread. The Architect will be the final arbiter of acceptability of plant form.
1. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 2. Small Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1.
 3. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1.
 4. Deciduous Shrubs: Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
 5. Coniferous Evergreens: Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
- C. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- D. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- E. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted in writing by the Architect.
- F. Where a size or caliper range is stated, at least 50% of the material shall be closer in size to the top of the range stated.
- G. Plants shall not be pruned before delivery.
- H. Plants indicated as "B&B" shall be balled and burlapped.
1. Unless otherwise permitted by the Architect, plants shall be nursery grown.
 2. Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.
 3. Nursery grown plants shall be dug in the current planting season. No heeled in plants or plants from cold storage that were dug in the previous season shall be accepted.

- I. Container grown plants shall be well rooted and established in the container in which they were grown. They shall have grown in the container for a sufficient length of time for the root system to hold the planting medium when taken from the container, but not long enough to become root bound. Container grown plants exceeding the sizes indicated in ANSI Z60.1 shall have containers which are not less than 75% of the ball sizes for comparable B&B plant material. Each container plant shall be inspected and circling roots loosened or pruned as needed.
 - J. Canes or Trunk(s) and Branches:
 - 1. Very well formed and sturdy with distinct leader and no crotches that may interfere with growth of leader. Trees with included bark in crotches shall be avoided.
 - 2. Branching well spaced and uniformly distributed both vertically and around the circumference to form a well balanced plant.
 - 3. Scars shall be free of rot and not exceed $\frac{1}{4}$ the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
 - 4. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
 - 5. Graft union completely healed.
 - 6. No mechanical or pest damage.
 - 7. No extreme succulence.
 - 8. Evidence of adequate twig growth in the past 2-4 years, and well-formed buds.
 - K. Foliage:
 - 1. Densely supplied with healthy, vigorous leaves of normal size, shape, color and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
 - 2. One half of the foliage should be growing on the lower $\frac{2}{3}$ of the trunk.
 - 3. No chlorosis.
 - 4. No more than 5% of total foliage affected by pest or mechanical damage.
 - L. Root System:
 - 1. Sturdily established and evenly distributed.
 - 2. Container grown plants shall be well developed and hold the soil ball together when removed from the container.
 - 3. Container grown plants shall not be excessively rootbound (except if deliberately grown rootbound to produce a dwarf plant).
- 2.02 GROUND COVER PLANTS AND VINES
- A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.
- 2.03 BULBS
- A. Bulbs shall be of sizes suitable for outdoor bedding purposes. Both grade names and sizes shall be as indicated on the Drawings and/or Plant List(s).
- 2.04 PLANTING SOIL
- A. Existing Topsoil
 - 1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect.

B. Planting Soil

1. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications. Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight.
2. Planting soil shall have the following mechanical analysis (see paragraph 1.07 for particle sizes):

Approximate Particle Distribution

Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10– 20%
Clay	15 – 20%

3. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.
4. The Contractor shall provide the Architect with planting soil test results, as specified in Paragraph 1.06, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.
5. Planting soil for ericaceous shrubs shall have a pH value range of 4.5 to 5.0.

2.05 COMPOST

- A. Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. Pine bark shall be carbon source. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

1. Minimum thermophilic bioreduction time of four months with aeration based on temperature monitoring. Compost must be under cover during a minimum curing time of four weeks.
2. Thermophilic temperatures must be sustained at or above 150 degrees F. for eight weeks for weed seed and pathogen sterilization.
3. Finished compost shall be screened to minus ½ in., protected from any outside contaminants during and after screening and curing.
4. Finished compost shall fall below the following limits:

Ammonium (NH ₄ -N)	0 PPM
Magnesium (Mg)	70 PPM
Iron (Fe)	3.8 PPM
Manganese (Mn)	1.0 PPM
Copper (Cu)	.10 PPM
Zinc (Zn)	.15 PPM
Soluble salts	5.50 mmho/cm

pH shall fall between 6.0 and 7.0

- B. Pine Bark Humus: shall be aged and fully decomposed pine bark humus screened to minus ½ in. Screened bark humus shall fall below the following limits:

