

**International Society of Arboriculture**

**Guide for Developing Planting Specifications**

**Section 02950**

**Landscape Planting**

**Part I. General**

**I. Description of Work**

- A. Provide all exterior planting as shown on the drawings or inferable therefrom and/or as specified in accordance with the requirements of the Contract Documents.
- B. These specifications include standards necessary for and incidental to the execution and completion of planting, including hauling and spreading of topsoil, and finished grading as indicated on the prepared drawings and specified herein.
- C. Protection of existing features. During construction, protect all existing trees, shrubs, and other specified vegetation, site features and improvements, structures, and utilities specified herein and/or on submitted drawings. Removal or destruction of existing plantings is prohibited unless specifically authorized by the owner.

**II. Applicable Standards**

- A. *American National Standards for Tree Care Operations, ANSI A300.* American National Standards Institute, 11 West 42<sup>nd</sup> Street, New York, N.Y. 10036.
- B. *American Standard for Nursery Stock, ANSI Z60.1.* American Nursery and Landscape Association, 1250 Eye Street. NW, Suite 500, Washington, D.C. 20005.
- C. *Hortus Third*, The Staff of the L.H. Bailey Hortorium. 1976. MacMillan Publishing Co., New York.
- D. All standards shall include the latest additions and amendments as of the date of advertisement for bids

**III. Qualifications**

- A. Landscape planting and related work shall be performed by a firm with a minimum of five years experience specializing in this type of work. All contractors and their sub-contractors who will be performing any landscape work included in this section of the specification shall be approved by the landscape architect.

#### IV. Requirements of Regulatory Agencies

- A. Certificates of inspection shall accompany the invoice for each shipment of plants as may be required by law for transportation. File certificates with the landscape architect prior to acceptance of the material. Inspection by federal or state authorities at place of growth does not preclude rejection of the plants at the site.

#### V. Submittals

- A. Manufacturer's Data: Submit copies of the manufacturer's and/or source data for all materials specified, including soils.
- B. Samples: Submit samples of all topsoil, soil mixes, mulches, and organic materials. Samples shall weigh 1 kg (2 lb) and be packaged in plastic bags. Samples shall be typical of the lot of material to be delivered to the site and provide an accurate indication of color, texture, and organic makeup of the material.
- C. Plant Photographs: Submit color photographs of representative specimens of each type of tree and shrub on the plant list. Photos shall be 75 x 125 mm (3 x 5 in.) taken from angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph. For species where more than 20 plants are required, include a minimum of three photos that show the average plant, the best quality plant, and the worst quality plant to be provided. Label each photograph with the plant name, plant size, and name of the growing nursery.
- D. Nursery Sources: Submit a list of all nurseries that will supply plants, along with a list of the plants they will provide and the location of the nursery.
- E. Soil Test: Submit soil test analysis report for each sample of topsoil and planting mix from a soil testing laboratory approved by the landscape architect.

1. Provide a particle size analysis, including the following gradient of mineral content:

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+2 mm
Very course 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	smaller than 0.002 mm

2. Provide a chemical analysis, including 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 the testing laboratory recommendations for supplemental additions to the soil based on the requirements of horticultural plants.
  - d. Soluble salt by electrical conductivity of a 1:2, soil: water, sample measured in millimho per cm.
  - e. Cation exchange capacity (CEC).
  
- F. Material Testing: Submit the manufacturers particle size analysis, and the pH analysis and provide a description and source location for the content material of all organic materials.

## **VI. Planting Season**

*(NOTE: Planting season varies with region, climatic conditions, type of nursery stock, and other factors. Insert the appropriate planting dates for your region.)*

- A. Planting shall be done within the following dates:

Deciduous trees and shrubs \_\_\_\_\_ to \_\_\_\_\_.

Evergreen trees \_\_\_\_\_ to \_\_\_\_\_.

Exceptions: \_\_\_\_\_.

- B. Variance: If special conditions exist that warrant a variance in the above planting dates, a written request shall be submitted to the landscape architect stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of the landscape architect. Any variance in the planting season will not affect the guarantee period.

## **VII. Utility Verification**

*(NOTE: This section is important because the contractor may be responsible for damages to any unmarked utility.)*

- A. The contractor shall contact the local utility companies for verification of the location of all underground utility lines in the area of the work. The contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement.

