

SECTION 329300 - PLANTS

PART 1 -

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. Except as otherwise specified, form, size, and grade of plant materials shall conform to ANSI Z60.1.
- B. Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting. **In no case shall ball size be less than 11 inches in diameter for each inch of caliper.**
- C. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of the species. Plants shall possess a normal balance between height and spread. The Landscape Architect will be the final arbiter of acceptability of plant form.
 1. Canes or Trunk(s) and Branches:
 - a. Well formed and sturdy.
 - b. Branching plentiful and uniformly distributed to form a well-balanced plant.
 - c. Trees with leaders that are damaged, crooked, or crossed shall be rejected.
 - d. Trees with multiple leaders shall be rejected, unless form is typical for the species or specifically indicated in the Drawings.
 - e. Multiple leaders with narrow crotches (included bark) shall not be acceptable.
 - f. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
 - g. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
 - h. Graft union completely healed.
 - i. No mechanical or pest damage.
 - j. No extreme succulence.
 2. Foliage:
 - a. Densely supplied with healthy, vigorous leaves of normal size, shape, color, and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
 - b. No holes, cavities, or depressed areas caused by broken or dead branches or insufficient foliage.
 - c. No chlorosis.
 - d. Pest or mechanical damage barely perceptible with no more than 5% of total foliage affected.
 - e. No discernible frost or cold damage.
 3. Root System:

- a. Plants shall have a well-developed fibrous root system
 - b. Sturdily established in container, but shall not be excessively rootbound except plants deliberately grown rootbound to produce a dwarf plant.
 - c. No stem girdling roots..
 - d. No noxious weeds on rootball.
- D. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs and larvae.
- E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects. These defects shall not interrupt more than 25 percent of the circumference of the plant cambium.
- F. F. Plants shall not be pruned before delivery, and shall not be pruned for form (if needed to improve aesthetic appearance and/or growth habit) until Substantial Completion Acceptance.
- G. Plants shall meet the sizes indicated on the Plant List or Schedule. Where a size or caliper range is stated, at least 50 percent of the material shall be closer in size to the top of the range stated. Plants larger or smaller than specified may be used only if accepted by the Landscape Architect.
- H. Plants indicated as “B&B” shall be balled and burlapped.
- 1. Unless otherwise permitted by the Landscape Architect, plants shall be nursery grown.
 - 2. Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.
 - 3. Nursery grown plants shall be freshly dug. No heeled in plants or plants from cold storage will be accepted, unless otherwise permitted by the Landscape Architect.
- J. Herbaceous Plants: Including, but not limited to, annuals, biennials, perennials, wetland or water plants, bulbs, tubers, and corms: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems or well-formed root forms. Provide only plants that are acclimated to outdoor conditions before delivery. Provide flowering plants that are in bud but not yet in bloom.
- K. Bareroot stock, where specified or approved by Engineer/Landscape Architect, shall meet the standards of ANSI Z60.1 and shall conform to the following:
- 1. Root System. The root system of bareroot stock shall be sufficient to insure plant growth.
 - 2. Bareroot Trees. Bareroot trees shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting, and root pruning. The spread of the root system shall be 12 times greater than the trunk diameter plus an additional 6 in.
 - 3. Bareroot Shrubs. Bareroot shrubs shall have a well-developed fibrous root system, with a minimum spread conforming to the following:

<u>Plant Height, ft.</u>	<u>Minimum Spread of Roots, in.</u>
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1.5 to 2	10
2 to 3	11
3 to 4	14
4 to 5	16
5 to 6	18
6 to 8	20

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, by weight. Class T is more finely ground and quicker acting but dustier than Class O.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- 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 (0.30-mm) 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.

2.3 ORGANIC SOIL AMENDMENTS

A. TOPSOIL

- 1. Topsoil shall be obtained from a previously established stockpile on the site, to the extent that suitable material is available. Additional topsoil required shall be obtained from off-site sources.
- 2. Topsoil, whether stripped from site or supplied from off-site, shall be a sandy loam as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

<u>Textural Class</u>	<u>% of Total Weight</u>	<u>Average %</u>
Sand (0.05-2.0 mm dia. range)	45 to 75	60
Silt (0.002-0.05 mm dia. range)	15 to 35	25
Clay (less than 0.002 mm dia. range)	5 to 25	15

- a. 95% of topsoil shall pass a 2.0 mm sieve.

- b. Topsoil shall be free of stones 1 inch in longest dimension, earth clods or clay, plant parts, weeds, and debris.
 - c. Organic matter content shall be 4 to 12% of total dry weight.
 - d. Range of pH: 5.4 to 7.
- B. Compost: Well-composted, stable, and substantially weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; soluble salt content of <3 mmhos/cm or <3 decisiemens/m-and free of substances toxic to plantings; and as follows:
- 1. The compost stock must mature for a minimum of 90 days. During this time, the compost stock shall achieve thermophilic temperatures (175 to 180 degrees) for 15 days; multiple turnings may be required for the entire stockpile. A Solvita test may be requested to determine the maturity and stability of the compost.
 - 2. Frozen or muddy compost shall be unacceptable for use.
- ~~C. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.~~
- ~~D. 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.~~
- ~~E. Wood Derivatives: Decomposed, nitrogen treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.~~
- F. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.
- G. Compost Manufactured Topsoil: Uniform mixture of compost and base soil to achieve the compost manufactured topsoil product consisting of the following ingredients:
- 1. Compost: An organic substance produced by the biological and biochemical decomposition of source separated organic materials that may include leaves and lawn trimmings, food or industrial residuals, and/or municipal biosolids. The product shall not contain levels of substances toxic to plants and shall be reasonably free (< 1 percent by dry weight) of man-made foreign matter. Compost shall meet USEPA 40 CFR Part 503 standards for Class A, Exceptional Quality compost, as well as all applicable state standards for its intended use.
 - 2. Base soil: Topsoil and/or other soils (clay, silt, sand sand, sandy loam, or loamy sand in texture according to USDA soil classification. It shall be free of stones, clods, plant parts, weeds, and other debris >2 inches in any dimension. It shall not contain levels of substances that shall inhibit or be harmful to plant growth.
 - 3. Product Parameters:

Parameter	Compost	Base Soil	Compost Manufactured Topsoil
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pH	6.0-8.5	5.0-8.0	6.0-7.8
% Organic Matter	<40%	0-5%	6-20%
Particle Size	<1"	<2", USDA Class: sand, sandy loam, loamy sand	<2", USDA Class: sand, sandy loam, loamy sand
Salts/conductivity	Varies; must be reported	<2mmhos/cm after handling, placement & rainfall	<2mmhos/cm after handling, placement & rainfall
Carbon: Nitrogen Ratio	15-25:1	N/A	N/A

- H. Mycorrhizal Fungi: Dry, organic, granular root stimulant/inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.
 - 1. Mycorrhizal fungi amendment shall be manufactured by one of the following, or approved equivalent:
 - a. Roots
 - b. Plant Health Care
 - c. Mycorrhizal Applications of Oregon
 - 2. Shall not be used on herbaceous materials or in compacted soils.
- I. Hydrogel: Shall be water absorbant crystals or granules manufactured by one of the following, or approved equal: Plant Health Care, Terra-Sorb, Viterra Gelscape. Product shall be amended as recommended by the manufacturer.

2.4 FERTILIZERS

- A. Provide supplements at application rates as recommended by soil test reports from a qualified soil-testing laboratory.
- B. Verify use of phosphate-containing fertilizers with authorities having jurisdiction.
- C. Bonemeal: Commercial, raw or steamed, finely ground; **a minimum of [1] [4] percent nitrogen and [10] [20] percent phosphoric acid. Call out?**
- D. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- E. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 0 percent phosphorous, and 2 percent potassium, by weight.
- D. Controlled-release fertilizer shall be equal to the following:

<u>Product</u>	<u>Manufacturer</u>
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Osmocote	Scotts Miracle-Gro Company
Agriform 20-10-5	Sierra Chemical Co.
Planting Tablets	Milpitas, CA 95035
EZY-Grow Fertilizer Packet	EZY-Grow - Landscape Specialties

1. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium of equal proportions.
2. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots. Nutrient composition: nitrogen, phosphorous, potassium and micronutrients.

2.5 PLANTING MEDIA

- A. Plant bed media: Verify site conditions and suitability of native surface topsoil to produce viable planting soil. Modify and fertilize soil types to create acceptable plant bed media for specific site conditions, plant species, and proposed use in accordance with soil test reports. Plant bed media shall have pH value range of 5.5 to 7. Clean soil of roots, plants, sod, stones >1” in any dimension, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. **<Select applicable options below>**
1. Plant bed media for largely unchanged site conditions, reusing on-site topsoil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and retained in-place or stockpiled on site. Supplement with standardized topsoil or imported topsoil if quantities are insufficient. Mix native topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: [1:4] [1:3] [1:2] **<Insert ratio>**.
 2. Plant bed media using imported topsoil from off-site sources if existing surface soil is not of suitable quality or quantity. Obtain topsoil from naturally well-drained construction or mining sites with topsoil at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes. Mix imported topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: [1:4] [1:3] [1:2] **<Insert ratio>**.
 3. Plant bed media using standardized topsoil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, and minimum 6 percent organic material content. Mix ASTM D 5268 topsoil with loose compost in the following quantities to produce plant bed media: Ratio of loose compost to topsoil by volume: [1:4] [1:3] [1:2] **<Insert ratio>**.
- B. Planter Soil:
- C. Skeletal or Structural Soil:
- B. Lightweight Planting Soil: **need?**

2.6 MULCHES

- A. Organic Mulch: Mulch shall be 100% [**fine-shredded pine or other softwood bark**] [**Pine straw**] [**Salt hay or threshed straw**] [**Pine needles**] <Insert mulch type>, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than two months and no more than two years before use. <delete last sentence if not bark mulch>
- B. 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 less than 3 decisiemens/m or 3 mmhos/cm as measured for soil mixture electrical conductivity; not exceed 0.5 percent inert contaminants and free of substances toxic to plantings. Product must be cured for a minimum of 90 days and produce minimal heat or odor to be considered a stable, mature product suitable for use with plants.
- C. Stone (Mineral) Mulch: [**Rounded riverbed gravel or smooth-faced stone**] [**Crushed stone or gravel**] [**Marble chips**] [**Granite chips**] <Insert stone type>.
1. Size Range: [**1-1/2 inches (38 mm) maximum, 3/4 inch (19 mm) minimum**] [**3/4 inch (19 mm) maximum, 1/4 inch (6.4 mm) minimum**] <Insert size range>.
 2. Color: [**Uniform tan-beige color range acceptable to Landscape Architect**] [**Readily available natural gravel color range**] <Insert color>.

2.7 WEED-CONTROL BARRIERS

- A. Weed control barriers are not recommended for planted areas as the materials prevent or slow water penetration required for plant growth. They may be beneficial for largely unplanted, mulched areas.
- B. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. (101g/sq.m) minimum.
- C. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd. (162g/sq.m).

2.8 CHEMICAL PRODUCTS

- A. General: Pesticides, herbicides, fungicides, bactericides or any other chemical compounds shall be 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.
1. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 2. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

3. Anti-desiccant: Shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Anti-desiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use. Anti-desiccant shall be Wilt-Pruf as manufactured by Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426, or approved equal.
4. Fungicide: Shall be zinc ethylene bisdithiocarbonate (Zineb), or equal, applied at manufacturer's suggested rates.
5. Chemical Root Control Barrier: Chemical compounds or fabric impregnated with growth-regulating chemicals designed to modify root growth. Manufacturers shall be Plant Health Care or Typar Biobarrier, or approved equal.

2.10 FILTER FABRIC OR SOIL SEPARATION FABRIC

- A. Nonwoven geotextile made of polypropylene, polyolefin, or polyester fibers, or combination, 101 g/sq. m (3 oz./sq. yd.) minimum, Mirafi 140-N, or approved equal.

2.11 GUYING AND STAKING MATERIALS

- A. Install tree support materials only when conditions warrant. See Part 3. Rootball stabilization is preferred method.
- B. Rootball Stabilization Materials:
 1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2 x 2 inch nominal; stakes pointed at one end.
 2. Wood Screws: ASME B18.6.1.
 3. Proprietary Devices: At – or below-grade stabilization systems to secure each new tree planting by its rootball; sized per manufacturer's written recommendations unless otherwise indicated. Provide one of the following products, subject to compliance:
 - a. Tomahawk Tree Stabilizers by Border Concepts, Inc.
 - b. Duckbill Rootball Fixing System by Foresight Products, LLC
 - c. Tree Staples by Tree Staple, Inc.
- C. Wood Stakes: For trees under 10 ft. in height, straight, sound, rough sawn lumber not less than 2 x 2 inch, if square, or 2-1/2 inch diameter, if round. Wire for staking shall be 12 gauge steel.
- B. Wire for Guying: Galvanized steel 1 x 19 preformed 3/16 inch diameter.
- C. Turnbuckles: Galvanized steel fitted with locking eyebolts.
- D. Deadman: Sound, rough sawn lumber 2 x 4 inch triangular galvanized steel plates, or other material approved by the Landscape Architect.
- E. Hose: High quality braided rubber hose, 3/4 inch diameter and suitable length, black in color.

- F. Polyethylene tie strapping may be used with 2 x 2 pressure treated wood stakes.

2.12 ROOT CONTROL BARRIER (PHYSICAL)

- A. Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils (2.2 mm) thick, with vertical root deflecting ribs protruding 3/4 inch (19 mm) out from panel, and each panel [**18 inches (457 mm)**][**24 inches (610 mm)**] wide. **<Insert measurement>**

2.13 EROSION CONTROL JUTE MESH FABRIC

- A. Jute Mesh: Jute mat, 1200 mm (4 feet) in width, made of unbleached, undyed and loosely twisted yarn woven in a grid with approximately 12 mm (½ inch) openings.
- B. Anchoring Staples: Cold-drawn 2 mm (14-gauge) or wider in diameter formed into a U-shape from a wire 300 mm (12 inch) or longer.

2.14 LANDSCAPE EDGING

- A. Wood: Western Red Cedar, Eastern White Cedar or pressure-treated Southern Yellow Pine with stakes of same type, 1 x 2 inch nominal by 18 inches long, with galvanized nails for anchoring the edging.
- B. Steel: Standard commercial steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
1. Provide products by one of the following manufacturers, subject to compliance with requirements, or approved equal:
 - a. Sure-Loc Edging Corporation
 - b. The J.D. Russell Company
 - d. Collier Metal Specialties, Inc.
 - e. Border Concepts, Inc.
 2. Edging Size: [**3/16 inch (4.8 mm) wide by 4 inches (100 mm) deep**][**1/4 inch (6.4 mm) wide by 5 inches (125 mm) deep**][**1/4 inch (6.4 mm) wide by 4 inches (100 mm) deep**][**1/8 inch (3.2 mm) wide by 4 inches (100 mm) deep**][**1/8 inches (3.2 mm) wide by 6 inches (150 mm) deep**][**0.1 inch (2.5 mm) wide by 4 inches (100 mm) deep**] **<insert dimensions>**
 3. Stakes: Tapered steel, minimum of [**12 inches (300 mm)**][**15 inches (380 mm)**] long. **<Insert length>**
 4. Accessories: Standard tapered ends, corners, and splicers.
 5. Finish: [**Standard paint**][**Zinc coated**][**Unfinished**].
 6. Paint color: [**Black**][**Green**][**Brown**].
- C. Aluminum: Standard-profile extruded aluminum edging, ASTM B 221 or ASTM B 221M,

Alloy 6063-T6, fabricated in standard lengths of interlocking sections with loops stamped from face of sections to receive stakes.

1. Provide products by one of the following manufacturers, subject to compliance with requirements, or approved equal:
 - a. Sure-Loc Edging Corporation
 - b. The J.D. Russell Company
 - c. Permaloc corporation
 - d. Curv-Rite, Inc.
 2. Edging Size: **[3/16 inch (4.8 mm) wide by 5 1/2 inches (140 mm) deep] [3/16 inch (4.8 mm) wide by 4 inches (100 mm) deep] [1/8 inches (3.2 mm) wide by 5 1/2 inches (140 mm) deep] [1/8 inch (3.2 mm) wide by 4 inches (100 mm) deep]**<insert dimensions>
 3. Stakes: Aluminum, ASTM B 221 or ASTM B-221M, Alloy 6061-T6, 1 1/2 inches (38 mm) wide by 12 inches (300 mm) long.
 4. Finish: **[Standard paint][Powdercoated][Mill – natural]{Black anodized}**.
 5. Paint color: **[Black][Green][Brown]**.
- D. Plastic: Standard-black polyethylene or vinyl edging **[V-lipped bottom][horizontally grooved]**, extruded in standard lengths, with 9inch (225 mm) **[steel angle][plastic]** stakes.
1. Provide products by one of the following manufacturers, subject to compliance with requirements, or approved equal:
 - a. Valley View Industries
 - b. **Oly-Ola Edgings, Inc.**
 2. Edging Size: **[0.1 inch (2.5 mm) wide by 5 inches (125 mm) deep][0.07 inch (1.8 mm) wide by 5 inches (125 mm) deep]**.<insert dimensions>
 3. Top profile: **[straight] [round]**.
 4. Accessories: Manufacturer's standard alignment clips or plugs.

END OF SECTION 329300