Ammonium (NH ₄ -N)	20 PPM
Magnesium (Mg)	5.0 PPM
Iron (Fe)	8.0 PPM
Manganese (Mn)	1.0 PPM
Copper (Cu)	.10 PPM
Zinc (Zn)	.15 PPM
Soluble salts	0.50 mmho/cm

pH shall fall between 4.0 and 7.0

2.06 LIMESTONE

- A. Limestone shall be an approved agricultural limestone containing no less than 50% of total carbonates, and 25% total magnesium with a neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a No. 100 U.S. Standard Sieve, and 98% will pass through a No. 20 U.S. Standard Sieve. The lime shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

2.07 ALUMINUM SULFATE

- A. Aluminum sulfate shall be unadulterated and shall be delivered in containers with the name of the material and manufacturer and net weight of contents.

2.08 WATER

- A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

2.09 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency. Manufacturer's literature shall be submitted for approval.

- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.10 LIQUID BIOLOGICAL AMENDMENTS (IN LIEU OF FERTILIZER)

- A. Liquid Biological Amendments standards:

1. Desired Levels Of Organisms (Direct Microscopy)
 - 10 to 150 or more µg active bacteria /ml.

- 150 µg to 300 or more µg total bacteria /ml compost tea^[SEP] 2 to 10 µg or more active fungi /ml.
 - 5 to 20 or more µg total fungal biomass/ml.
 - 2,000 or more protozoa ^[SEP] 1,000 or more flagellates^[SEP] 1,000 or more amoebae^[SEP] 10 – 30 ciliates.
 - 2 to 10 BENEFICIAL nematodes/ ml (desired; typically lacking in tea)^[SEP] 1 - 5 bacterial-feeders^[SEP] up to 5 fungal-feeders^[SEP] 1 - 5 predatory nematodes (typically lacking in tea)^[SEP] No root-feeding nematodes.
2. Minimum of 10% active bacteria and fungi
 3. Protozoa Inoculums:
 - 4,000 or more protozoa/ml. 2,500 or more flagellates, 1,500 or more amoebae 10-30 ciliates.
 4. Nematode extractions:
 - ☐ 24-32 beneficial nematodes/ml. 10-12 bacterial-feeders, 7-10 fungal feeders and 7-10 predatory nematodes.
 5. Mycorrhizal Spores:
 - ☐ 9 Species Endo (31,200 prop/lb).
 - ☐ 11 Species Ecto (1.5 billion prop/lb)

2.11 SUPERPHOSPHATE

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

2.12 MULCH

- A. Mulch shall be a 100% fine-shredded pine bark, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than six months and no more than two years before use. No chunks 3 in. or more in size, and thicker than 1/4 in. shall be left on site.
 1. The production shall be fired with coal, using no waste or toxic fuels.
 2. The material shall be ceramic, 100% inert and completely inorganic.
 3. Material shall be capable of being blended with other soil amendments.
 4. Material shall not compress, decompose, or react with agricultural or horticultural chemicals.
 5. Material shall be fully calcined, highly predictable, consistent, and stable over time under varying soil conditions.
 6. Material shall provide excellent aeration in the soil mix.
- B. All lightweight aggregate shall be produced by the rotary kiln process and shall meet all the requirements of ASTM 330 (AASHTO M195). ASTM certification, verified by an independent testing laboratory within 2 years, shall be submitted to the architect/engineer at least 60 days prior to the start of the project. Concrete made from the aggregate with a cement content of 564 pcy (334 kg/m³) and approximately 6% air content shall have a minimum durability factor of 85% when tested in accordance with ASTM C 666.

