

SECTION 32 96 00 - EXTERIOR LANDSCAPE

PART 1 – GENERAL

1.1 SUMMARY

- A. Extent of Landscape Work is indicated on Drawings and in schedules.
- B. Provide and furnish all labor, materials and equipment required or inferred from Drawings and Specifications to complete the Work of this Section.

1.2 UNIT PRICES

- A. Submit bid on unit prices bid form provided in this specification manual.

1.3 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. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. 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.
- E. Finish Grade: Elevation of finished surface of planting soil.
- F. Manufactured Topsoil Backfill Media: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil for use in planting soil mix or topsoil planting backfill media.
- G. 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.
- H. 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.
- I. Planting Area: Areas to be planted.

- J. Planting Soil Mix: Standardized topsoil; existing, native surface topsoil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers,
- L. ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. 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.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. 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.
- P. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- Q. 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.

1.4 SUBMITTALS

- A. Approval: Obtain approval from Design Professional for all submittals prior to the beginning of Work, unless otherwise approved.
- B. Plant Material Orders from Approved Nurseries: Bold Spring Nursery, Select Trees, Mid- Georgia, Moons Tree Farm.
 - 1. Submit confirmed orders for plant materials from approved nurseries as indicated on the Drawings within thirty (30) days from date that contract is awarded to Contractor. Contractor is responsible for payment of deposits required by the approved nurseries to secure the plant material for the Project.
 - 2. Alternate Nurseries Proposed by Contractor: Alternate nurseries will be considered by the Design Professional only if photographs of specified materials are submitted within thirty (30) days prior to bid due date. The Design Professional will tentatively accept, subject to physical observation and tagging, or reject alternate nurseries within two (2) weeks of submittal date of photographs. The Design Professional will select and tag 100 percent of plant materials from acceptable alternate nurseries prior to delivery to Project Site. The Contractor will be responsible for all expenses related to tagging trips to alternate nurseries, including usual professional service fees charged by the Design Professional. The Contractor shall arrange or and provide transportation for the Design Professional. Contractor shall provide the Design Professional a minimum of three (3) weeks advance notice to proposed tagging trip(s). Contractor shall limit tagging trips to no more than two (2) at a maximum of two (2) days each. All tagging trips will be completed within forty-five (45) days from date contract is awarded to General Contractor. Contractor will submit confirmed orders from acceptable alternate nurseries within ten (10) days of tagging by the Design Professional. Contractor is responsible for payment of deposits required by acceptable alternate nurseries to secure plant material for the Project.
 - a. Photographs submitted from alternate nurseries shall indicate a person and measuring pole, with clear numerical indicators of height in each scene. Submit photograph(s) of individual plant and one photograph showing an overall view of the field(s) that plants are being grown in.
- C. Topsoil Location and Sample: Furnish Design Professional with written statement stating location of property from which topsoil is to be obtained, depth to be stripped, and crops grown during past two (2) years. Submit one (1) gallon

Ziploc bag of topsoil proposed for use.

- D. Topsoil Test Report: Submit results of soil analysis by a qualified soil-testing laboratory, for information only, for standardized ASTM 5268 topsoil proposed for use in planting soil mixes. Report shall include percentages of deleterious materials; organic matter; gradation of sand, silt, and clay content, as determined by test methods included in Part 2 - Products; cation exchange capacity; pH level; mineral, major nutrient and micro nutrient content of top soil.
- E. Planting Soil Mix Sample: Submit one (1) gallon Ziploc bag of each proposed planting soil mix.
- F. Planting Soil Mix Test Report: Submit results of soil analysis by a qualified soil-testing laboratory, for information only, of each planting soil mix as specified. Report shall include percentages of organic matter; pH level; mineral; major nutrient and micro nutrient content of each mix.
 - 1. State recommended quantities of nitrogen, phosphorus, potash and other nutrients and soil amendments to be added for suitable plant growth.
- G. Plant Material Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from a minimum of two (2) angles depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than twenty (20) plants are required, include a minimum of three (3) 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.
- H. On Site Soil Report: Submit results of soil analysis by a qualified soil-testing laboratory, for information only, of on site soil. Report shall include pH level, mineral; major nutrient and micro nutrient content of on site soil.
- I. Product Data: Submit, for information only, product data for proprietary materials and items, including soil amendments, soil conditioner, Soil Cells, Tree Staking System, and other packaged and manufactured products.
- J. Planting Mulch: Submit one (1) gallon Ziploc bag of each mulch product.
 - 1. Shredded hardwood mulch
- K. Soil Permeability Test Report: Submit laboratory test results of planting soil mix to be used in all structured planters. Planting soil mix shall be tested in accordance with ASTM D 2434.
- L. Tree Pit Drainage Certification: Submit written documentation certifying that results of drainage test on tree pits and planting beds comply with requirements contained here in.
- M. Fertilizer Analysis: Submit, for information only, label or technical data for fertilizer bearing the trade name, manufacturer's name, weight and analysis for fertilizers used in planting soil mixes and on sodded lawn areas.
- N. Planting Schedule: Submit planting schedule showing scheduled dates for each type of planting in each area of site. The Owner may require special schedule requirements for specific areas of the project, prior to beginning the Work.
- O. Certification: Prior to acceptance of plant material submit certificates of inspection as required by governmental authorities, and manufacturer's or vendors certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.
- P. Maintenance Instructions: Upon completion of the installation, submit typewritten recommendations for maintenance of any portion of the landscape which, in the opinion of the Contractor, requires special attention.

- Q. Installer Certification: Submit written documentation certifying that Installer complies with requirements of "Installer Qualifications" below.
- R. Filter Fabric: Submit, manufacturer's product data, for information only, including specifications, installation instructions and general recommendations.

1.5 QUALITY ASSURANCE

- A. Industry Reference Standards: Refer to Division 01 References Section. National List of Scientific Plant Names, latest edition.
American National Standards Institute, Inc. (ANSI):
ANSI Z60.1 American Standard for Nursery stock by the American Association of Nurseryman.
- B. Qualifications:
 - 1. Installer Qualifications: Engage a firm specializing in landscape installation. Submit written documentation of successful completion of ten (10) projects of similar size, scope and complexity to work specified for this Project.
 - a. Firm Experience Period: Seven (7) years of experience.
 - b. Field Foreman Experience: Five (5) years of experience with installing firm.
- C. Soil-Testing Laboratory Qualifications: Engage a reputable independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct testing and analysis of existing surface soils representative of planting areas and lawn areas on site, new topsoil to be used in soil mixes and soil mixes with reference to specified plant materials.
Soil report to include analysis of a minimum of three (3) soil samples from different locations for existing on site surface soils.
- D. Qualification of Arborist: All work of pruning (limbs and roots) shall be performed by an arborist certified by the International Society of Arboriculture. Refer to Tree Protection and Preservation Plan within the Contract Documents.
- E. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant- nutrient content of the soil.
 - 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 - 2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Design Professional. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 - 3. Report suitability of tested soil for plant growth.
 - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m.) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

- F. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
1. Selection of plants purchased under allowances will be made by Design Professional, who will tag plants at their place of growth before they are prepared for transplanting.
- G. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Certain tree species, particularly conifers, may have extended leaders which protrude well beyond the body of the crown. In such cases, only the first foot of growth of the leader beyond the closest side branch will count towards its overall height measurement. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
 2. Each plant procured for the project must, at the minimum, meet all of the specified size parameters listed, i.e. caliper, height, spread, container size, comment. The Design Professional has the right to reject any material that falls short of the specified sizes.
 3. All container sizes listed are full sizes (e.g. one gallon must fit the dimensions of a full one gallon pot). No trade gallons will be acceptable unless prior approval is granted by the Design Professional.
 4. Other Plants: Measure with stems, petioles, and foliage in their normal position.