## Part 2. Materials

### I. Topsoil

*(NOTE: The specification of soils varies from region to region. Consult local sources for available particle size distributions and other requirements. The following specification is an example for soils in an area of the mid-Atlantic region with fine-grained soils. This soil specification would be reasonable for trees and shrubs not subjected to regular compaction forces. Topsoil for lawn areas and other applications are often specified with more sand and are not covered here. Consult a soil expert for regional differences and special applications.)*

#### A. Imported Topsoil

1. Loamy, friable soil, containing a minimum of 1.5 percent by dry weight organic matter; free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 25 mm (1 in.), noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 5.5 and 6.5.
2. Soil Texture: loam soil with the following particle size distribution.

#### Approximate Particle Distribution Imported Topsoil

Gravel	Less than 10%
Coarse to medium sand	30-65%
Fine sand	5-20%
Very fine sand	0-20%
Silt	15-25%
Clay	15-25%

3. Provide a minimum of one soil sample with the accompanying soil test report per 200 cubic meters (250 cubic yards) of material required from samples obtained randomly throughout the source field location or stockpile.

#### B. Existing Topsoil

1. Existing topsoil may be used if it meets the requirements for imported topsoil or if approved by the landscape architect. Provide a minimum of one soil sample with accompanying soil test report for each topsoil type found at the site. Following the completion of the soil testing, the contractor and the landscape architect shall meet at the site prior to beginning of topsoil stripping and establish the limitations of areas where existing topsoil may be used and the depth of topsoil stripping permitted. *(NOTE: The landscape architect may test the existing soil prior to bidding the project and include the areas and depths of topsoil availability in the bid documents along with the soil test results.)*

- C. Topsoil shall not be stripped, transported, or graded if moisture content exceeds field capacity or if the soil is frozen.
- D. Topsoil stockpiles shall be protected from erosion and contamination.
- E. E. Amendments required to be added as indicated on the soil test report shall be added by the contractor at the time of spreading and/or grading.

## II. Plants

- A. Plants shall be true to species and variety specified and nursery-grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the project for at least two years. They shall have been freshly dug (during the most recent favorable harvest season).
  - 1. All plant names and descriptions shall be as defined in *Hortus Third*.
  - 2. All plants shall be grown and harvested in accordance with the *American Standard for Nursery Stock*.
  - 3. Unless approved by the landscape architect, plants shall have been grown at a latitude not more than 325 km (200 miles) north or south of the latitude of the project unless the provenance of the plant can be documented to be compatible with the latitude and cold hardiness zone of the planting location.

*(NOTE: Many tree species are sensitive to the photoperiod of their native provenance. For example, red maple stock from native southern stock will not harden off in time for northern winters.)*
- B. Unless specifically noted, all plants shall be of specimen quality, exceptionally heavy, symmetrical, and so trained or favored in development and appearance as to be unquestionably and outstandingly superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well branched, and densely foliated when in leaf; free of disease and insects, eggs, or larvae; and shall have healthy, well-developed root systems. They shall be free from physical damage or other conditions that would prevent vigorous growth.
  - 1. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, or cuts of limbs over 20 mm (3/4 in.) in diameter that are not completely closed will be rejected.
- C. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the landscape architect. Use of larger plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.

1. Caliper measurements shall be taken on the trunk 150 mm (6 in.) above the natural ground line for trees up to and including 100 mm (4 in.) in caliper, and 300 mm (12 in.) above the natural ground line for trees over 100 mm (4 in.) in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of sizes is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Measurements specified are minimum sizes acceptable after pruning, where pruning is required. Plants that meet measurements but do not possess a standard relationship between height and spread, according to the *American Standards for Nursery Stock*, shall be rejected.
- D. Substitutions of plant materials will not be permitted unless authorized in writing by the landscape architect. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price.
- E. The plant list at the end of this section, or on the drawing, is for the contractor's information only, and no guarantee is expressed or implied that quantities therein are correct or that the list is complete. The contractor shall ensure that all plant materials shown on the drawings are included in his or her bid.
- F. All plants shall be labeled by plant name. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Plant labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering.
- G. Selection and Tagging
1. Plants shall be subject to inspection for conformity to specification requirements and approval by the landscape architect at their place of growth and upon delivery. Such approval shall not impair the right of inspection and rejection during progress of the work.
  2. A written request for the inspection of plant material at their place of growth shall be submitted to the landscape architect at least ten calendar days prior to digging. This request shall state the place of growth and the quantity of plants to be inspected. The landscape architect may refuse inspection at this time if, in his or her judgment, sufficient quantities of plants are not available for inspection.
  3. All plants shall be selected and tagged by the landscape architect at their place of growth. For distant material, photographs may be submitted for pre-inspection review.
  4. All field grown deciduous trees shall be marked to indicate the trees north orientation in the nursery. Place a 1-in. diameter spot of white paint onto the north side of the tree trunk within the bottom 12 inches of the trunk.

