

SECTION 329300 – LANDSCAPE

Part 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 1 Specification Sections, apply to this Section. Execute the work of this Specification in accordance with applicable portions of:

1. Division 1 - General Requirements
2. Drawings L-101, L-102, L-103

1.2 SUMMARY

- A. Section Includes:

1. Plants.
2. Planting soils.
3. Tree stabilization.

- B. Related Sections:

1. Division 01 Section "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work
2. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
3. Division 32 Section "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 ALLOWANCES

- A. Allowances for plants are specified in Division 01 Section "Allowances."

1. Perform planting work under quantity allowances and only as authorized. Authorized work includes: Unless specifically excluded hereinafter under RELATED SECTIONS: provide labor, materials, equipment and services necessary and incidental to complete work described by this Section's title shown above. Work includes, but is not necessarily limited to:
 - a. Fine Grading.
 - b. Providing and Placing all Off-site Topsoil and Planting Soil Backfill Mix required to complete Landscape Development Work.
 - c. Preparation of Planting Areas as required.
 - d. Furnishing and installing all Plant Material.
 - e. Furnishing and installing all Shredded Hardwood Bark Mulch/Stone Mulch.
 - g. Furnish and install Reforestation. (NIC)
 - h. Pruning, Fertilizing and Clean-up of existing wooded area and existing stand-alone trees to remain.
 - i. Maintenance of all Work until Final Acceptance (not less than 60 days).
 - j. Clean-up of Work Area as outlined in these specifications.
2. Notify Landscape Architect weekly of extent of work performed that is attributable to quantity allowances.
3. Perform work that exceeds quantity allowances only as authorized by Change Orders.

- B. Work By Others;
 - 1. Installation of Bituminous Parking Lots and Drives.
 - 2. Installation of Curbs and Walks and Wheel Stops.
 - 3. School Buildings, Play fields, out buildings and utilities.

1.4 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Division 01 Section "Unit Prices."
 - 1. Unit prices apply to authorized work covered by quantity allowances.
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.5 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. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. 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.
- F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- H. Finish Grade: Elevation of finished surface of planting soil.
- I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- J. 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.

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticides and Herbicides: Include product label and manufacturer's application instruction specific to the Project.
 - 3. Plant Photographs: Include color photographs in either digital or 3- by 5-inch (76- by 127-mm) print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle 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 10 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Samples for Verification: For each of the following:
 - 1. Trees and Shrubs: Contact Landscape Architect for review of plant material, based on information received above in product data. The Landscape Architect reserves the right to inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for name, variety, size and quality. Provide trees and shrubs grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions or disfigurement. Provide trees and shrubs of the sizes shown as specified. Trees and shrubs of larger size may be used, if acceptable to Landscape Architect, and if sizes of roots or balls are increased proportionately.

2. Mulch: one quart volume of each organic mulch required, in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. River Stone; Submit a minimum of 5 full size samples stone providing the 3 to 4 inch diameter required. Include full range of style, size, finish, color & texture proposed for the work.
4. Filter Fabric: 12 x12" sample, with manufacturer specifications.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualifications: The Landscape Work shall be done by a single firm specializing in landscaping work. Include list of similar projects completed, demonstration Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulation applicable to landscape materials.
 2. Manufacturer's certified analysis of standard products.
 3. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Material Test Reports:
 1. Certification: For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.
- D. Maintenance Instructions: Maintenance Instructions: Submit two copies of typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).
- E. Provide two copies of warranty (See Item 1.11 for specific requirements).
- F. Schedule of Work: For information only, submit 3 copies of tentative schedule to Owner and/or Owner's Agent along with Landscape Architect. Contractor shall keep all parties above apprised of any changes so that the Owner's Agent is aware of scheduled work at least 24 hours prior to said work being started.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Provide Professional Memberships.
 2. Provide number of years experience in Landscape Installation in addition to requirements in Division 01 Section "Quality Requirements"
 3. Provide Field Supervision Installers experience. Note full-time Supervisor to be on Project Site at all times when landscape installation is in progress.
 4. Pesticide Applicator: Licensed
- B. Provide Soil-Testing Laboratory Name and Qualifications.
- C. 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 Landscape Architect. 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 or volume per cu. yd. 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.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1. Do not make substitutions: If specified landscape material is not obtainable, submit to Landscape Architect proof of non-availability and proposal for use of equivalent material. When authorized, adjustment of Contract amount will be made.

E. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials 14 days in advance of delivery to site.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable. Protect materials from deterioration during delivery, and while stored at the 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, and soil amendments with appropriate certificates.

C. Plant Materials:

1. Bare- Root Stock: Deliver bare-root stock plants freshly dug. 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.
2. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

3. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
4. Do not remove container grown stock from containers until planting time.
5. Handle planting stock by root ball.
6. Bulbs: NOT USED
7. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six(6) hours after delivery, set plants and trees in their appropriate conditions, protect from weather and mechanical damage, and keep roots moist.
 - a. Set balled stock on ground and cover ball with soil, peat moss, or other acceptable material.
 - b. Do not remove container-grown stock from containers before time of planting.
 - c. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.
 - d. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.

1.10 PROJECT CONDITIONS

- A. Field Measurements: Installer must verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work. Installer must observe the conditions under which work is to be performed, and notify the Landscape Architect of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 1. Notify the Landscape Architect/ Construction Manager and or Owner no fewer seven days in advance of proposed interruption of each service or utility.
 2. Do not proceed with interruption of services or utilities without Construction Managers and or Owner's written permission.
- C. Planting Restrictions: Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.
- E. Planting Schedule: Prepare a proposed planting schedule. Schedule the dates for each type of landscape work during normal seasons for such work in the area of the site. Correlate with specified maintenance periods to provide maintenance until acceptance by the Owner. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- F. Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Landscape Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.
- G. Protect existing trees, shrubs and other hardscape elements against damage including trespassing, and erosion.
- H. Protect all existing plant material in the area of this contract, whether inside or outside the contract limit line, against any damage, which in the opinion of the Landscape Architect will cause death or major retardation.

Such material shall be replaced with same size and species by the Contractor at no additional cost should such damage occur.

- I. Inspection of work will be made at the conclusion of work (at acceptance of the project). Submit written notice requesting final inspection at least 10 days prior to anticipated date.

1.11 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 1. Failures include, but are not limited to the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond contractor's control.
 - b. Structural failures including plantings, falling or blowing over.
 - c. Structural failures of tree stabilization structures, or stone energy dissipaters
 2. Warranty periods will begin from the Date of installation completion (as determined by the Landscape Architect for a period of 12 months (one year).
 3. Include the following remedial actions as a minimum.
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement for each plant will be required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for a period equal to the original warranty period, for replaced plant material.

1.12 MAINTENANCE

- A. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.
 1. Seeded and/or sodded lawns, not less than 60 days. If seeded in Fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following Spring until acceptable lawn is established.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, regrading, and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- C. All planted trees, shrubs, groundcovers and annual flowers, shall be maintained until final acceptance of the completed contract. This shall be not less than 60 days. Maintenance shall include watering, cultivating, control of insects, fungus, and other horticultural operations necessary for the proper growth of all plants.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings L-102, L-103, L-104 and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-

shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders (unless otherwise indicated); tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 "Standard for Nursery Stock" for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls. Provide plant materials true to name and variety established by the American Joint Committee on Horticultural Nomenclature "Standardized Plant Names," Second Edition, 1942.

C. Deciduous Trees: 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 shown or listed.

1. Provide balled and burlapped (B&B) deciduous trees.
2. Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.

D. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than the minimum number of canes required by ANSI 260.1 for the type and height of shrub required.

1. Provide balled and burlapped (B&B), bare root (B.R.) or container deciduous shrubs as specified in plant list.
2. Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to the specified limitations for container grown stock.

E. Coniferous and Broadleaved Evergreens: Provide evergreens of the sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types, such as globe, dwarf cone, pyramidal, broad upright and columnar. Provide normal quality evergreens with well-balanced from complying with requirements for other size relationships to the primary dimension shown.

1. Provide balled and burlapped (B&B) or container grown evergreens as specified.
2. Container grown evergreens will be acceptable in lieu of balled and burlapped evergreens subject to the specified limitations for container grown stock.

F. Labeling: label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

G. If formal arrangements or consecutive order of plants is shown on plans, select stock for uniform height and spread, and number the labels to assure symmetry in planting

H. Annuals and Biennials – NOT USED

2.2 INORGANIC SOIL AMENDMENTS

A. Ground Limestone: (To be incorporated into soil if soil pH value test shows low level of soil Ph which needs to be raised.). ASTM C 602, natural limestone containing not less than 85% of total carbonates, ground so that not less

90% passes a 10 mesh sieve and not less than 30% passes a 100 mesh sieve. Apply at the rate adequate to bring pH range up to 6.0 to 6.5.

- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No.6 sieve and a maximum of 10 percent passing through no. 40 sieve.
- C. Iron Sulphate: Granulated ferrous sulfate containing a minimum of 20 percent and 10 percent sulfur. (To be incorporated into soil if soil pH value test shows high level of soil pH which needs to be lowered.) Iron Sulphate shall be applied at the rate adequate to bring pH range down to 6.0 to 6.5 and as per "Cornell Recommendations for Commercial Turf Grass Management".
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean , washed, natural or manufactured, and free of toxic materials.
- H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 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 1/2 inch sieve sieve; soluble salt content of 4 to 8 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight
 - 2. Feedstock: NOT USED
- B. Peat Humus: FS Q-P-166 and with the texture and pH range OF 3.4 TO 4.8.
- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Wood Derivatives: NOT USED
- E. Manure: NOT USED

2.4 FERTILIZERS

- A. Bonemeal: Commercial, raw, or steamed, finely ground; 4% nitrogen and 20% phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, Soluble; a minimum of 20% available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium.
 - 1. For All New Trees and Shrubs:

All trees and shrubs shall be fertilized with a controlled release 16-8-16 analysis fertilizer contained in a polyethylene perforated bag with micropore holes. The bag shall contain four (4) ounces minimum of water soluble fertilizer so as to be effective for eight (8) years.

The packets shall be placed equidistantly within the planting pit adjacent to the ball or root mass, but not in direct contact with roots. Placement depth shall be 6 to 8 inches. Packets shall not be cut, ripped or damaged.

If it becomes necessary to remove and replace dead or unhealthy plants, damaged or broken packets shall be replaced with new packets.

A "Certificate of Compliance" must accompany invoice showing quantity of material ordered, where material was supplied and shipped to, and its consigned route and specific job application.

2. For lawns, provide fertilizer with not less than 4% phosphoric acid and not less than 2% potassium and the percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 1000 sq. ft. of lawn area. Provide nitrogen in a form that will be available to the lawn during the initial period of growth.

- D. Organic Fertilizer and Soil Conditioner: All trees and shrubs shall be treated with PHC Healthy Start which contains a blend of natural organic nutrients, proteins, sugars and other carbohydrates, humic acids, biostimulants and beneficial bacteria that enrich soil.

PHC Healthy Start is available from Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, Pennsylvania, 1-800-421-9051.

- E. Superabsorbent Co-polymer for trees, shrubs, herbaceous ground cover and coniferous ground cover shall be "Terra-Sorb" AG as manufactured by Industrial Services International, Inc., PO Box 10834, Bradenton, Florida, 34282-0834, Telephone (800) 227-6728.

- F. Terra-Wet: All trees, shrubs, and coniferous ground cover shall be treated with Terra-Wet which is a performance enhanced wetter/penetrant derived from Yucca Schidigera plants.

Terra-Wet is available from Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, Pennsylvania, 1800-421-9051.

- G. Natural Organic Biostimulant for herbaceous and coniferous ground cover shall be "Dry Roots 2" root growth enhancer and soil conditioner as manufactured by Roots Inc. a division of LISA Products Corp., 25 Science Park , New Haven, CT 06511 (203) 786-5295.

- H. Doggett 32-7-7 Slow Release Tree Fertilizer: All existing trees over 8" caliper to remain on main site with Doggett 32-7-7 Slow Release Tree Fertilizer as manufactured by The Doggett Corporation, Lebanon, NJ 08833, 1-800-448-1862.

- I. Doggett's Natural Resource: All existing trees over 8" caliper to remain on the main site shall be injected with Doggett's Natural Resource as manufactured by The Doggett Corporation, Lebanon, NJ 08833, 1-800-448-1862.

- J. Mycor Tree, Tree Saver Pt Injectable: All existing trees over 8" caliper to remain on the main site shall be injected with Mycor Tree, Tree Saver Pt Injectable, which is an ectomycorrhizal fungi superstrain inoculant containing live spores of beneficial ectomycorrhizal fungi, a polyacrylamide superabsorbent and plant biostimulants to ensure the survival and performance of newly planted trees and shrubs. Mycor Tree, Tree Saver Pt Injectable is available from Plant Health Care, Inc., 44 William Pitt Way , Pittsburgh, Pennsylvania, 1-800-421-9051.

2.5 PLANTING SOILS

A. TOPSOIL

Topsoil shall be from off-site sources. It shall be without admixture of subsoil or slag and shall be free of stones, lumps, plants or their roots, sticks and extraneous matter, and shall not be moved, placed or used while in a frozen or muddy condition.