1.6 MATERIAL QUANTITIES:

- A. It is the Contractor's responsibility to total and confirm all material quantities. Items quantified by an area (i.e., square feet - sf., square yard - sq. yd.) or volume (cubic feet - cu. ft., cubic yard - cu. yd.) shall be calculated and confirmed by the Contractor. The quantities listed on the plant list are estimated. In the event of a discrepancy between the totals listed on the plant list and the numerical callouts on the Drawings, the Drawings shall govern. The actual total quantities shall be determined by the Contractor.
1. The plants listed on the unit price proposal form in the project manual is provided for convenience. In the event of a discrepancy between the unit price proposal form and plant quantities indicated on the Drawings, the Drawings shall govern.

1.7 MATERIAL SIZES:

- A. It is the Contractor's responsibility to confirm that the sizes indicated on the Drawing callouts match the sizes on the Drawing plant list. The plants list on the Drawings is provided for convenience and is only a summary. In the event of a discrepancy between the sizes on callouts and the plant sizes indicated on the Drawing plant list, the larger of the two sizes shall govern. The Contractor shall bring any discrepancy to the Design Professional's and Owner's attention.
1. The plants listed on the unit price proposal form in the project manual is provided for convenience. In the event of a discrepancy between the unit price proposal form and the plant sizes indicated on the Drawing callouts, the Drawings shall govern.

1.8 DELIVERY, STORAGE AND HANDLING:

- A. Packaged Materials: Deliver packaged materials in original and unopened containers showing weight, certified analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored on site.

B. Bulk Materials

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers [,lime,] and soil amendments with appropriate certificates.

C. Sod: Time delivery so that sod will be placed within twenty-four (24) hours after stripping. Protect sod against drying and breaking of rolled strips.

D. Trees, Shrubs and Ground Cover: Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during shipment.

1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

E. Deliver trees, shrubs and ground cover after preparations for planting have been completed and plant immediately. If planting is delayed more than six (6) hours after delivery, set trees, shrubs and ground cover in shade, protect from current and forecasted weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground or in partially excavated hole and cover rootball with soil, peat moss, sawdust or other acceptable material.
2. Do not remove container-grown stock from containers until planting time.
3. Heal-in bare-root stock. Soak roots in water. Do not let roots dry out.
4. Water root systems of plant material stored on-site. Water as often as necessary to maintain root systems in a moist condition.

F. Label at least one (1) tree and one (1) shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

G. Do not remove labels attached to plant material by the Design Professional until directed to do so.

H. Soil Cells: Protect Soil Cells from damage during delivery, storage and handling.

1. Store under tarp to protect from sunlight when time from delivery to installation exceeds one week. Storage should occur on smooth surfaces, free from dirt, mud and debris.
2. Handling is to be performed with equipment appropriate to the size (height) of Cells and site conditions, and may include, hand, handcart, forklifts, extension lifts, small cranes, etc., with care given to minimize damage to Soil Cell frames, decks and adjacent Soil Cells. Backhoes, front-end loaders and skid steers are considered inappropriate for Soil Cell transport and placement.

1.9 PROJECT CONDITIONS:

- A. Insurance on plant material and other materials stored or installed is the responsibility of the Contractor. Such insurance shall cover fire, theft, vandalism and other unusual phenomenon. Should the Contractor elect not to provide such insurance, he will in no way hold the Owner responsible for any losses incurred by the aforementioned acts. The Contractor is responsible for all costs incurred in replacing damaged or stolen materials prior to Date of Material Completion of the Work.

- B. Proceed with and complete landscape work as rapidly as portions of Site become available, working within seasonal limitations for each kind of landscape work required.
- C. Existing Grades: Existing grades will be within 0.2 feet of grades shown on the Civil Engineering Drawings when landscape work is to begin. Determine condition of existing grades prior to beginning the Work. When irregular or incomplete grading conditions are encountered, notify the Owner in writing before beginning the Work. Determine location of existing drainage patterns and maintain patterns in completed Work. Perform Work in a manner which will avoid damage to finished grading and drainage patterns. All damage to finished grading and drainage resulting from Work covered in these Contract Documents shall be repaired at the Contractor's expense.
- D. Existing Utilities: Determine location of underground utilities. Perform Work in a manner which will avoid possible damage. Excavate as required. Maintain grade stakes set by others unless removal is mutually agreed upon by parties concerned. All damage to utilities resulting from Work covered in these Contract Documents shall be repaired at the Contractor's expense.
- E. Existing Conditions: Perform landscape Work in the Tree Protection Zones and in existing or previously completed landscape areas to avoid damage and disturbance to these areas. Limit work in these areas to only that necessary to perform work specified herein and shown on the Drawings. Return and repair any areas damaged or disturbed while performing the Work to the existing conditions encountered prior to the Work.
- F. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Design Professional in writing before planting.
- G. Weather Limitations: Proceed with planting when existing and forecasted weather conditions are suitable. Do not proceed with work when subgrades, soils and planting soils are in a wet, muddy or frozen condition.
- H. Planting Schedule: Prepare a proposed planting schedule. Schedule dates for each type of landscape work during contract period. Coordinate schedule with Contractor and Irrigation Contractor.
- I. Coordination With Turf Areas (Lawns): Plant trees and shrubs after final grades are established and prior to planting of turf, unless otherwise acceptable to Design Professional. If planting of trees and shrubs occurs after turf Work, protect turf areas and promptly repair damage to turf areas resulting from plant operations.