H. Anti-Desiccants

1. Anti-desiccants, if specified, are to be applied to plants in full leaf immediately before digging or as required by the landscape architect. Anti-desiccants are to be sprayed so that all leaves and branches are covered with a continuous protective film.

#### I. Balled and Burlapped (B&B) Plant Materials

1. Trees designated B&B shall be properly dug with firm, natural balls of soil retaining as many fibrous roots as possible, in sizes and shapes as specified in the *American Standard for Nursery Stock*. Balls shall be firmly wrapped with nonsynthetic, rottable burlap and secured with nails and heavy, nonsynthetic, rottable twine. The root collar shall be apparent at surface of ball. Trees with loose, broken, processed, or manufactured root balls will not be accepted, except with special written approval before planting.

*(NOTE: Some nurseries practice result in the root flare being buried several inches deep. The top of the root ball may be at ground level, but the root flare actually is too deep. Remove the excess soil on the top of the root ball. Proper planting depth requires the root flare to be at or slightly above the finished grade.)*

#### J. Container Plants

1. Plants grown in containers shall be of appropriate size for the container as specified in the most recent edition of the *American Standard for Nursery Stock* and be free of circling roots on the exterior and interior of the root ball.
2. Container plants shall have been grown in the container long enough to have established roots throughout the growing medium.

#### K. Bareroot and Collected Plants

1. Plants designated as bareroot or collected plants shall conform to the *American Standard for Nursery Stock*.
2. Bareroot material shall not be dug or installed after bud break or before dormancy.

- L. Immediately after harvesting plants, protect from drying and damage until shipped and delivered to the planting site. Rootballs shall be checked regularly and watered sufficiently to maintain root viability.

#### M. Transportation and Storage of Plant Material

*(NOTE: No matter how good plant materials may be at a nursery, how that material is handled after it is dug is of critical importance.)*

1. Branches shall be tied with rope or twine only, and in such a manner that no damage will occur to the bark or branches.
2. During transportation of plant material, the contractor shall exercise care to prevent injury and drying out of the trees. Should the roots be dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn, the landscape architect may reject the injured tree(s) and order them replaced at no additional cost to the owner. All loads of plants shall be covered at all times with tarpaulin or canvas. Loads that are not protected will be rejected.
3. All bareroot stock sent from the storage facility shall be adequately covered with wet soil, sawdust, woodchips, moss, peat, straw, hay, or other acceptable moisture-holding medium, and shall be covered with a tarpaulin or canvas. Loads that are not protected in the above manner may be rejected.
4. Plants must be protected at all times from sun or drying winds. Those that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet mulch, or other acceptable material, and kept well watered. Plants shall not remain unplanted any longer than three days after delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.

#### N. Mechanized Tree Spade Requirements

Trees may be moved and planted with an approved mechanical tree spade. The tree spade shall move trees limited to the maximum size allowed for a similar B&B root-ball diameter according to the *American Standard for Nursery Stock* or the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller. The machine shall be approved by the landscape architect prior to use. Trees shall be planted at the designated locations in the manner shown in the plans and in accordance with applicable sections of the specifications.

### III. Materials for Planting

- A. Mulch: shall be \_\_\_\_\_. Material shall be mulching grade, uniform in size, and free of foreign matter. Submit sample for approval.

*(NOTE: Mulch material varies by region, such as shredded hardwood bark, pine needles, or processed wood chips. Use local sources to establish the specification.)*