2.13 GUYING AND STAKING MATERIALS

- A. Wood Stakes: Straight, sound, rough sawn lumber 2 in. x 2 in., if square, or 2-1/2 in. diameter, if round. Stakes shall be stained dark green. Wire for staking shall be 12 gauge steel.
- B. Wires and Cables
 - 1. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
 - 2. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
 - 3. Guy Cables: Five-strand, 3/16-inch- (4.8-mm-) diameter, galvanized-steel cable, with zinc-coated [turnbuckles] [compression springs], a minimum of 3 inches (75 mm) long, with two 3/8-inch (10-mm) galvanized eyebolts.
 - 4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
- C. Turnbuckles: 1/4" x 73/4" Galvanized steel with a 2 1/2" in. lengthwise opening fitted with eyebolts, as manufactured by Crown Bolt Inc., or approved equal.
- D. Hose: High quality braided rubber hose, 3/4 in. diameter and suitable length, black in color.
- E. Strapping: Arbortie, manufactured by DeepRoot Green Infrastructure, LLC, 530 Washington Street, San Francisco, CA 94111 Tel: 800 458 7668 or 415 781 9700; Fax: 800 277 7668 or 415 781 0191, or approved equal.

2.14 WRAPPING MATERIAL

- A. Tree wrapping material shall be equal to the following:
 - 1. Osnaburg Cloth, 4-7/8 in. wide, unbleached, pinked on both edges, manufactured by The Carnegie Textile Co., 1734 Ivanhoe Road, P.O. Box 10276, Cleveland, OH 44110.

2.15 ANTIDESICCANT

- A. Antidesiccant shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Antidesiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use.
- B. Antidesiccant shall be equal to the following:

<u>Product</u>	<u>Manufacturer</u>
Wilt-Pruf	Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426
Winter Shield	Rockland Corporation

2.16 FUNGICIDE

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended 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.

- A. Fungicide shall be LESCO Mancozeb DG, #022033, sprayable broad-spectrum fungicide, manufactured by LESCO, Inc., 1301 East 9th Street, Cleveland, OH 44114-1849, or approved equal..

2.17 INSECTICIDE

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended 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.
- B. Insecticide shall be LESCO Horticultural Oil spray, for control of insects and mites, manufactured by LESCO, Inc., 1301 East 9th Street, Cleveland, OH 44114-1849, or approved equal.

2.18 POST-EMERGENT HERBICIDE

- A. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.19 PRE-EMERGENT HERBICIDE

- A. 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.

2.20 STEEL EDGING

- A. Steel edging shall be Border Concepts Edging, "Border King", manufactured by Border Concepts, Inc., P.O. Box 471185, Charlotte, NC 28247 or approved equal. Steel edging shall be shop fabricated, primed and painted black.
1. Steel edging shall have slotted holes for staking steel edging every 30 in. o.c.
 2. Steel stakes shall be 15 in. long, tapered.
 3. Provide manufacturer's end stake and splicer unit.
 4. Provide manufacturer's optional preformed tree rings and tree squares as indicated on the Drawings.
 5. Provide manufacturer's standard touch-up paint for in field touch-up of scratched or marred areas..

2.21 CRUSHED STONE

- A. Crushed stone fill for tree pit drainage shall consist of washed, durable, crushed rock free from fine sand, slit, or rock flour. Gradation shall conform to the following:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
3/4 in.	100
1/2 in.	90-100
3/8 in.	40-70
No. 4	0-15
No. 8	0-5

2.22 DEER PROTECTION

- A. Deer control netting may be used at the Owner's and Architect's direction, to protect conifer tree plantings and shrub plantings during the course of the Work.
- B. Hardware cloth tree enclosures shall be 23 gauge, 1/4 in. galvanized steel mesh, 4 ft. high.
- C. Fasteners for hardware cloth shall be non-corrosive metal ties or galvanized wire.
- D. Deer Netting: Deer control netting shall be "C-Flex", concrete reinforcement fabric manufactured by Tenax, supplied by Metro Milorganite, Inc., Bedford Hills, NY 10507; Tel: (914) 666-3171, or approved equal.
 - 1. C-Flex fabric shall be supplied in 6 ft. wide rolls.
 - 2. Wood Stakes for Deer Netting: Straight, sound, rough sawn lumber not less than 2 in. x 2 in., if square, or 2-1/2 in. diameter, if round x 8 ft. long.