Topsoil from off-site sources shall have an acidity range of pH 5.0 to 7.0 and shall contain not less than 5% organic matter as determined by the "Walkley-Black Method" (Colorimetric version). Sufficient limestone shall be added to topsoil used to bring it to a range of pH 6.0 to pH 6.5.

Soil sample tests will be ordered by the Landscape Contractor and shall be made by a state or commercial laboratory using methods approved by the Associates of Official Agricultural chemists or the State Agricultural Experiment Station.

Such analysis will be paid for by the Contractor. Moving and placing of topsoil may be made after approval of the analysis by the Landscape Architect.

If approved, natural topsoil not having the hydrogen-ion value specified above may be amended by the contractor, at his own expense, to bring it within the specified limits. Topsoil shall meet the following mechanical analysis:

	<u>Passing %</u>	<u>Retained %</u>
1" Screen	100%	0%
1/2" Screen	97-100%	0-3%
No. 100 Mesh Sieve	60-40%	40-60%

There shall be a minimum of 4" of topsoil (after settlement) in all plant beds, pit plantings, ground cover areas, and lawns or as called for on the drawings whichever is greater.

- B. Fill - NOT USED
- C. Lightweight Or Structure Planting Soil – NOT USED

2.6 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
 - 1. Mulch: Shall be 100% Double Hammered Milled Shredded Hardwood Bark
 Mulch. Mulch shall be free from any extraneous materials, and spread to a 3" depth minimum (after settlement). Contractor shall submit certification detailing content and source of mulch for Landscape Architect's approval.
 - 2. Color: Natural
- B. Compost Mulch: NOT USED
- C. Mineral Mulch: Hard, durable stone (River Stone), washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color: Washed, 1 to 3" in diameter, Natural color.

2.7 WEED-CONTROL BARRIERS – NOT USED

2.8 PESTICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, treated softwood with specified wood pressure-preservative treatment, free of knots, holes, cross grain, and other defects, (6" by 6" by 3'-6" min), pointed at one end.
 2. Wood Deadmen: Timbers measuring 8" in diameter and 48" long, treated with specified wood pressure-preservative treatment.
 3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 12 gauge.
 4. Guy Cables: Five-strand, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8 inch galvanized eyebolts.
- B. Root-Ball Stabilization Materials: NOT USED

2.10 LANDSCAPE EDGINGS – NOT USED

2.11 TREE GRATES – NOT USED

2.12 MISCELLANEOUS LANDSCAPE MATERIALS

- A. Anti-Desiccant: Emulsion type, film-forming agent similar to Dowax by Dow Chemical Co., or Wilt-Pruf by Nursery Specialty Products, Inc., designed to permit transpiration, but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions. All plants shall be sprayed with an anti-desiccant once in late Fall (November) and once in late Winter (February).
- B. Wrapping: Tree-wrap tape not less than 4" wide, designed to prevent borer damage and winter freezing.
- C. Filter Fabric: Filter weave 40/10 as manufactured by Nicolon/Mirafi Group. Filter weave 40/10 is available from Ragen Associates. 20 Larsen Rd., Iselin, NJ 08830, (732)602-9500 or (800)752-1010 outside NJ.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