- B. Anti-desiccant: shall be an emulsion specifically manufactured for agricultural use, which provides a protective film over plant surfaces. Anti-desiccants shall be delivered in containers of the manufacturer and shall be mixed according to the manufacturer's directions. Submit manufacturer literature for approval.
- C. Tree Shelter: shall be extruded, twin-walled polypropylene tubes, 80 mm to 105 mm (3-1/4 to 4-1/4 in.) in diameter; 600 mm (2 ft) tall, with manufacturer-supplied oak stakes and bird screen. Submit manufacturer literature for approval.
- D. Tree Wrap:
  - 1. Option 1 Extruded, translucent, twin-walled polypropylene protection board sheets; 3 mm thick. 1800mm (6 ft) long tree shelters may be utilized for short trunk trees 75 mm (3 in.) caliper or less. Submit manufacturer literature for approval.
  - 2. Option 2 Breathable synthetic fabric tree wrap. White in color, delivered in 75 mm (3 in.) wide rolls. Specifically manufactured for tree wrapping. Tree wrap shall be "Breathable Fabric Tree Wrap" as manufactured by the Dewitt Company, Inc., Sikeston, MO, or approved equal. Submit manufacturer literature for approval.
  - 3. Tree wrap shall be secured to the trunk using bio-degradable tape suitable for nursery use and which is expected to degrade in sunlight in less than two years after installation.
- E. Biostimulants: shall contain soil conditioners, VAM, and endomycorrhizal and ectomycorrhizal fungi spores and soil bacteria appropriate for existing soil conditions. Submit manufacturer literature for approval.

#### **IV. Materials for Soil Amendment**

- A. Pine Bark: (*NOTE: Pine bark is high in lignin and is a superior organic amendment to regular compost.*)  
Horticultural-grade milled pine bark, with 80 percent of the material by volume sized between 0.1 and 15.0 mm.
  - 1. Pine bark shall be aged sufficiently to break down all woody material. Pine bark shall be screened.
  - 2. pH shall range between 4 and 7.0.
  - 3. Submit manufacturer literature for approval.
- B. Organic Matter: Leaf matter and yard waste composted sufficiently to break down all woody fibers, seeds, and leaf structures, and free of toxic and nonorganic matter. Organic matter shall be commercially prepared compost. Submit 0.5 kg (1 lb) sample and suppliers literature for approval.

C. Course Sand: Course concrete sand, ASTM C-33 Fine Aggregate, with a Fines Modulus Index of 2.75 or greater.

1. Sands shall be clean, sharp, natural sands free of limestone, shale and slate particles.
2. Provide the following particle size distribution:

<u>Sieve</u>	<u>Percentage Passing</u>
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 16 (1.18 mm)	50-85
No. 30 (0.60 mm)	25-60
No. 50 (0.30 mm)	10-30
No. 100 (0.15 mm)	2-10

- D. Lime: shall be ground, palletized, or pulverized lime manufactured to meet agricultural standards and contain a maximum of 60 percent oxide (i.e. calcium oxide plus magnesium oxide). Submit manufacturer literature for approval.
- E. Sulfur: shall be flowers of sulfur, pelletized or granular sulfur, or iron sulfate. Submit manufacturer literature for approval.
- F. Fertilizer: Agricultural fertilizer of a formula indicated by the soil test. Fertilizers shall be organic, slow-release compositions whenever applicable. Submit manufacturer literature for approval.

## **V. Planting Mix**

*(NOTE: In areas where topsoils are fine grained, which makes them self-compacting, or in specialized applications, a planting mix of pine bark, course sand, and clay loam topsoil can make a superior planting medium. Other opportunities to expand rooting volumes in urban areas, such as structural soils, root paths, and other methods, should be explored during the design process and are beyond the scope of these specifications. Consult a soil expert for specifications of specialized planting mix.)*

- A. Mixture of clay loam topsoil, course sand, and pine bark, mixed to the following proportion:

<u>Component</u>	<u>% by volume</u>
Pine bark	10% - 12%
Course sand and clay loam topsoil	In quantities as necessary to achieve the particle distribution criteria
<u>Approximate Finished Planting Mix Particle Distribution</u>	
Gravel	Less than 10%
Course to medium sand	55-65%
Fine to very fine sand	15-25%
Silt	10-20%
Clay	15-20%

- B. Planting mix shall be thoroughly mixed, screened, and shredded.
- C. Clay loam topsoil shall meet all the requirements of imported topsoil, except the particle size distribution shall meet the USDA classification for clay loam.
- D. Prior to beginning the mixing process, submit a 1-kg (2-lb) sample of the proposed mix with soil test results that indicate the mix ratio and the results achieved.
- E. During the mixing process but prior to installing the mix, submit a 1-kg (2-lb) sample for each 200 cubic meters (250 cubic yards) of planting mix, taken randomly from the finished soil mix, with soil test results for approval. In the event that the test results do not meet the required particle size distribution, remix and resubmit a revised planting mix.
- F. Make all amendments of lime/sulfur and fertilizer indicated by the soil test results at the time of mixing.
- G. All mixing shall take place in the contractors yard, using commercial mixing equipment sufficient to thoroughly mix all components uniformly
- H. Protect the planting mix from erosion prior to installation.