1.10 WARRANTY:

- A. Warranty for a period AS INDICATED , following the Date of Material Completion, all trees, shrubs, groundcovers, plants and grass against any defects including death and unsatisfactory growth, as determined by the Design Professional. Warranty shall include the complete cost to supply and install all replacement plant materials according to the requirements herein. Defects resulting from lack of adequate maintenance, neglect or abuse by the Owner, abuse or damage by others, or unusual phenomenon or incidents beyond the Contractor's control are excepted. Should questions arise concerning the responsibility of replacement, the Design Professional will be available for arbitration provided the Owner and Contractor mutually desire.
- B. Remove and replace all trees, shrubs, groundcovers and lawn, or other plants found to be more than 25 percent dead or in unhealthy condition during warranty period as determined by Design Professional or Owner. Make replacements immediately unless required to plant in the succeeding planting season.
- C. Replacements: Match adjacent specimens of same species. Replacements are subject to all requirements stated in the Contract Documents and are subject to observation by the Design Professional prior to digging.

- D. Repair grades, lawn areas, paving and any other damage resulting from replacement planting operations, at no additional cost to the Owner.
- E. Inspect Project site monthly during warranty period to determine what changes, if any, should be made in the maintenance program. Submit all recommended changes in writing to the Design Professional and the Owner.
- F. Replacements made during the Warranty Period or following the site visit for Final Acceptance will carry an additional one (1) year warranty beginning at the time of replacement.

PART 2 - PRODUCTS

2.1 SOURCE QUALITY CONTROL:

- A. General: Only plant material grown in a recognized nursery in accordance with good horticultural practice will be accepted. Provide healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions or disfigurement.
- B. Observation of Plant Material Prior to Digging:
 - 1. Contractor must locate all plant material to be supplied for the Project and inform the Design Professional in writing of location within thirty (30) days of the date of the Contract or notice to proceed, whichever is first.
 - 2. The Design Professional may select and tag the trees required for the Project, at the Contractor's sources. In any event the Design Professional shall approve 100 percent of the trees required for the Project.
 - 3. In the event plant material is found to be unacceptable, the Contractor will pursue other sources until acceptable plant material is found, at no additional cost to the Owner. If, due to unacceptable plant material at the Contractor's source, additional tagging trips are required by the Design Professional, the Contractor will reimburse the Design Professional for his time and travel expenses.
 - 4. Approval at the plant source does not impair the right of the Design Professional to observe and reject material at the time of shipping or during progress of the Work.
- C. **Shipping:**
 - 1. Ship landscape materials with certificates of inspection required by governing authorities. Inspection by Federal and/or State Governments at Grower does not preclude rejection of plants at the site by the Design Professionals. Comply with regulations applicable to landscape materials. Prepare plants for shipment to prevent damage to the plants.
 - 2. From March 15th to September 15th, ship plant material to be transported over one hundred (100) miles at night only. Make arrangements to have plant material watered during shipment as necessary to avoid excessive stress. Plant material may be rejected if not properly shipped.
 - 3. Do not ship plant material in temperatures below 20 degrees Fahrenheit.
- D. Do Not Make Substitutions: If specified landscape material is not obtainable, submit to Design Professional proof of non-availability and for use of equivalent material. For proof of non-availability submit a written statement from a minimum of twelve (12) reliable nursery sources (American Nurserymen's Association Members) that the plant in question is not obtainable in the Eastern United States.
- E. Analysis and Standards: Package standard products with manufacturer's certified analysis. Including but not limited to:
 - 1. Soil Amendments
 - 2. Grass Materials

3. Mulch

- F. Approval and Selection of Materials and Work: The selection of all materials and the execution of all operations required under the Drawings and Specifications is subject to the approval of the Design Professional. The Design Professional has the right to reject any and all materials and any and all Work which, in his opinion, does not meet the requirements of the Contract

Documents at any stage of the operations. The Contractor shall remove rejected work and/or materials from Project site and replace promptly.

2.2 TOPSOIL:

- A. Topsoil has not been stockpiled for re-use in planting soil and other Landscape Work.
- B. Provide new topsoil which is fertile, friable, pervious, sandy loam, surface soil; free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than one and one-half (1½) inches in any dimension, and other extraneous or toxic matter harmful to plant growth.
- C. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at Project Site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than four (4) inches; do not obtain from bogs or marshes, unless specified.
- D. Provide documentation showing topsoil does not contain the following:
1. Soils defined regionally by the Natural Resources Conservation Service web soil survey as Prime Farmland, Unique Farmland, or Farmland of statewide or local importance;
 2. Soils from other Greenfield sites; or
 3. Sphagnum peat moss
- E. Topsoil: ASTM D 5268 complying with the following composition as determined by the indicated test methods:
1. Deleterious Materials: 2 percent max. by mass; ASTM D 2487. (Rock, gravel, slag, cinder, stone).
 2. Organic Material: 5-10 percent min. by mass; ASTM D 2974.
 3. Sand Content: 20 - 30 percent by mass.
 4. Silt Content: 25 - 35 percent by mass.
 5. Clay Content: 15 - 25 percent by mass.
 6. pH Range: 5 to 7; ASTM D 4972.

2.3 INORGANIC SOIL AMENDMENTS:

- A. Lime: ASTM C 602, Class T, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.
- B. Aggregate Soil Conditioner: Rotary kiln expanded slate specially graded for use as a horticultural soil conditioner with the following composition as determined by the indicated test methods:
1. Dry Loose Unit Weight: 48-55 lbs/cu.ft.; ASTM C 29.
 2. Specific Gravity: To meet 1.45 to 1.60 dry bulk; ASTM C 127.
 3. Gradation: 3/8-inch to No. 8; ASTM C 330 with 100 percent passing the 3/4-inch sieve.
 4. Absorption: Five percent or more; ASTM C 127.
 5. LA Abrasion: Weight loss between 20 percent and 30 percent; AASHTO T 96.

6. Chemical Characteristic:
 - a. pH: 6.5 to 10 range.
 - b. Soluble salts: To meet horticultural rural range of 0.75 to 3.5 mmhos/cm.
 7. Process the slate using only non-hazardous fuels such as coal or natural gas.
 8. The expanded slate shall be free of clay lumps and organic impurities.
 9. Obtain aggregate soil conditioner from a single supplier.
- C. Coarse Sand: Clean, washed, natural or manufactured sand, free of extraneous or toxic matter with the following grain size distribution or coarser; ASTM C136.

Sieve Size	% Passing
.5 in.	100.0
.375 in.	98.0
#4	98.0
#10	93.0
#20	21.0
#60	1.0
#140	0.5
#200	0.5

2.4 ORGANIC SOIL AMENDMENTS:

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 4 to 6 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. Organic Matter Content: 50 percent minimum of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste that meet all State Environmental Protection Agency requirements.
- B. Organic Pre-Mixed Soil Amendment: Composted and screened 100 percent organic manufactured soil amendment.
- C. Shredded Pine Bark: Shredded bark pieces between one-quarter (1/4) inch and one (1) inch in length with partially decomposed bark matter.