- A. Rough grade will be left 4" below finished grade by others. Loosen subgrade of lawn areas to a minimum depth of 4". Remove stones over 1" in any dimension and sticks, roots, rubbish and other extraneous matter and legally dispose of them off Owner's property. Limit preparation to areas, which will be planted promptly after preparation.
 - 1. Spread topsoil to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement (4" after settlement). Place approximately 1/2 of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remains of topsoil. Add specified soil amendments (as per Section 3.19-B of this specification) and mix thoroughly into the upper 4 inches of topsoil.
 - 2. Where final grades are not indicated, finish grades shall be of uniform level or slope between points for which elevations are given or from such points to existing grades, except that tops and bottoms of banks shall be rounded. Subgrade elevations shall be understood to be the specified depth below finished grades.
 - 3. Moistening prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before seeding. Do not create a muddy soil condition.
 - 4. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.
- B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45 degree angle. Excavations with vertical sides are not acceptable. Leave center bottom of excavation slightly raised at center to provide proper drainage. Ensure that root ball will sit on undisturbed base soil to prevent settling. Loosen hard subsoil in bottom of excavation.
1. For balled and burlapped (B&B) trees and shrubs, make excavations at least the equivalent of two and a half times as wide as the ball radius and equal to the ball depth, plus the following allowance for setting of ball on a layer of compacted backfill: Allow for 6" setting layer of planting soil mixture.
 2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 3. Do not excavate deeper than the depth of the root ball, measured from the root flare to the bottom of the root ball.
 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 5. Maintain required angles of repose of adjacent material as show on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 6. Maintain supervision of excavations during working hours.
 7. Keep excavations covered or otherwise protected after working hours, overnight and when unattended by contractor's personnel.
- B. Subsoil and topsoil removed from excavations MAY NOT be used as planting soil.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the tip-most root emerges from the trunk. After soil removal to expose the root flare, verify that the root ball still meets size requirements.
- B. Remove stem girdling roots and kinked roots, Remove injured roots by cutting cleanly; do not break.
- C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 3 inches above adjacent finished grade.
1. When set, apply "Terra-Wet" to planting pit/hole as follows: Dilute 100 to 1 in cold water (1 oz. of Terra-Wet per 100 gallons of water). "Terra-Wet" may foam with agitation, to reduce foaming add an anti-foaming agent to mix as per manufacturer's recommendations.
 2. Apply the solution to the excavated planting hole at the rate of 5 gallons per inch of caliper for trees and 3 gallons for 12" of root ball for shrubs. Subsequently place plant in planting hole and drench plant ball with "Terra-Wet".
 3. After "Terra-Wet" application place backfill around base and sides of ball and work each layer to settle backfill and eliminate voids and air pockets.
 4. During the placement of backfill place "Unique Fertilizer Packets" as specified in section 2.4 C as follows:

Types of Plants No. of Packets

a.	Trees:		
	Over 4 inch caliper		4
	1 to 4 inch caliper	3	
	Over 6 feet high	4	
	3 to 6 feet high		3
	15 to 36 inches high		2
	Under 15 inches high		1
b.	Shrubs:		
	Over 3 feet high	3	
	2 to 3 feet high		2
	Under 2 feet high	1	

The packets shall be placed equidistantly within the planting pit adjacent to the ball or root mass, but not in direct contact with roots. Placement depth shall be 6 to 8 inches. Packets shall not be cut, ripped or damaged. If it becomes necessary to remove and replace dead or unhealthy plants, damaged or broken packets shall be replaced with new packets.

5. When excavation is approximately 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. Remove collar ropes only. Retain burlap on balls.

D. Set bare root stock on cushion of planting soil mixture. Spread roots, apply "Terra-Wet" to root mass by spraying. Then carefully work backfill around roots by hand and puddle with water until backfill layers are completely saturated. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers above roots. Set collar 1" to 2" above adjacent finish landscape grades. Spread cut roots without tangling or turning up to surface. Cut injured roots clean, do not break.

E. Set container grown stock as specified for balled and burlapped stock, except cut cans on two sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.

F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope: the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

G. Dish top of backfill to allow for mulching. For Spring planting, provide additional backfill berm around edge of excavations to form shallow saucer to collect water.

1. Note: Surface of all Shrub Beds shall be crowned or sloped as required to achieve a 3% minimum surface pitch and insure positive surface drainage.

H. Apply anti-desiccant prior to the onset of winter and again in mid-winter, 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 two weeks after planting.

I. Wrap tree trunks of 2" caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures required before wrapping.

3.6 MECHANIZED TREE SPADE PLANTING – NOT USED

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches, Do not prune for Shape.

B. Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the Landscape Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character and accomplish their use in the landscape design. Required shrub sizes are the size after pruning.

1. Remove and replace excessively pruned or misformed stock resulting from improper pruning.
2. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension shown on Drawings. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.9 ROOT-BARRIER INSTALLATION – NOT USED

3.10 PLANTING IN PLANTERS – NOT USED

3.11 GROUND COVER AND PLANT PLANTING – NOT USED

3.12 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and tree like shrubs in Turf Areas: Apply mulch ring of 3 inch thick with 36 inch radius around trunks or stems. Do not place mulch within six inches of trunk or stems
2. Organic Mulch in Planting Areas: Apply three inches thickness of organic mulch or stone extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finished grades. Do not place mulch within three inches of trunks or stems.