PART 3 EXECUTION

3.01 PREPARATION OF PLANT MATERIALS

- A. Immediately before digging and following consultation with the Architect, spray all evergreen or deciduous trees in full leaf with Transplant Biostimulant, applying an adequate film over trunks, branches, twigs and foliage and apply Transplant Biostimulant to the root ball area
- B. Dig, and ball and burlap (B&B) plants with firm, natural balls of earth, of depth and diameter not less than that recommended by the American Standard for Nursery stock. Plants moved with a ball will not be accepted if the ball is cracked or broken before or during planting operation. Remove all grass, weeds and accumulated soil resulting from nursery cultivation from the top of the root ball prior to digging so that the original trunk flare shows on top of the root ball.
- C. Use only natural burlap and jute twine. Do not use synthetic fibers or wire to ball and burlap root balls. Wire baskets will be acceptable if removed in accordance with these specifications.
- D. All plant material in transit or temporary stored shall be covered with burlap or similar covering to keep plants from drying out.
- E. Ship and store bare root material in refrigerated trucks and storage areas. Keep roots moist and cool until time of planting.
- F. If the construction schedule requires trees over 3 1/2" in caliper to be planted in the fall, that are of a species considered to be difficult to transplant in the fall, these trees shall be root pruned the previous spring in the nursery.
 - 1. The Architect will determine tree species to be root pruned.
 - 2. A trench shall be dug around the tree at the limit of the proposed root ball to a minimum depth of 24" and back-filled.
 - 3. A 3" high saucer shall be built around the tree outside the edge of the trench.
 - 4. The tree shall be guyed or braced.
 - 5. The tree shall be watered as necessary through the summer.
 - 6. When the tree is dug in the fall, the digging shall be done using methods that preserve the new root growth growing in the soft soil of the trench.
 - 7. Root pruning, when required, shall be done at no additional cost to the Owner, except for owner pre-purchased trees.

3.02 EXAMINATION OF SUBGRADE

- A. Examine subgrade and rough grading before planting. Alert Architect to unacceptable rough grading or subgrade conditions.

3.03 PREPARATION OF SUBGRADE

- A. After subgrade levels have been reached and immediately prior to placing planting soils, the entire subgrade area shall be loosened to a minimum depth of 12 inches utilizing the bucket of a backhoe or equivalent equipment.
- B. Any subgrade areas which have become heavily compacted (defined as exceeding 86% - 88% compaction ASTM C698 Standard Proctor) including, but not limited to, temporary parking areas, material stockpile areas, temporary roadways, construction areas, areas shown on the plans, or areas identified by Architect shall be deep-scarified. Immediately prior to placing soils, heavily compacted areas shall be loosened to a minimum depth of 36 inches using the teeth of a backhoe or other suitable equipment. Frequency of compaction tests shall be one per 200 square feet.
- C. Using a wide-track bulldozer size D-5 or smaller, compact the scarified subgrade to 86% - 88% compaction ASTM D698 Standard Proctor. Contractor shall provide shovel dug test pits to the full depth of the mitigation, where located per the direction of the Architect, in order for the Architect to review whether the work has been done as required. Backfill the pits after the review(s).
- D. Confirm that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Provide a written report to Architect indicating that subgrade has been placed to the required elevations, has been decompacted according to the Contract Documents and is ready for inspection at least 3 days prior to placing planting soil. Perform no work of placing and spreading planting mixes until elevations have been confirmed and written report has been accepted by the Owner's Representative.
- E. After the soils have been loosened and inspected, topsoil may be spread by using a wide track bulldozer size D-5 or smaller or may be dumped and spread with bucket of a backhoe from the edge of the loosened area. No rubber-tired equipment or heavy equipment except for small bulldozer shall pass over the subsoils (subgrade) after they have been loosened. If Contractor plans to utilize such areas for any use of heavy equipment, this should be carried out prior to beginning the process of loosening soils or filling in that area, or it shall be rescarified to meet this specification requirement.