2.5 FERTILIZER:

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-released nitrogen, 50 percent derived from natural organic sources, phosphorous, and potassium in the following composition:
1. General: For trees, shrubs and ground cover, provide a homogeneous fertilizer complete with micro nutrients having an analysis of 12-4-8 (12 pounds of nitrogen, 4 pounds of available phosphoric acid, and 8 pounds of water soluble potash respectively for each 100 pounds of mixture).
 2. For trees, shrubs, and ground cover provide fertilizer with adjusted analysis in accordance with results and

- recommendations of planting soil mix test reports.
3. For lawns, provide fertilizer in accordance with results and recommendations of existing on site surface soil report relative to lawn installation. Provide nitrogen in a form that will be available to lawn during initial period of growth.
- 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 existing on site surface soil reports from a qualified soil-testing laboratory.
- C. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial- grade FeDTPA for ornamental grasses and monocots.

2.6 PLANTING SOIL:

- A. Planting Soil Mix For On-Grade Plantings: Provide soil mix consisting of existing surface soil amended with a completely decomposed and manufactured natural organic soil amendment in not less than the following quantities.
1. Existing surface soil by volume: 40 percent.
 2. Manufactured soil amendment by volume: 60 percent.
 3. Commercial fertilizer as recommended in soil report.
- B. Planting Soil Mix For Planters: Provide type of soil mix as indicated above for specific type of planting/plant materials to fill the top ten (10) inches of all above grade planters. Remaining depth of planter to be filled with specified topsoil. Contractor to have planting soil mix tested by an independent laboratory for compatibility with soil separator and drainage medium.
- C. Provide documentation showing planting soil mix does not contain the following:
1. Soils defined regionally by the Natural Resources Conservation Service web soil survey as Prime Farmland, Unique Farmland, or Farmland of statewide or local importance;
 2. Soils from other Greenfield sites; or
 3. Sphagnum peat moss
- D. Planting Soil Mix shall meet the following:
1. Maximum size shall be one inch largest dimension. The maximum retained on the #10 sieve shall be 20% by weight of the total sample.
 2. Ratio of particle size for 80% passing (D_{80}) to the particle size for 30% passing (D_{30}) shall be 6.5 or less ($D_{80}/D_{30} < 6.5$)
 3. Saturated hydraulic conductivity of the mix: not less than 2 inches per hour according to ASTM D5856-95 (2000) when compacted to a minimum of 86% Standard Proctor, ASTM 698.
 4. Organic content: between 4.0 and 6.0 percent by weight.
 5. The pH shall be between 5.5 and 7.0.

2.7 PLANT MATERIALS:

- A. General:
1. Provide plants true to species and variety, complying with recommendations of ANSI Z60.1 "American Standard for Nursery Stock". Nomenclature to comply with "National List of Scientific Plant Names."
 2. Specific requirements concerning plant material and the manner in which it is to be supplied are shown on the Drawings and plant list.

3. Plant material indicated as pre-tagged and pre-purchased on the Drawings has been selected and purchased for the Project by the Owner at the nursery indicated. Contractor shall be responsible for the total installation of the material including freight, labor, profit, complete warranty and replacement, and all items specified herein and as indicated on the Drawings.
 4. Acclimatization: Plants must have grown under climatic conditions similar to those of the locality of the project site for a minimum of two (2) years immediately prior to being planted on the Project.
 5. Plants shall be in accordance with *American Standard for Nursery Stock, ANSI Z60.1*. Botanical plant names shall be in accordance with plant designations included in Hortus Third.
- B. Quality and Size:
1. Furnish nursery grown plants, freshly dug, normally shaped and well branched, fully foliated when in leaf and with healthy well developed root systems. Plants to be free of disease, insect infestations or their eggs and larvae, and defects such as knots, sun scald, injuries, abrasions and disfigurement.
 2. Furnish plants to match as closely as possible whenever symmetry is called for.
 3. Provide trees and shrubs of sizes shown or specified. Trees and shrubs of larger size may be used if acceptable to the Design Professional, and if sizes of roots or rootballs are increased proportionately. The increased size will not result in additional cost to the Owner.
 4. Stock Specified in a Size Range: Within each size range not less than 50 percent the plants must be of the maximum size specified.
 5. Balled and Burlapped Plants: Plants designated "B&B" are to have firm, natural balls of soil corresponding to sizes specified in ANSI Z60.1 "American Standard for Nursery Stock". Balls to be firmly wrapped in biodegradable burlap and securely tied with biodegradable heavy twine, rope and/or wire baskets. Plants with loose, broken or manufactured rootballs will be rejected. Rootballs shall be lifted from the bottom only, not by stems or trunks.
 6. Container grown plants in cans, plastic containers or timber boxes will be acceptable in lieu of balled and burlapped plants provided that they are of specified quality. The container must be removed prior to planting, with care being exercised as to not injure the plant.
- C. Trees:
1. Provide trees of height and caliper listed or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are specified in the Contract Documents.
 2. Provide self-supporting trees with straight trunks and leaders intact. Where required in the Contract Documents, provide trees with character as described.
 3. Determining dimensions for trees are caliper, height and spread. Caliper shall be measured six (6) inches above ground for trees up to and including four (4) inch caliper. Trees over four (4) inch caliper shall be measured twelve (12) inches above ground. Specified height and spread dimensions refer to the main body of the plant and not branch tip to tip. Take measurements with branches in natural position.
- D. Tree Forms: Do not limb up tree forms more than two (2) feet before planting. Prune to desired shape as directed by Design Professional.
1. The bark of all trees shall be vigorous and healthy.
 2. Pruning scars shall be clean cut and shall leave no protrusion beyond the branch collar.
 3. No trees with double-leaders or twin-heads will be permitted.
- E. Shrubs: Provide established and well-rooted plants, in removable containers, 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.

1. All shrubs shall be healthy and vigorous plants which are very well shaped, heavily branched, densely foliated, and true to form for the variety.
 2. No shrub with pest or mechanical damage will be accepted.
 3. Shrubs shall show no signs of frost or winter damage to the foliage. Foliage shall not be in a state of drought stress. Leaves or needles shall show no signs of wilt or desiccation due to weather stress at any season of the year.
- F. Ground Cover: Provide established and well-rooted plants, in removable containers or integral peat pots, having not less than minimum number and length of runners by ANSI Z60.1 for the pot size specified.
1. Plants shall be healthy, free of insects, and diseases.kjh
- G. Grass Materials:
1. Sod: Provide viable sod of uniform density, color, and texture, strongly rooted, not less than two (2) years old and free of weeds and undesirable native grasses. Only provide sod capable of growth and development when planted (viable, not dormant). Provide machine cut sod of a uniform minimum soil thickness of five-eighths (5/8) inch, plus thickness of top growth and thatch. Sod pieces to be consistent in size and shape. All sod must be a true certified turfgrass.