### **Part 3. Execution**

#### **I. Excavation of Planted Areas**

- A. Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the landscape architect is required before excavation begins.
- B. Tree, shrub, and groundcover beds are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped.

1. The sides of the excavation of all planting areas shall be sloped at a 45 degrees. The bottom of all beds shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed. The bottom of the planting bed directly under any tree shall be horizontal such that the tree sits plumb.
  2. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.
  3. Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected overnight.
- C. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 150-mm (6 in.) layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.
1. In areas of slowly draining soils, the root ball may be set up to 75 mm (3 in.) or 1/8 of the depth of the root ball above the adjacent soil level.
  2. Save the existing soil to be used as backfill around the tree.
  3. On steep slopes, the depth of the excavation shall be measured at the center of the hole and the excavation dug as shown on the drawings.
- D. Detrimental soil conditions: The landscape architect is to be notified, in writing, of soil conditions encountered, including poor drainage, that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received from the landscape architect.
- E. Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the landscape architect.

## **II. Installation of Topsoil and Planting Mix**

*(NOTE: This section is for soil installation where soil is being replaced in large continuous beds. Where plants are to be installed in individual holes in areas where the soil does not require replacement or deep soil modification, refer to the section on planting operations for replacing the soil around the tree.)*

- A. Prior to the installation or modification of topsoil and planting mix, install subsurface drains, irrigation main lines, lateral lines, and irrigation risers shown on the drawings.

- B. The landscape architect shall review the preparation of subgrades prior to the installation or modification of topsoil or planting mix.
- C. Do not proceed with the installation of topsoil and planting mix until all utility work in the area has been installed.
- D. Protect adjacent walls, walks, and utilities from damage or staining by the soil. Use 12-mm (1/2 in.) plywood and/or plastic sheeting as directed to cover existing concrete, metal, masonry work, and other items as directed during the progress of the work.
  - 1. Clean up any soil or dirt spilled on any paved surface at the end of each working day.
  - 2. Any damage to the paving or architectural work caused by the soils installation contractor shall be repaired by the general contractor at the soils installation contractors expense.
- E. Till the subsoil into the bottom layer of topsoil or planting mix.
  - 1. Loosen the soil of the subgrade to a depth of 50 to 75 mm (2 to 3 in.) with a rototiller or other suitable device.
  - 2. Spread a layer of the specified topsoil or planting mix 50 mm (2 in.) deep over the subgrade. Thoroughly till the planting mix and the subgrade together.
  - 3. Immediately install the remaining topsoil or planting mix in accordance with the following specifications. Protect the tilled area from traffic. DO NOT allow the tilled subgrade to become compacted.
  - 4. In the event that the tilled area becomes compacted, till the area again prior to installing the planting mix.
- F. Subsoiling: When subsoiling is indicated on the drawings, use a chisel plow subsoil ripping tool mounted on a machine of sufficient power to make vertical trenches 500 mm (18 in.) deep into the subsoil 600 mm (24 in.) apart. Run the ripping tool over each area in opposite directions so that each area is ripped twice to thoroughly break up the compacted subgrade material prior to the installation of topsoil and planting mix.
- G. Install the remaining topsoil or planting mix in 200- to 250-mm (8- to 10-in.) lifts to the depths and grades shown on the drawing. The depths and grades shown on the drawings are the final grades after soil settlement and shrinkage of the organic material. The contractor shall install the soil at a higher level to anticipate this reduction of soil volume, depending on predicted settling properties for each type of soil.
  - 1. Phase the installation of the soil such that equipment does not have to travel over already-installed topsoil or planting mixes.