3.04 SOIL DRAINAGE/DETRIMENTAL SOILS

- A. Test drainage of five planting pits in locations as directed by the Architect. Pits shall be filled with water twice in succession. The time at which water is put into the pit for a second filling shall be noted. Architect shall then be notified of the time it takes for pit to drain completely. Planting operations shall not proceed until Architect has reviewed test drainage results.
 - 1. To test drainage, dig a hole about 1 foot deep. Fill with water and allow it to drain completely. Immediately refill the pit and measure the depth of the water with a ruler. 15 minutes later, measure the drop in water in inches, and multiply by 4 to calculate how much water drains in an hour.
 - 2. Less than 1 inch per hour is poor drainage, indicating the site may stay wet for periods during the year. Plants that don't tolerate poor drainage will suffer. 1 to 6 inches of

drainage per hour is desirable. Soils that drain faster than 6 inches per hour have excessive drainage, and you should consider choosing plants that tolerate dry conditions and "droughty" soils.

- B. The Contractor shall notify the Architect in writing of all soil or drainage conditions that are considered detrimental to growth of plant material. Submit proposal and cost estimate for correction of the conditions for Architect's approval before starting work.

3.05 LAYOUT OF PLANTING AREAS

- A. Individual plant locations and outlines of shrub and ground cover areas to be planted shall be staked by the Contractor in ample time to allow inspection by the Architect.
- B. Digging shall not begin until locations are approved by the Architect.
- C. Location of trees shall be staked using color coded stakes. A different stake color shall be used for each tree species.

3.06 PLANT PIT EXCAVATION

- A. Planting pits for trees and shrubs shall be excavated to the depth and dimensions indicated on the Drawings.
- B. Excavation shall not begin until locations are approved by the Architect.

3.07 STEEL EDGING

- A. Steel edging shall be installed at locations indicated on the Drawings. Where required, edging shall be cut square and accurately to required length.
 - 1. Steel edging shall be securely staked in required position. Stakes shall be driven every 30 in. o.c. along length of edging.
 - 2. Adjacent lengths of edging shall be spliced together with manufacturer's standard splicer unit.
 - 3. Edging shall be set plumb and vertical at required line and grade. Straight sections shall not be wavy; curved sections shall be smooth and shall have no kinks or sharp bends.

3.08 SPREADING OF PLANTING SOIL

- A. Planting soil shall be spread in lifts not greater than 12 inches and compacted to a density between 82% and 86% Standard Proctor Maximum Dry Density in accordance with ASTM D698. The surface area of each lift, including the subgrade after it has been compressed by a backhoe, shall be scarified by raking prior to placing the next lift.
- B. Place and spread planting medium to a depth greater than required such that after settlement, finished grade shall conform to the lines, grades and elevations shown on the Drawings. Ensure proper drainage in an uninterrupted pattern free of hollows and pockets.
- C. Remove stiff clods, lumps, brush, roots, stumps, litter and other foreign material and stones over 1 inch diameter and legally dispose of off-site.
- D. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