2.8 MISCELLANEOUS LANDSCAPE MATERIALS:

- A. Burlap for wrapping earthball shall be biodegradable jute mesh not less than 7.2 oz. per square yard. Wrapping materials made from man made fibers are unacceptable.
- B. Guy Stakes, Upright Stakes, and Deadmen: Grade No. 2 or better, uniform grade pressure preservative treated pine AWPAC-2, or sound new hardwood or redwood free of knots, holes and other defects, two (2) by two (2) inches by thirty (30) inches long, pointed at one end.
- C. Guy Anchors: No. 4 rebars or comparable size steel stakes, three (3) feet in length.
- D. Arbotape: generic name; rot resistant, flat woven polypropylene or similar material, 3/4 inch wide min., 900 lb break strength min., resistant to degradation by the sun, cold weather, chemicals and contact with soil.
1. Color: Green/Olive
- E. Hose: One half (1/2) inch diameter black reinforced rubber or plastic garden hose. Cut to required lengths to protect tree trunks from damage by wires. Used hose is acceptable.
- F. Drainage/Separation Fabric: Manufacturer's standard nonwoven pervious geotextile fabric of polypropylene, nylon or polyester fibers, or a combination.
1. Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D 4759 and the referenced standard test method:
 - a. Grab Tensile Strength (ASTM D 4632): 100 lb.
 - b. Apparent Opening Size (ASTM D 4751): #100 U.S. Standard Sieve.
 - c. Permeability (ASTM D 4491): 150 gallons per minute per sq. ft.
- G. Drainage Gravel: Washed crushed stone.
- H. Water and water transportation is the sole responsibility of the Contractor.

I. Mulch:

1. Pinestraw: Pine needle mulch predominately composed of Longleaf Pine needles and other long needled Southern Yellow Pine species. Clean, fresh, dark brown, and free of branches, cones, foreign matter, insects and disease.
2. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - a. Organic Matter Content: 50 percent minimum of dry weight.
 - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste that meet all State Environmental Protection Agency requirements.
3. Hardwood Bark: Mulch shall be high quality, premium shredded hardwood bark mulch free of dirt, debris and foreign matter. Pieces between one-quarter (1/2) inch and one (2) inch in length with partially decomposed bark matter.
4. Stone Mulch:
 - a. Water washed river slicks, grey in color, with rounded edges, free from organic materials, surface coatings, or other deleterious materials. Stone mulch shall not be limestone. Stone shall be between 4"-8" in size.

J. Lawn Anti-Erosion Mulch: Clean, threshed straw of wheat, rye, oats or barley.

K. Anti-Desiccant: Water-insoluble emulsion type, film-forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully labeled containers and mix in accordance with manufacturer's instructions.

L. Drain Pipe and Fittings: Corrugated perforated polyethylene drain tubing, black, meeting ASTM F 405.

M. Drain Basins and Grates: Black meeting in ASTM D 1892 and ASTM D 4549. As shown on the Drawings.

N. Geotextile:

1. Non-woven polypropylene fabric with the following properties:
 - a. Grab tensile strength 370 lb.
 - b. Grab tensile elongation 50%
 - c. Mullen burst strength 380 psi
 - d. Puncture strength 130 lb.
 - e. Apparent opening size US sieve 80
 - f. Water flow rate 95 gpm/SF
 - g. Geotextile shall be delivered in 12 feet wide rolls min.

O. Wrapping Material:

1. Wrapping material shall be first quality, 4-inch wide heavy waterproof crepe paper manufactured for this purpose. Tape for securing wrapping material shall be a durable, weatherproof tape of same color as wrapping material.

P. Steel Edging for Plant Beds

Edging shall be 12 gauge 6 inch wide steel commercial edging with standard black powder coat finish. Edging shall be furnished in 10-16 foot lengths. Edging shall be manufactured by Collier Metal Specialties, or approved equal. Stake per manufacturer recommendations.

PART 3 - EXECUTION

3.1 PREPARATION:

A. General:

1. Contractor shall examine conditions under which planting is to be installed, review applicable Design Drawings, and be familiar with alignment of underground utilities before digging.
2. Planting Time: Planting operations are to be performed at such times of the year as the job may require, with the stipulation that the Contractor guarantees the plant material as specified. Plant only during periods when weather conditions are suitable.
3. Verify layout information shown on the Drawings, in relation to property survey and existing bench marks before proceeding to layout the work. Locate and protect existing benchmarks and control points. Preserve reference points (coordinates) shown on the Drawings during construction.
4. Work from lines established by the property survey, established bench marks and markers to set coordinate points for the tree locations on the Project. Calculate and measure required dimensions. Do not scale Drawings to determine dimensions.
5. Tree Locations: Locate and layout tree (coordinate) locations by instrumentation and similar appropriate means.
6. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Design Professional's acceptance before start of excavation for planting work. Make adjustments as requested.
7. Notify Design Professional of adverse sub-surface drainage or soil conditions. State conditions and submit a recommendation for correction including costs. Obtain approval for method of correction prior to continuing Work in the affected area. In the event that alternate locations are selected, the Contractor shall prepare such areas at no additional expense to the Owner.

B. Excavation for Trees and Specimen Shrubs:

1. Excavate pits, beds and trenches with vertical sides, as specified and as shown on the Drawings.
2. Loosen hardpan and moisture barrier until hardpan has been broken and moisture is allowed to drain freely.
3. For balled and burlapped (B&B trees and shrubs), make excavations at least four (4) feet wider than the ball diameter for the top twelve (12) inches of the pit. For the remaining depth of the pit, excavate at least two (2) feet wider than the full diameter and equal to the ball depth, plus an allowance for setting of ball on a layer of compacted backfill. Allow for six (6) inch minimum setting layer of excavated soil.
4. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

C. Test Drainage:

1. Tree and Specimen Shrub Pits: Fill each pit with water. If percolation is less than 100 percent within a period of twelve (12) hours, drill a ten (10) inch diameter auger hole to a depth up to five (5) feet below the bottom of the pit. Fill auger hole with drainage gravel and cover with filter fabric. Retest pit. In case drainage is still unsatisfactory, notify Design Professional, in writing, of the condition before planting trees in the questionable areas. Contractor is fully responsible for warranty of the plant material.

D. Subsoil Removal:

1. Dispose of subsoil removed from landscape excavations at an off-site location. Do not mix with planting soil.

Do not use as backfill.

3.2 FIELD QUALITY CONTROL:

- A. Testing: Contractor shall employ testing agency to perform soil permeability test in accordance with ASTM 2434 on planting soil mix to be used in structured planters prior to procuring and installing drainage matting. Test results shall be used to determine weight of integral non- woven filter fabric.