2. Compact each lift sufficiently to reduce settling but not enough to prevent the movement of water and feeder roots through the soil. The soil in each lift should feel firm to the foot in all areas and make only slight heel prints. Overcompaction shall be determined by the following field percolation test.
  - a. Dig a hole 250 mm (10 in.) in diameter and 250 mm (10 in.) deep.
  - b. Fill the hole with water and let it drain completely. Immediately refill the hole with water, and measure the rate of fall in the water level.
  - c. In the event that the water drains at a rate less than 25 mm (1 in.) per hour, till the soil to a depth required to break the overcompaction.
  - d. The landscape architect shall determine the need for, and the number and location of percolation tests based on observed field conditions of the soil.
3. Maintain moisture conditions within the soils during installation to allow for satisfactory compaction. Suspend installation operations if the soil becomes wet. Do not place soils on wet or frozen subgrade.
4. Provide adequate equipment to achieve consistent and uniform compaction of the soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction.
5. Add lime, sulfur, fertilizer, and other amendments during soil installation. Spread the amendments over the top layer of soil and till into the top 100 mm (4 in.) of soil. Soil amendments may be added at the same time that organic matter, when required, is added to the top layer of soil.
6. Protect soil from overcompaction after placement. An area that becomes overcompacted shall be tilled to a depth of 125 mm (6 in.). Uneven or settled areas shall be filled and regraded.

### **III. Installation of Organic Matter Layer**

*(NOTE: In Areas of Tree, Shrub, or Flower Planting but not in lawn areas, it is usually beneficial to increase the organic content in the very top layer of the soil. This effectively builds an O or A horizon in the soil, that may otherwise have been removed, without creating a shrinking soil that often results from adding high levels of organic matter in the entire soil depth.)*

- A. After the specified topsoil or planting mix is installed and just prior to fine grading and the installation of tree, shrub, or flower plantings, spread 100 mm (4 in.) of organic matter over all bed areas designated on the drawings and rototill into the top 100 mm (4 in.) of the planting mix or topsoil.

- B. Allow the finished grades to remain 50 to 75 mm (2-3 in.) higher than the grades on the grading plan to anticipate settlement over the first year. At the end of the planting guarantee period, reset the grades in this area, if required, to the final grades shown on the grading plan.

#### **IV. Fine Grading**

- A. Grade the surface of all planted or lawn areas to meet the grades shown on the drawings after the 12-month settling period. Set grades at time of installation high enough relative to the type of soil mix and settlement anticipated so that the soil will be at the correct grades after the settlement period. Adjust the finish grades to meet field conditions as directed.
  - 1. Provide for positive drainage from all areas toward the existing inlets and drainage structures.
  - 2. Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the drawings.
- B. Fill all dips and remove any bumps in the overall plane of the slope.
  - 1. The tolerance for dips and bumps in lawn areas shall be a 12-mm (1/2 in.) deviation from the plane in 3,000 mm (10 ft).
  - 2. The tolerance for dips and bumps in shrub planting areas shall be a 25-mm (1 in.) deviation from the plane in 3,000 mm (10 ft).
  - 3. All fine grading shall be inspected and approved by the landscape architect prior to planting, mulching, sodding, or seeding.

#### **V. Planting Operations**

- A. Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil or planting mix has been placed and tamped around the base of the root ball. Improper compacting of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

*(NOTE: Proper planting depth requires the root flare to be at or slightly above the finished grade. It is important to determine how deep the root flare is in the ball before it is placed in the planting hole. Sometimes the top of the ball may need to be raised until the root flare is at the proper planting depth and/or soil must be removed from the top of the ball.)*

1. Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery.
  2. If the root flare is less than 50 mm (2 in.) below the soil level of the root ball, plant at the tree the appropriate level above the grade to set the flare even with the grade. If the flare is more than 50 mm (2 in) at the center of the root ball the tree shall be rejected.
- B. Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.
- C. Remove plastic, paper, or fiber pots from containerized plant material. Pull roots out of the root mat, and cut circling roots with a sharp knife. Loosen the potting medium and shake away from the root mat. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting.
- D. The roots of bare-root trees shall be pruned at the time of planting to remove damaged or undesirable roots (those likely to become a detriment to future growth of the root system). Bare-root trees shall have the roots spread to approximate the natural position of the roots and shall be centered in the planting pit. The planting-soil backfill shall be worked firmly into and around the roots, with care taken to fill in completely with no air pockets.
- E. Cut ropes or strings from the top of shrub root balls and trees smaller than 3 in. caliper after plant has been set. Remove burlap or cloth wrapping and any wire baskets from around top half of balls. Do not turn under and bury portions of burlap at top of ball.
1. Do not immediately remove the ropes and burlap from trees larger than 3 in. caliper. Return to each tree three months after planting (six months for fall-planted material), and cut all ropes around the trunks and tops of the root balls of these trees.
  2. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.
- F. Set balled and burlapped trees in the hole with the north marker facing north unless otherwise approved by the landscape architect.

*(NOTE: Containerized material may not have a north orientation due to movement during the production process.)*

- G. Place native soil, topsoil, or planting mix into the area around the tree, tamping lightly to reduce settlement.
1. For plants planted in individual holes in existing soil, add any required soil amendments to the soils, as the material is being backfilled around the plant. Ensure that the amendments are thoroughly mixed into the backfill.

2. For plants planted in large beds of prepared soil, add soil amendments during the soil installation process.
  3. When required by the landscape architect, add biostimulants at the time of planting in the area directly around the plant rootball.  
*(NOTE: The landscape architect must amend these specifications to include Biostimulants.)*
  4. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning.
- H. Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil.
- I. Remove all tags, labels, strings, etc. from all plants.
- J. Remove any excess soil, debris, and planting material from the job site at the end of each workday.
- K. Form watering saucers 100 mm (4 in.) high immediately outside the area of the root ball of each tree as indicated on the drawings.

## **VI. Staking and Guying**

- A. Stake or guy a tree only when necessary for the specific conditions encountered and with the approval of the landscape architect. Staking may be required in unusual circumstances such as sandy soils in either the root ball or adjacent soils or in extremely windy locations. Poor-quality trees with cracked, wet, or loose root balls, poorly developed trunk-to-crown ratios, or undersized root balls shall be rejected if they require staking, unless written approval to permit staking or guying as a remedial treatment is obtained from the landscape architect. Trees that settle out of plumb due to inadequate soil compaction either under or adjacent to the root ball shall be excavated and reset. In no case shall trees that have settled out of plumb be pulled upright using guy wires.
- B. When required, staking and guying methods shall be approved by the landscape architect. If no staking or guying requirements appear on the drawings, submit for approval a drawing of the staking or guying method to be used. Stakes, anchors, and wires shall be of sufficient strength to maintain the tree in an upright position that overcomes the particular circumstances that initiated the need for staking or guying. Guy wires shall be galvanized, multistrand, twisted wire.
- C. Where guy wires are attached around the tree, the trunk shall be protected with 20-mm (3/4 in.) diameter rubber hose, black in color, and of sufficient length to extend past the trunk by more than 105 mm (6 in.).
- D. Stakes and guys shall be installed immediately upon approval or planting, and shall be removed at the end of the first growing season. Any tree that is not stable at the end of this time shall be rejected.

## **VII. Wrapping**

- A. Wrap the trunk of any tree only when necessary for the specific conditions encountered and with the approval of the landscape architect. Wrapping may be required for thin-barked species in unusual circumstances such as trees planted adjacent to South- or West-facing reflective surfaces, or when it is impossible to plant the tree with the trunk oriented to the same north orientation that it held in the growing nursery.
- B. When required, wrapping methods shall be approved by the landscape architect. If no wrapping requirements appear on the drawings, submit for approval a drawing of the wrapping method to be used. Wrapping material shall be as specified in this specification. Wrapping material shall be fastened using a biodegradable tape. All tape shall be loosely wrapped around the wrapping material in single layer to permit its breakdown in sunlight and permit a minimum of 25 mm (1 in.) of unrestricted trunk growth. Stapling or tying the wrap with non- or slowly biodegradable tape or any synthetic or natural fiber string shall be prohibited.
- C. Wrapping material shall be applied from the base of the tree to the first branch.
- D. All wrapping material shall be removed no later than at the end of the year after planting or as specified by the landscape architect.

## **VIII. Pruning**

- A. Plants shall not be heavily pruned at the time of planting. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear walks and roads. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant.
- B. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears.
- C. Except in circumstances dictated by the needs of specific pruning practices, tree paint shall not be used. The use of tree paint shall be only upon approval of the landscape architect. Tree paint, when required, shall be paint specifically formulated and manufacturing for horticultural use.
- D. Pruning of large trees shall be done from a hydraulic man-lift such that it is not necessary to climb the tree.

## **IX. Mulching**

- A. All trees, shrubs, and other plantings will be mulched with mulch previously approved by the landscape architect. The mulch on trees and shrubs shall be to the depths shown on the drawing. Mulch must not be placed within 8 cm (3 in.) of the trunks of trees or shrubs.

## **X. Maintenance of Trees, Shrubs, and Vines**

*(NOTE: This maintenance period is only until the initial acceptance of the work. A better practice is to make the installing contractor responsible for all maintenance during the guarantee period.)*

- A. Maintenance shall begin immediately after each plant is planted and continue until its acceptance has been confirmed by the landscape architect.
- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, tightening and repairing guys and stakes, resetting plants to proper grades or upright position, restoring of the planting saucer, and furnishing and applying such sprays or other materials as necessary to keep plantings free of insects and diseases and in vigorous condition.
- C. Planting areas and plants shall be protected at all times against trespassing and damage of all kinds for the duration of the maintenance period. If a plant becomes damaged or injured, it shall be treated or replaced as directed by the landscape architect at no additional cost.
- D. D. Watering: Contractor shall irrigate as required to maintain vigorous and healthy tree growth. Overwatering or flooding shall not be allowed. The contractor shall monitor, adjust, and use existing irrigation facilities, if available, and furnish any additional material, equipment, or water to ensure adequate irrigation. Root balls of all trees and large shrubs shall be spot watered using handheld hoses during the first four months after planting, as required to ensure adequate water within the root ball.
- E. During periods of restricted water usage, all governmental regulations (permanent and temporary) shall be followed. The contractor may have to transport water from ponds or other sources, at no additional expense to the owner when irrigation systems are unavailable..

## **XI. Acceptance**

- A. The landscape architect shall inspect all work for acceptance upon written request of the contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
- B. Acceptance of plant material shall be for general conformance to specified size, character, and quality and shall not relieve the contractor of responsibility for full conformance to the contract documents, including correct species.
- C. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the landscape architect, the landscape architect shall certify in writing that the work has been accepted.

## **XII. Acceptance in Part**

- A. Work may be accepted in parts when the landscape architect and contractor deem that practice to be in their mutual interest. Approval must be given in writing by the landscape architect to the contractor verifying that the work is to be completed in parts. Acceptance of work in parts shall not waive any other provision of this contract.

## **XIII. Guarantee Period and Replacements**

- A. The guarantee period for trees and shrubs shall begin at the date of acceptance.
- B. The contractor shall guarantee all plant material to be in healthy and flourishing condition for a period of one year from the date of acceptance.
- C. When work is accepted in parts, the guarantee periods extend from each of the partial acceptances to the terminal date of the guarantee of the last acceptance. Thus, all guarantee periods terminate at one time.
- D. The contractor shall replace, without cost, as soon as weather conditions permit, and within a specified planting period, all plants determined by the landscape architect to be dead or in an unacceptable condition during and at the end of the guarantee period. To be considered acceptable, plants shall be free of dead or dying branches and branch tips and shall bear foliage of normal density, size, and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification.
- E. The guarantee of all replacement plants shall extend for an additional period of one year from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of said extended guarantee period, the landscape architect may elect subsequent replacement or credit for that item.
- F. At the end of the guarantee, the contractor shall reset grades that have settled below the proposed grades on the drawings.
- G. The contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program. If changes are recommended, they shall be submitted in writing to the landscape architect. Claims by the contractor that the owners maintenance practices or lack of maintenance resulted in dead or dying plants will not be considered if such claims have not been documented by the contractor during the guarantee period.

#### **XIV. Final Inspection and Final Acceptance**

*(NOTE: Inspections may be made before, during, and after planting trees and shrubs. Some owners prefer to inspect and select nursery stock at the nursery. Others inspect it upon arrival or at planting time. It is best to reject trees before they are planted. Inspection of the work site should occur during the first day of planting to ensure that the contractor understands the specifications. In addition to an inspection after the work is completed, occasional inspection should be conducted as the work progresses. The final inspection occurs at the end of the guarantee period. At this time, decisions are made whether more plants are to be replaced.)*

- A. At the end of the guarantee period and upon written request of the contractor, the landscape architect will inspect all guaranteed work for final acceptance. The request shall be received at least ten calendar days before the anticipated date for final inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the landscape architect at that time, the landscape architect shall certify, in writing, that the project has received final acceptance.

#### **XV. Payment**

*(NOTE: The basis for payment to the contractor may be included in the General Provisions section or in this section.)*

- A. Payment shall be made to the contractor as follows:  
*(Example)*
- 50 percent of contract sum upon receipt and approval of plant materials by the owner
  - 35 percent of the contract sum upon completion of planting of the plant materials
  - 10 percent of contract sum after the replanting of replacement material, if required
  - 5 percent of contract sum after final acceptance.

#### **END OF SECTION**

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