3.09 PLANTING

- A. Tree, shrub, and groundcover beds shall be excavated to the depth and widths indicated on the Drawings. If the planting pit for any tree is dug too deep, soil shall be added to bring it to correct level, and the soil shall be thoroughly tamped. Walls of plant pits shall be dug so that they are sloped as shown on the Drawings, and scarified. Do not excavate compacted subgrades of adjacent pavement or structures.
- B. Plants shall be set as indicated on Drawings. Plants shall be set so that the root flare is at, or slightly above, finished grade. Plants located in poorly drained soils shall be set 2 to 4 inches above finished grade, gradually sloping between the top of the root ball and the surrounding finished grade.
- C. Plants shall be turned to the desired orientation when required by Architect.
- D. Containerized plants shall be removed from container taking care not to damage roots. The side of the root ball shall be scarified to prevent root-bound condition before positioning in planting pit.
- E. Plants shall be positioned in center of planting pits, set plumb, and rigidly braced in position until all planting soil has been tamped solidly around the balls.
- F. Pits shall be backfilled with planting soil. Soil shall be worked carefully into voids and pockets, tamping lightly every 6 in.
 - 1. When pit is two-thirds full, plants shall be watered thoroughly, and water left to soak in before proceeding.
 - 2. At this time, ropes or strings on top of balls shall be cut and shall be pulled back. Burlap or cloth wrapping shall be left intact around ball except that portions of wrap that are exposed at top of ball shall be turned under and buried. Non-biodegradable ball wrapping and support wire shall be totally removed from ball and planting pit.
 - 3. Wire baskets shall be completely cut away from sides of root ball, and removed from pit. Bottom of basket may remain.
 - 4. Remove nursery plant identification tags.
- G. Backfilling and tamping shall then be finished and a saucer formed around plant pits as indicated on the Drawings.
- H. Saucer shall be filled with water and water left to soak in. Saucer shall then be filled with water again.

3.10 BULBS

- A. Prepare flowering plant planting bed by application of fertilizers and pH-altering amendments and thoroughly rototilling into the top 12 in. prior to planting bulbs and flowering plants.
- B. Bulbs shall be planted at depths and spacing indicated on the Drawings in soil cultivated a minimum depth of 12 in. Fertilizer and bone meal shall be incorporated at this time.
 - 1. After bulbs are placed, cover halfway with planting soil, water thoroughly, then cover completely with planting soil and water again.

3.11 PERENNIALS

- A. Set out and space plants 12 inches (300 mm) apart, unless otherwise indicated on the landscape planting plan.

- B. Perennials: Dig at least 18" deep, but 12" is adequate. Work 6" humus into the top layers of soil by digging or tilling.
- I. Perennials: Check root ball after removing plant from its container. Encircling roots need to be gently loosened from the tight mat of root-bound plants. If roots are very dense at bottom of pot, slice off the bottom 1". If roots are seriously disturbed when planting, cut back some foliage to reduce the water stress that will occur. Plant at the same soil level as the plant was in its container.
- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.12 LIQUID BIOLOGICAL AMENDMENTS

- A. In all new planting areas, create injection sites made every 2 feet in a grid pattern. If the viable root zone varies from this area, adjust the pattern accordingly. Each injection site shall have a 2-inch wide diameter by 8-inch deep column that will act as leaching fields during the planting process. After the liquid and aeration injection is completed, the injection columns shall be backfilled with a custom blend of long-term granular food sources that include 25% feathermeal, 75% humate plus corresponding mycorrhizal spores.

- B. Early spring injection for both Ecto and Endo Mycorrhizal plants shall consist of 50% concentrated liquid Biological Amendment with 1/2 gallon per a 100 gallons of soluble kelp, humic acid and molasses (or fish hydrolysate).

3.13 FERTILIZER APPLICATION

- A. Fertilizer, if required, shall be applied at the rates recommended by soil testing results, as specified in paragraph 2.11.

3.14 FUNGICIDE

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Immediately after planting, all trunks of deciduous trees shall be sprayed with fungicide, applied as directed by chemical manufacturer.

3.15 PRE-EMERGENT-HERBICIDE

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Immediately after planting, pre-emergent herbicide shall be applied to ornamental shrub beds and and around base of trees, in strict accordance with chemical manufacturer's printed instructions.