3.3 FILLING AND COMPACTION

- A. Subsoil or ordinary borrow shall have been excavated and filled as required by the Contract Documents and specified and paid for under Division 31 EARTHWORK, of this Specification, or as modified and remediated by sand and ripping as described in Division 31 EARTHWORK. Do not damage the work previously installed. Maintain all required angles of repose of materials adjacent to the loam as shown on the Contract Documents. Do not over excavate compacted subgrades of adjacent pavement or structures during loaming operations.
- B. Confirm that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Subgrade elevations shall slope parallel to the finished grade and or toward the subsurface drain lines as shown on the Contract Documents. Provide a written report to the Landscape Architect that the subgrade has been placed to the required elevations and that the subgrade drains water at the rates specified under the required percolation tests specified, performed and paid for under this Division 31 EARTHWORK. Perform no work of placing and spreading loam until elevations have been confirmed and written report has been accepted by the Landscape Architect.
- C. Clear the subgrade of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Such construction debris, trash, rubble and foreign material shall be removed from the site and disposed of in a legal manner. Fill any over excavation with approved fill and compact to the required subgrade compaction levels.
- D. Do not proceed with the installation of planting soils until all utility work in the area has been installed.
- E. Protect adjacent walls, walks and utilities from damage or staining by the planting soils. Use 0.5-inch plywood and or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.

3.4 PREPARATION OF PLANTING SOIL:

- A. Before mixing, clean topsoil, or existing surface soil if using a soil conditioner, of roots, plants, clods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
- B. Mix specified soil amendments and fertilizers with topsoil, or soil conditioner with existing surface soil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
- C. For pit and trench type backfill, mix planting soil prior to backfilling and keep covered until used.
- D. For planting soil prepared with a manufactured soil conditioner, mix planting soil in large batches before backfilling, stockpile for use at site and keep covered until used. Do not mix soil conditioner at individual planting sites.
- E. For groundcover and shrub beds, mix planting soil either prior to planting or apply on a surface layer over prepared bed area and mix both thoroughly in the bed before planting.

1. Mix lime, if required, with dry soil prior to mixing of fertilizer.
2. Prevent lime from contacting roots of acid-loving plants.
3. Apply phosphoric acid fertilizer (in addition to that constituting a portion of complete fertilizers) directly to subgrade before applying planting soil and tilling.

3.5 PREPARATION OF SHRUB AND GROUNDCOVER PLANTING BEDS:

- A. Layout planting beds on the ground to the lines shown on the Drawings. Have layout approved by Design Professional prior to constructing the bed.
- B. Outline bed with a trench edge as shown on the Drawings. Place soil for trench edge within bed area.
- C. Loosen existing soil to a minimum depth of twelve (12) inches using a roto tiller or similar equipment. Remove all sticks, stones, rubbish and other material detrimental to plant growth.
- D. Spread four (4) inch minimum layer of planting soil mix over entire bed area. (Additional soil mix may be necessary to build up shrub beds to grade as shown on the Drawings.) Work planting soil mix into top of loosened soil with roto tiller.
- E. Smooth planting areas to conform to specified grades after settlement has occurred. Slope surface of shrub beds to drain toward the trench edge.
- F. Mass preparation of beds is not applicable for areas exceeding 4:1 slope.

3.6 PREPARATION OF PLANTERS:

- A. Planters: Place drainage and filter materials in bottom of planters according to the Drawings and fill with planting soil mix. Place soil in lightly compacted layers to an elevation one and one-half (1-1/2) inches below top of planter. Crown soil according to the Drawings.
- B. Take precautions to maintain the integrity of waterproofing.
- C. Notify Design Professional of any damage or defects in planter waterproofing prior to planting.

3.7 PREPARATION OF ANNUAL COLOR AND PERENNIAL BEDS:

- A. Excavate bed to a depth of four (4) inches, break through 'hard pan' and remove all stone, roots, debris, etc. Remove excavated soil.
- B. Roto till excavated bed to a depth of six to eight (6-8) inches.
- C. Slope the base of the bed to the trench edge.
- D. Spread six (6) inch minimum layer of planting soil mix over entire bed. Work planting soil mix into top of loosened soil with roto tiller.
- E. Place additional planting soil mix to build up bed a minimum of six (6) inches above existing grade for annual color beds and four (4) inches above existing grade for perennial beds. Roto till entire bed to a depth of twelve (12) inches.

3.8 PREPARATION FOR PLANTING LAWNS:

- A. Loosen the grade of lawn areas to a minimum depth of six (6) inches. Remove stones over one and one-half (1½) inches in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.
- B. Place approximately one-half (1/2) of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remainder of topsoil mixture to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. (Insert Paragraph if included in scope and coordinate with Alternate No. 2 & 3).
- C. Allow for sod thickness in areas to be sodded.
- D. Grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- E. Fertilize and lime prior to start of grassing operation. Apply ground limestone at the rate recommended by soil test analysis and work into top six (6) inches of soil. Apply fertilizer at the recommended rate; work into top two (2) inches of soil. The fertilizer application shall not precede the placement of sod by more than three (3) days.
- F. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
- G. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.
- H. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than six (6) inches; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions; till soil to a homogenous mixture of fine texture, free of lumps, clots, stones, roots and other extraneous matter. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of Owner's property; do not turn over into soil being prepared for lawns.

3.9 PLANTING TREES AND SPECIMEN SHRUBS:

- A. Season for Planting:
 - 1. Plant trees and shrubs when temperatures are between 35 and 60 degrees Fahrenheit and there are sufficient degree days (35 to 60 degrees F) before freeze or high temperatures threaten plant establishment. Plant only during days with temperatures suitable for planting. Do not plant when ground is frozen.
 - 2. Contractor assumes all responsibility for the timing of the planting operations and for planting during inclement weather.
- B. Trucking, transport and stockpiling of plant material as the construction site:
 - 1. Tie up branches of trees with rope or twine specifically manufactured to avoid abrasion of bark and branches. Do not damage bark or branches by tying operations.
 - 2. Cover all plants during transport. Plant material arriving at the construction site in open trucks or trailers without cover will be rejected immediately upon delivery. Plant material arriving on site in anyway damaged, with dry rootballs, branches broken or bark skinned or torn will be rejected and replaced at no additional cost to the Owner.

3. Upon delivery, all plants shall be protected against drying out by excessive exposure to sunlight or wind. Plant material that cannot be planted within 24 hours of delivery to the construction site shall be healed in by covering with soil or wood chip mulch and watered daily until the time of planting. Plant material stockpile areas shall be protected against theft and damage by construction equipment. Plant material that is not planted within 14 days of arrive at the construction site will be rejected and replaced with new plants at no additional cost to the Owner. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.
- C. Set balled and burlapped (B&B) stock on layer of compacted excavated existing soil, plumb and in center of pit or trench with top of ball two to three (2-3) inches above the finish grade and also two to three (2-3) inches above the grade they bore to natural grade before transplanting. Remove all straps and ropes made of man-made fibers completely from rootball. Loosen and remove burlap and biodegradable ropes from top half of rootball. Cut and remove the top half of all wire baskets before backfilling. Use planting soil mixture to backfill plant pits. When plants are set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately two thirds (2/3) full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.
- D. Remove all man made or impervious materials from the rootball and trunk before final installation of trees and specimen shrubs.
- E. Set container grown stock as specified for balled and burlapped stock, except remove containers, without damaging rootballs, prior to backfilling.
- F. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again after planting as per manufacturer's recommendations.
- G. Mulching: Immediately after planting work has been completed, mulch pits, trenches and planting beds. Provide a minimum depth of two (2) inches of bark or three (3) inches of pinestraw. Finish edges according to the Drawings.
- H. Water: Soak all plants immediately after planting, continue watering thereafter as necessary until Date of Material Completion.
- I. Smooth planting areas to conform to specified grades after full settlement has occurred and mulch has been applied.
- J. All plants shall be inoculated with mycorrhizal fungi. Inoculant shall be added after the plants have been placed in their holes. Open the required number of packets for each plant and thoroughly mix the inoculant powder into the upper 10 inches (250 mm) of backfill soil.
 1. Mycorrhizal fungal inoculant shall be added to the plant pits according to plant size.
 2. The application rates for mycorrhizal fungal packets shall be in accordance with the manufacturer's recommendations.

3.10 STAKING, GUYING AND PRUNING:

- A. Stake and guy trees immediately after planting. Plants shall be plumb after staking or guying. Maintain stakes, wires and guys until Final Acceptance of the Work.
- B. Staking trees of one (1) inch caliper and under or four (4) feet height: Use single stake with rubber hose and wire loop around trunk. Use only wooden stakes as specified.
- C. Staking trees of one (1) inch caliper and up to two and three quarters (2-3/4) inch caliper: Drive two stakes, 180 degrees

to each other, securely into ground and fasten to tree with wire and tie. Use hose around wire so wire is not in contact with plant, or use Cinch-tie of appropriate size. Adhere to staking details unless alternate detail has been approved by Design Professional prior to beginning of planting operation.

- D. Guying trees of three (3) inch caliper and larger: Guy trees according to detail. Position guys around trunk at approximately two-fifths (2/5) the height of the tree. Anchor guys in ground either to notched stakes or steel rods driven securely into ground with top end three (3) inches below finish grade.
- E. Pruning: Unless otherwise directed by the Design Professional do not cut tree leaders. Remove only injured or dead branches from trees, if any. Prune shrubs at the direction of the Design Professional.
- F. Remove and replace promptly any plants pruned or mis-formed resulting from improper pruning.
- G. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures.

3.11 PLANTING SHRUB AND GROUNDCOVER BEDS:

- A. Excavate large enough area in loosened soil to install specified container grown plants.
- B. Remove containers without damaging the rootball and set in excavated hole. If the plants are root bound, gently pull roots apart by hand to loosen up the rootball.
- C. Place container grown plant in excavated hole with top of rootball even with final shrub bed elevation.
- D. Backfill rootball with soil from the bed and lightly compact soil around plant to eliminate voids and air pockets.
- E. Mulching: Immediately after planting mulch planting beds with a minimum depth of two (2) inches of bark or three (3) inches of pine straw. Finish edges according to the Drawings. Remove all mulch from foliage of plants.
- F. Watering: Soak entire area immediately after planting. Continue watering thereafter as necessary until Date of Material Completion.

3.12 SPACING AND LAYOUT OF SHRUBS AND GROUNDCOVER:

- A. Layout bed outline per the plans.
- B. Layout individual shrubs and groundcovers per the spacing indicated on the plans. Mass plantings are usually laid out by either staggered rows (SR) or even rows. Note that the spacing between rows may be different than the on-center spacing between the plants.
- C. Unless otherwise noted, all shrubs and groundcover shall be given the same spacing from hardscape edges (i.e. sidewalks, roads, or buildings) as their on center spacing (e.g. a shrub labeled as thirty-six inches (36") on center shall have the row closest to the hardscape edge planted thirty-six inches (36") from the hardscape edge.) The Design Professional shall approve all plant placement prior to plant material installation.
- D. When two shrub or groundcover beds abut, the on-center spacing between the different plant beds shall be the combined on-center spacing of the two differing plants (e.g. if one plant spaced thirty-six inches (36") on center abut another plant spaced twenty-four inches (24") on center, the on-center spacing between the two different plant beds shall be sixty inches (60"))
- E. Should the site conditions differ from that indicated on the Drawings, notify the Design Professional of such conditions with a recommendation for correcting the condition. Obtain approval of method of correction prior to continuing Work.

- F. All plant beds and plants shall be laid out prior to the review of the Design Professional.
- G. Should the number of plants not properly match the space allocated for the layout, notify the Design Professional prior to installation and obtain an approved, alternate course of action prior to continuing Work.
- H. In cases where the number of too many plants listed on the Drawing become too many for the bed area in the field, maintain the specified spacing. Do not change the spacing in an attempt to use all of the plants listed.
- I. Refer to the Drawings for clarification of spacing details and layout information.
- J. Plant Bed Edging:
 - 1. Install edging at all plant bed locations, adjacent to gravel path and in locations shown on the Drawings. Fully cut the edging as shown on the Detailed Drawings. Place edging prior to completely backfilling plant beds with specified planting soil. Set edging to the required alignment as shown in the drawings, curved and true and to the required elevation to ensure full mulch restraint.
 - 2. Bed edging shall be accurately measured in required position.

3.13 Edging shall be set plumb and vertical at required line and at grade as indicated in the Contract Documents. Straight sections shall not be wavy; curved sections shall be smooth and shall have no kinks or sharp bends.**PLANTING URBAN LANDSCAPE AREAS:**

- A. Excavate the structural backfill mix to a depth equal to the height of the rootball or size of the container. Excavations shall be as wide as indicated on the Drawings.
- B. Install plant material as indicated herein, but immediately after excavation is made in structural backfill mix.
- C. Backfill plant material rootball immediately with specified planting soil mix in one (1) foot maximum lifts and as indicated herein until the pit or excavation is filled to the specified finish grade.
- D. Dispose of excavated structural backfill mix. Do not reuse.

3.14 INSTALLING LAWNS:

- A. Seeding New Lawns:
 - 1. The grass seed shall be applied at the rate specified in the Seed Schedule and at the planting dates indicated.
 - 2. Sow seed using a spreader or hydro-seeding machine.
 - 3. Do not seed when wind velocities affect even distribution. Do not sow when seed bed is crusty or frozen. Sow in equal quantities in two (2) directions at right angles to each other.

GRASS SEEDING SCHEDULE

Seed Type	Seeding Rate Lbs/1000 sf	Planting Dates	Visible Seedling Stand Under Ideal Conditions	Ultimate Mowing Height
1. Common Bermuda	2 – 3	May 1 – Aug. 15	12 days*	1-1/4 – 1"
2. Tall	6 – 8	Sept 15 – Nov 15	8 days*	2 – 2-

Fescue				1/2"
3. Annual	4 – 6	Oct 1 – Mar 1	6 days*	2 – 2-
Ryegrass				1/2"

*Planting dates for type 1-3 are for Atlanta/North Georgia region only. These dates differ for other areas where seasonal variations require modification. According to the Plant Hardiness Zone Map published by the United States Department of Agriculture, 1990, these dates refer to Zones 7a and 7b.

4. If seed bed is left slightly rough or furrowed, no "planting" of the seed is necessary. If seed bed is smooth and very dry, the seed should be lightly raked into the top quarter (1/4) inch of seed bed.
5. Protect seeded areas with slopes not exceeding 1:5 by spreading wheat straw or hay mulch. The quantity of mulch to be applied shall be that to uniformly form a continuous blanket at least three-quarters (3/4) of an inch and not more than one and one-half (1½) inches in loose depth over the seeded area. Spread by hand, blower, or other suitable equipment.
 - a. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
6. Protect seeded areas with slopes exceeding 1:5 with erosion-control fiber mesh and 1:3 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
7. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - a. Mix slurry with nonasphaltic tackifier.
 - b. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
8. Thoroughly moisten seeded area immediately after seeding. If rainfall is insufficient lightly water planting area until grass is established.
9. Protect seeded areas from traffic and disturbance.
10. Scarify, re-seed and re-fertilize seeded areas that do not show satisfactory growth within fifteen (15) days after sowing, until a satisfactory stand is established. Seeded areas are considered established when a dense grass stand has developed of a uniform green color, reasonably free from weeds, the specified grass is vigorous and growing well, and no bare spots larger than one (1) square foot area is apparent. Full coverage is required in thirty (30) days. Irregularities resulting from diseases and insect infestation are unacceptable. Mow grass at height specified in seeding schedule.
11. After two (2) or three (3) mowings the new lawn shall be fertilized with ammonium nitrate at the rate of 50 lbs/acre. Nitrogen shall be applied with mechanical hand spreader capable of producing uniform coverage. One (1) application is mandatory. Nitrogen shall not be applied between October 15 and March 15, unless noted otherwise.

B. Sodding New Lawns:

1. Water soil prior to receiving sod. At the time of sod placement soil must be moist but not saturated.
2. Lay sod within twenty-four (24) hours from time of stripping. If not possible, sod may be stored on site up to thirty-six (36) hours after stripping provided sod is properly protected: unstack, unroll and place in shade and keep moist until installation.
3. Do not plant dormant sod.
4. Do not plant sod on frozen ground.

5. Lay sod to form a solid mass with tightly fitted joints. Snugly fit ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.
6. Anchor sod with wood pegs to prevent slippage on slopes equal to or greater than 3:1 and wherever erosion can be anticipated. Lay sod perpendicular to slope direction, with staggered joints.
7. Water sod thoroughly with a fine spray immediately after planting until soil is damp to a depth of four (4) inches. If rainfall is insufficient, keep sodded area moist until grass has securely rooted into the planting area.

C. Reconditioning Existing Lawns:

1. Recondition existing lawn areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading is required.
2. Provide fertilizer, seed or sod and soil amendments as specified for new lawns and as required to provide a satisfactorily reconditioned lawn. Provide new topsoil as required to fill low spots and meet new finish grades.
3. Cultivate bare and compacted areas thoroughly to provide a satisfactory planting bed.
4. Remove diseased and unsatisfactory lawn areas; do not bury under soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel and other loose building materials.
5. Where substantial lawn remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps and cultivate soil, fertilize, and seed. Remove weeds before seeding or if extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.
6. Thoroughly water newly planted areas immediately after planting. If rainfall is insufficient, lightly water planting area until new grass is established.

3.15 MAINTENANCE:

- A. Begin maintenance immediately after planting.
- B. Maintain trees, shrubs lawns, and other plants until Date of Material Completion of the Work.
- C. Maintain trees, shrubs, lawns and other plants by watering, pruning, cultivating, weeding, and re-mulching as required for healthy growth. Restore trench edges around mulch rings and along bed lines. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.
- D. Maintain lawns by watering, weeding, mowing, repair of eroded areas and re-seeding or re-sodding as necessary to establish a uniform stand of the specified grasses.
- E. Remove all trees, shrubs, ground covers, lawn or other plants which die, turn brown and/or defoliate prior to Date of Material Completion from the site. Replace immediately with plant material of the same species, quantity, size and meeting all requirements.

3.16 CLEAN UP AND PROTECTION:

- A. During Landscape Work, keep pavements clean and work area in an orderly condition.
- B. Upon completion of Work, clear grounds of debris, superfluous materials and all equipment. Remove from site to satisfaction of Design Professional and Owner.
- C. Protect landscape Work and materials from damage due to landscape operations, operations by other contractors and

trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape Work as directed, at no additional cost to the Owner.

- D. Theft: Contractor is responsible for theft of plant material at the Project site before, during and after planting, until the Date of Material Completion of the Work.

3.17 OBSERVATION AND ACCEPTANCE:

- A. Periodic site visits will be made by the Design Professional to review the quality and progress of the Work. Work found to be unacceptable must be corrected within five (5) calendar days. Remove rejected plants and materials promptly from the Project.
- B. Upon completion of Work, the Contractor shall notify the Design Professional and the Owner at least ten (10) days prior to requested date of site visit for Material Completion of all or portions of the Work. Design Professional will issue a punch list for work to be corrected. All work on the punch list must be completed within five (5) working days from date of site visit. Where Work does not comply with requirements, replace rejected Work and continue specified maintenance until by Design Professional finds work to be acceptable.
- C. If a site visit to verify Material Completion has been scheduled and the Design Professional arrives at the site and determines that the Landscape Development is not substantially complete, the Contractor shall be responsible for all costs incurred by the Design Professional to re-visit the site. Reimbursable expenses include the following: mileage, airfare, consultant's time, parking fee, meals, rental car, etc. All incurred expenses will be deducted from the final contract amount.
- D. Certificate of Material Completion will be issued for acceptable Work. If punch list items are issued with the Certificate, they must be corrected within five (5) working days.
- E. One (1) Year Warranty commences on the date of issuance of the Certificate of Material Completion. Refer to Section 32 90 00, 1.11 Warranty.
- F. Final Acceptance: One (1) year after Date of Material Completion of the Work in total the Design Professional and/or the Owner will visit the site to determine Final Acceptance. Upon satisfactory completion of repairs and/or
- G. replacements the Design Professional and/or the Owner will certify, in writing, the Final Acceptance of the Work. The Final Acceptance letter will serve as evidence that the Contractor's one (1) year warranty obligations have been met.
- H. At the end of the one-year guarantee and establishment period, remove all tree stakes, guys, or anchors installed on trees during the course of the work of this contract.
- I. All replacements shall be plants of the same kind and size specified in the PLANT SCHEDULE. The cost shall be borne by the Contractor, except for possible replacements due to vandalism or neglect on the part of others.

END OF SECTION 32 9600