3.13 EDGING INSTALLATION

A. Shovel-cut Edging. Separate mulched areas from turf areas with a 45 degree 4 to 6 inch deep, shovel cut edge.

3.14 TREE GRATE INSTALLATION – NOT USED

3.15 PLANT MAINTENANCE

- A. Begin maintenance immediately after planting. Maintain trees, shrubs and other plants until final acceptance, but in no case less than the following period: 60 days after planting.
- B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- C. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

- D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- E. Submit two copies of typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape work for one full year. Submit prior to the expiration of required maintenance period(s).

3.16 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.17 CLEANUP AND PROTECTION

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

3.18 DISPOSAL

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

3.19 PREPARATION OF PLANTING SOIL

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps and other extraneous materials harmful or toxic to plant growth.
- B. Mix specified soil amendments at required rates (derived from Topsoil Analysis Report). Also include the following:
 1. For Trees, Shrubs and all Ground covers (herbaceous and coniferous): "Terra-Sorb" AG at the rate of 32 oz. per Cubic Yard of Soil Mix.
 2. For Trees and Shrubs (excluding coniferous ground cover): PHC Healthy Start 3-4-3 organic fertilizer/soil conditioner, shall be applied at 1/2 lb. per trunk diameter (cal.) inch for trees.

For shrubs as follows:

<u>Plant Size</u>	<u>Rate</u>	<u>Cups</u>	<u>Lbs.</u>	<u># Plant Bag</u>
1 Gallon		1/2	1/4	100
5 Gallon		1	1/2	50
15 Gallon		2	1	25
24" Ball/Box	3		1 1/2	16
36" Ball/Box	5		2 1/2	10
42" Ball/Box	6		3	8
54" Ball/Box	8		4	6
72" Ball/Box	10		5	5

- C. Planting Soil Mixture: Shall consist of one part off-site topsoil, as required, one part clean coarse builder’s sand and one part humus. These shall be thoroughly mixed prior to any planting operations. The preceding shall be mixed with the soil amendments in Section 3.19 B.
- D. Lightweight Soil Mixture: (NOT USED)
- E. For pit and trench type planting, mix planting soil prior to back filling and/or placing stockpile at the site.
- F. For planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.20 MISCELLANEOUS LANDSCAPE CONSTRUCTION

A. Remedial Work on Existing Trees:

- 1. Pruning: All existing trees on the main site shall be pruned according to the best practices of the trade, making sure all the necessary limbs are removed to make a head clearance height of at least eight (8) feet under such tree or as directed. The trees shall be pruned to remove broken, dead, or dangerous limbs in accordance with “Pruning Standards For Shade Trees” as published by The National Arborists Association, adopted in 1950. Limbs to be removed shall be cut back to nearest crotch. No stubs are to remain on the tree.
- 2. Fertilizing Soil Amendment: All existing trees outside the wooded area shall be fertilized with a combination of Doggett’s Natural Resource and Doggett’s 32-7-7 Slow-Release Tree Fertilizer combined with Mycor Tree, Tree Saver Pt. Injectable amendment.

Apply mixture by injection into the soil/root area under hydraulic pressure. Soil injection shall be no more than 12” deep using a soil/root fertilization probe from a power sprayer. Pressure of 150 to 200 lbs. shall be more than adequate in good soils. Higher pressures may be used with care in more compacted soils.

Injection of the soil shall begin at a point out from the trunk where good site judgment deems the finer roots to be. Injections shall be spaced 2-1/2 ft. to 3 ft. apart and extend well beyond the dripline. For individual trees, injections shall follow a concentric circle type pattern.

Mixture:

<u>Product</u>	<u>Dilution</u>
Doggett 32-7-7	15 lbs. per 100 gal. Water
Doggett Natural Resource	1/8 lb. per 100 gal. water
Mycor Tree, Tree Saver Pt. Injectable	5 oz. per 100 gal. water

Apply mixture of fertilizer/soil amendment solution at a rate of 5 gallons of solution for every caliper inch (diameter) of tree trunk measured at breast height (5 gallons per DBH inch). This means a tree measuring 15" in diameter at breast height would require the injection of 75 gallons of solution.

3.21 INSPECTION & ACCEPTANCE

- A. When the landscape work is completed, including maintenance, the Landscape Architect will, upon request, make an inspection to determine acceptability. The landscape work may be inspected for acceptance in parts agreeable to the Landscape Architect, provided the work offered for inspection is complete, including maintenance, and that the area comprises a complete unit or area of substantial size.
- B. Where inspected landscape work does not comply with the requirements replace rejected work and continue specified maintenance until reinspected by the Landscape Architect and found to be acceptable. Remove rejected plants and material promptly from the project site.