3.16 POST EMERGENT-HERBICIDE

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Upon the appearance of weeds within planted areas, pre-emergent herbicide shall be applied to ornamental shrub beds and and around base of trees, in strict accordance with chemical manufacturer's printed instructions.

3.17 INSECTICIDE

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Upon the appearance of insect problems, all trunks of deciduous trees shall be sprayed with insecticide, applied as directed by chemical manufacturer.

3.18 WRAPPING

- A. Trunks of deciduous trees shall be spiral wrapped to a minimum height of the third branch or two-thirds the height of tree, whichever is higher. Wrap shall be applied from base up so

that layers overlap and shed water. Secure at the top with flexible weatherproof tape, as specified.

- B. REVIEW PSU extension Reference "Planting Ornamentals" for more additional information on wrapping standards <https://extension.psu.edu/planting-ornamentals>

3.19 STAKING AND GUYING

- A. Each tree shall be staked or guyed immediately following planting. All evergreen trees and deciduous trees over 4" caliper shall be guyed. Plants shall stand verticle and plumb after staking or guying. Set vertical stakes and space to avoid penetrating root balls or root masses. Allow enough slack to avoid rigid restraint of tree. Stakes and guys shall be installed as indicated on the Drawings.

3.20 MULCHING

- A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches (150 mm).
- B. Mulch shall be applied as follows (entire area listed shall be mulched):

<u>Plant Type</u>	<u>Mulch Area</u>	<u>Mulch Depth, in.</u>
Tree	Saucer	3
Shrub	Saucer or Bed	3
Ground Cover	Bed	2

Mulch shall not be allowed to cover the base of trunks.

- B. Compost mulch shall be uniformly applied within the area(s) indicated on the Drawings at an average depth of 2-3" Water thoroughly after application to stabilize the mulch. All foreign matter and debris larger than 2" shall be removed from the surface of the mulched area.

3.21 PRUNING

- A. Each tree and shrub shall be pruned to preserve the natural character of the plant. Pruning shall be done after delivery of plants and after plants have been inspected and approved by the Architect. Pruning procedures shall be reviewed with Architect before proceeding.
- B. Pruning shall be done with clean, sharp tools. Cuts shall be made flush, leaving no stubs. No tree paint shall be used.
- C. Dead wood, suckers, and broken, weak, interfering and badly bruised branches shall be removed.

3.22 DEER PROTECTION

- A. Install hardware cloth enclosures for all deciduous trees..
- B. For trees staked with bamboo stakes, stakes shall be inside of the enclosure, with the stakes on the northwest side of the tree (direction of the prevailing wind).
- C. Deer control netting shall be fastened to wood stakes with 3/8 in. heavy gauge staples. Wood stakes shall be buried 2 ft. deep in the ground, with 6 ft. exposed above grade to

receive netting. Size and location of fenced areas shall be determined by the Architect and the Owner.

3.23 MAINTENANCE OF PLANTING

- A. Maintenance shall begin immediately after each plant is planted and shall continue until Final Acceptance.
- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, fertilizing, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, adjusting and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in a healthy growing condition. 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.
- C. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- D. Daily watering of 1 gal./caliper inch should be delivered to the root ball of each tree during the first summer after planting. Continue through fall, reducing frequency. For trees larger than 3 inch caliper, fill saucer with 6 – 8 gallons twice per week during hot, dry weather, and once per week during cooler, wetter periods.
- E. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.
- F. Maintenance pruning of pollarded trees shall occur annually during the dormant season to remove branches 1 in. and larger in diameter and thin out sucker growth. Branches to be pruned shall be cut flush to the branch ends established in the initial pollarding. Maintenance pruning shall be done by a qualified arborist and techniques shall conform to NAA standards referenced above. Pollarding shall be reviewed with the Architect before commencing work. Additional light pruning to shape and thin crowns shall be done during the growth season as directed by the Architect.

3.24 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.25 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

3.26 WASTE MANAGEMENT

- A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION