SECTION 329300 - PLANTS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Plants.

Tree stabilization.

Landscape edgings.

Tree grates.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 312500 “Erosion and Sedimentation Controls.”

Section 329200 "Turf and Grasses."

* + - 1. REFERENCES
         1. American Nursery & Landscape Association

ANSI Z60.1 – American Standard for Nursery Stock

* + - * 1. American Wood Protection Association

AWPA – U1 – Use Category System: User Specification For Treated Wood

* + - * 1. American Society of Mechanical Engineers

ASME B18.6.1- 1981 (R2016) – Wood Screws (Inch Series)

* + - * 1. ASTM International

ASTM A48 – 03(2016) - Standard Specification for Gray Iron Castings

ASTM A641 – 19 - Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

ASTM B221 – 14 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction

* + - * 1. Plant Nomenclature: Conform to the latest edition of “Standardized Plant Names” as adopted by the American Joint Committee of Horticultural Nomenclature.
        2. Size and Grading Standards: Conform to the current edition of “American Standard for Nursery Stock” - Sponsor - the American Association of Nurserymen Inc., unless otherwise specified.
      1. DEFINITIONS

Retain terms that remain after this Section has been edited for a Project.

* + - * 1. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than [**sizes indicated**] [**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.
        2. 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 [**sizes indicated**] [**diameter and depth recommended by ANSI Z60.1 for type and size of plant required**].
        3. 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 the minimum root spread according to ANSI Z60.1 for type and size of plant required.
        4. 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.
        5. 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.
        6. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 310001 “Earthwork Materials” and drawing designations for planting soils.
        7. 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.
        8. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Insert other definitions if required to support planting requirements indicated on drawings.

* + - 1. COORDINATION

Retain "Coordination with Turf Areas (Lawns)" Paragraph below if there are turf areas (lawns); revise if contrary to planting schedule.

* + - * 1. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. List of Plants: At least seven days before plant material is shipped to the Project site, submit a complete itemized list of all plants including the source of supply.
         5. Product Data: For each type of product.

Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

* + - * 1. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to 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 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
        2. Qualification Data: For landscape Installer. Include list of 5 similar Projects completed by Installer during the past 2 years demonstrating Installer's capabilities and experience. Include Project names, addresses, and year completed, and include names and addresses of Director’s Representative's contact persons.

Retain "Product Certificates" Paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

Manufacturer's certified analysis of standard products.

Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

For plant materials, certificates of inspection required by State and Federal agencies.

* + - * 1. Sample Warranty: For special warranty.
        2. Maintenance Data: Recommended procedures to be established by Director’s Representative for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.
      1. QUALITY ASSURANCE
         1. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
         2. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

Retain subparagraph below if allowances are required. This is rare and should only be used at the direction of the Director’s Representative.

Selection of plants purchased under allowances is made by Architect, who tags plants at their place of growth before they are prepared for transplanting. Revise "Measurements" Paragraph below to suit Project.

* + - * 1. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

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. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.

Other Plants: Measure with stems, petioles, and foliage in their normal position.

* + - * 1. Plant Material Observation: Director’s Representative 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. Director’s Representative may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
        2. Do not use woody plant material from regions south of latitude 39 degrees unless such material has been lined out in nurseries located north of latitude 39 degrees for at least 2 growing seasons. Latitude 39 degrees is approximately a line from Annapolis, MD to Cincinnati, OH.
      1. DELIVERY, STORAGE, AND HANDLING

Retain one or more Paragraphs in this article to suit Project.

* + - * 1. Notify the Director’s Representative 48 hours in advance of delivery of plant material.
        2. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
        3. Bulk Materials:

Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

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.

Accompany each delivery of bulk materials with appropriate certificates.

* + - * 1. Deliver bare-root stock plants within [**24 hours**] [**36 hours**] of digging. 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. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
        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. Handle planting stock by root ball.
        4. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

Retain one of first two Paragraphs below; revise to suit Project.

* + - * 1. 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.

If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

* + - * 1. 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.
        2. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

Retain subparagraphs below to suit Project.

Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.

Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

Do not remove container-grown stock from containers before time of planting.

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.

* + - * 1. Deliver fertilizer in manufacturer’s standard sized bags showing weight, analysis, and manufacturer’s name. Store under a waterproof cover or in a dry place as designated by the Director’s Representative.
      1. FIELD CONDITIONS
         1. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
         2. Planting Restrictions: Plant within the appropriate schedules stated below. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

Plant deciduous, woody plants between October 1 and May 15 whenever temperature is above 32 degrees F and soil is in workable condition, unless otherwise approved in writing.

Plant evergreens between August 15 and September 15 or during April or May before start of new growth.

* + - * 1. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
      1. WARRANTY
         1. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

Failures include, but are not limited to, the following:

Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Director’s Representative.

Structural failures including plantings falling or blowing over.

Faulty performance of [**tree stabilization**] [**edgings**] [**and**] [**tree grates**] <**Insert item**>.

Deterioration of metals, metal finishes, and other materials beyond normal weathering.

Warranty Periods: From date of acceptance of the work.

Warranty periods in "Trees, Shrubs, Vines, and Ornamental Grasses," "Ground Covers, Biennials, Perennials, and Other Plants," and "Annuals" subparagraphs below are examples only for some categories of plants; revise or insert other plant categories to suit Project.

Trees, Shrubs, and Ornamental Grasses: 12 months.

Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

Annuals: Three months.

Include the following remedial actions as a minimum:

Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

Retain subparagraph below if required; revise to suit Project.

Provide extended warranty for period equal to original warranty period, for replaced plant material.

1. PRODUCTS
   * + 1. PLANT MATERIAL

Revise "General" Paragraph below to suit Project. Although usually indicated on drawings, the plant list, schedule, or legend may be included with the specifications. Revise below to suit Project.

* + - * 1. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings 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.

Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.

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.

Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Director’s Representative, with a proportionate increase in size of roots or balls. Larger plants cut back to specified dimensions will not be accepted.

Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

Provide trees which are transplanted, or root pruned 360 degrees at least once during the previous three years.

Retain first option in "Labeling" Paragraph below if many species of plants are required; retain second option if many plants of same species are required. Labeling is recommended unless an expert is available to identify plant material. Copy this Paragraph and re-edit for labeling different types of plants if required.

* + - * 1. Labeling: Label [**each**] [**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.

Retain first Paragraph below if applicable.

* + - * 1. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

Retain "(Annuals) (and) (Biennials)" Paragraph below for annuals or biennials. ANSI Z60.1 does not include them. Revise to suit Project; insert sizes of pots or containers if required.

* + - * 1. [**Annuals**] [**and**] [**Biennials**]: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery[**and that are in bud but not yet in bloom**].

Insert requirements here for other plants such as specimen trees and shrubs, specimen-planted ornamental grasses, and plants not included in ANSI Z0.1. Use ANSI Z60.1 requirements or insert others.

* + - 1. PLANTING SOIL

Use one of two Paragraphs below.

* + - * 1. Topsoil for Planting Soil: Obtain from outside sources.Use paragraph above or below.
        2. Topsoil for Planting Soil: Use approved topsoil stripped and stockpiled on the Site.
        3. Soil Amendments (For every 4-cu. yd. of topsoil):

Peat Moss: 7-1/2 cu ft bale or 15 bushels (loose measure).

Fertilizer: 5 lb.

Bonemeal: 80 lb.

* + - 1. FERTILIZERS
         1. Bonemeal: Commercial, steamed finely ground material containing not less than 1.0 percent nitrogen and 11 percent phosphoric acid.
         2. Commercial Fertilizer (10-6-4): Containing not less than 10 percent nitrogen, 6 percent available phosphoric acid and 4 percent water soluble potash.
      2. MULCHES

Retain one or more of “Peat Moss” and "Organic Mulch," Paragraphs below. Indicate function and location of each material on drawings.

* + - * 1. Peat Moss: Finely granulated material, passing a 1/2 inch sieve, free of sticks, woody roots, stones and other objectionable material, and of such physical condition that it can be readily incorporated with the topsoil. Furnish material conforming to the following criteria:

pH value: 3.0 to 5.0.

Moisture: Not less than 25 percent nor more than 50 percent.

Organic Material: Not less than 47 percent (90 percent dry basis).

* + - * 1. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

Retain appropriate materials in "Type" Subparagraph below.

Type: [**Shredded hardwood**] [**Wood and bark chips**] <**Insert mulch type**>.

Size Range: 3 inches maximum, 1/2 inch minimum.

Color: Natural.

* + - 1. WEED-CONTROL BARRIERS

Retain "Nonwoven Geotextile Filter Fabric" or "Composite Fabric" Paragraph below, or insert another type if required. If retaining more than one, specify or indicate on drawings where each barrier is used.

* + - * 1. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

Manufacturers:

Typar Pro 3301.

Approved equivalent.

* + - * 1. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.
      1. TREE-STABILIZATION MATERIALS

Retain this article if tree stabilization is required; coordinate with details on drawings.

Retain "Trunk-Stabilization Materials" Paragraph below for tree-trunk stabilization (staking and guying). Compression springs provide more line flexibility than turnbuckles.

* + - * 1. Trunk-Stabilization Materials:

Retain first seven subparagraphs below for nonproprietary devices. Insert provisions for painting the stakes if required.

Upright and Guy Stakes: Rough-sawn, sound, new [**hardwood**] [**softwood with specified wood pressure-preservative treatment**], free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.

Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.

Revise wire measurement in "Guys and Tie Wires" Subparagraph below to 0.080 inch in diameter for small trees.

Guys and Tie Wires: ASTM A641, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.

Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

Retain "Guy Cables" subparagraph below for tall and large-caliper trees.

Guy Cables: Five-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated [**turnbuckles**] [**compression springs**], a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.

Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

Retain "Root-Ball Stabilization Materials" Paragraph below if required.

* + - * 1. Root-Ball Stabilization Materials:

Retain "Upright Stakes and Horizontal Hold-Down" and "Wood Screws" subparagraphs below for nonproprietary devices.

Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.

Wood Screws: ASME B18.6.1.

* + - 1. LANDSCAPE EDGINGS

Mow strips are edgings that separate turf areas from other kinds of planted or mulched areas to facilitate easy mowing. Revise terms to suit Project.

* + - * 1. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Border Concepts, Inc., (800) 845-3343, 7621 Little Avenue, Suite 426, Charlotte, NC 28226.

Collier Metal Specialties, Inc., (800) 829-8225, 3333 Miller Park South, Garland, TX 75042.

J. D. Russell Company (The), (800) 888-9708, PO Box 183471, Shelby Township, MI 48318.

Sure-loc Edging Corporation, (800) 787-3562, 310 E. 64th Street, Holland, MI 49423.

Approved equivalent.

Edging Size: [**3/16 inch thick by 4 inches deep**] [**1/4 inch thick by 5 inches deep**].

Stakes: Tapered steel, a minimum of [**15 inches**] long.

Accessories: Standard tapered ends, corners, and splicers.

Finish: [**Manufacturer's standard paint**].

Retain "Paint Color" subparagraph below if retaining first option in "Finish" subparagraph above.

Paint Color: [**Black**] [**Green**] [**Brown**].

* + - * 1. Aluminum Edging: Standard-profile extruded-aluminum edging, ASTM B221, Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Curv-Rite, Inc., (800) 366-2878, 3603 10th St C, Wayland, MI 49348.

J. D. Russell Company (The), (800) 888-9708, PO Box 183471, Shelby Township, MI 48318.

Permaloc Corporation, (800) 356-9660, 13505 Barry Street, Holland, Michigan 49424.

Sure-loc Edging Corporation, (800) 787-3562, 310 E. 64th Street, Holland, MI 49423.

Approved equivalent.

Edging Size: 3/16 inch thick by 5-1/2 inches deep.

Stakes: Aluminum, ASTM B221, Alloy 6061-T6, approximately 1-1/2 inches wide by 12 inches long.

Finish: Mill (natural aluminum).

* + - 1. TREE GRATES

Retain "Tree Grates" Paragraph below for iron tree grates; revise if aluminum, bronze, brass, or plastic grates are required. Retain last option in Paragraph and retain "Frames" subparagraph elsewhere below if frames are required. Insert other design requirements and manufacturers' product designations if required.

* + - * 1. Tree Grates: Manufacturer's standard tree grates[**and frames**].

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Barry Pattern & Foundry Co., Inc.

EJ.

Ironsmith Inc.

Neenah Foundry Company.

Approved equivalent.

Grates: ASTM A48, Class 35 or better, gray-iron castings.

Frames: [**ASTM A48, Class 35 or better, gray-iron castings**] [**or**] [**ASTM A36 steel-angle, hot-dip galvanized,**] of shape, pattern, and size indicated.

* + - * 1. Shape and Size: 60 inches square.
        2. Finish: As fabricated.
      1. MISCELLANEOUS PRODUCTS

In this article, insert products such as tree protection devices (tree guards), landscape rock, and planters if not included elsewhere. Coordinate with other Sections to avoid duplication.

* + - * 1. Wood Pressure-Preservative Treatment: AWPA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.
        2. Root Barrier: Black, molded, modular panels [**18 inches**] [**24 inches**] high (deep), 85 mils thick, and with vertical root deflecting ribs protruding 3/4 inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

DeepRoot Green Infrastructure, LLC.

NDS Inc.

Villa Root Barrier.

Approved equivalent.

An approved equivalent is permitted.

* + - * 1. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

Manufacturers:

Wilt-Pruf by Wilt-Pruf Products, Inc., P.O. Box 469, Essex, CT 06426, (860) 767-7033.

Approved equivalent.

* + - * 1. Tree Wrapping:

Burlap: Non-synthetic, biodegradable.

Waterproof paper.

Manufacturers:

Tree Wrap by Eaton Brothers Corporation, 3530 Lakeview Road, P.O. Box 60, Hamburg, NY 14975, 1-888-322-3530.

Approved equivalent.

Retain "Planter Drainage Gravel" and "Planter Filter Fabric" Paragraphs below for planters.

* + - * 1. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with [**ASTM D448 for Size No. 8**].

1. EXECUTION
   * + 1. EXAMINATION
          1. Plants to be approved at the nursery by the Director’s Representative prior to being shipped to site.
          2. Do not plant any plant material until after inspection and approval in writing of plant shipments. Secure written approval of any substitutions before planting. Remove rejected material from planting areas.
          3. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

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.

Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.

Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

Uniformly moisten excessively dry soil that is not workable or which is dusty.

* + - * 1. 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 Director’s Representative and replace with new planting soil.
        2. Proceed with installation only after unsatisfactory conditions have been corrected.
      1. PREPARATION
         1. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
         2. 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.
         3. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Director’s Representative's acceptance of layout before excavating or planting. Make minor adjustments as required.
      2. PLANTING AREA ESTABLISHMENT
         1. General: Prepare planting area for soil placement.
         2. In the presence of the Director’s Representative, place the soil amendments over the topsoil piles and turn over the combined elements a minimum of 3 times until thoroughly mixed...
         3. Before planting, obtain Director’s Representative's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
      3. EXCAVATION FOR TREES AND SHRUBS

Revise size and cross section of tree and shrub planting pits and trenches in "Planting Pits and Trenches" Paragraph below to suit Project. As planting practices have evolved, pit and trench proportions have changed; they are wide at top with sides tapered to a narrow base and are as deep or almost as deep as the root ball, which is set on an undisturbed subgrade. Revise descriptions if required and supplement with drawing details.

* + - * 1. Planting Pits and Trenches: Excavate circular planting pits.

Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

Retain first two subparagraphs below if applicable. Retain one of four options in first subparagraph to suit Project.

Excavate approximately three times as wide as ball diameter for [**balled and burlapped**] [**balled and potted**] [**container-grown**] [**fabric bag-grown**] stock.

Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

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.

Dispose of excavated material of the site unless otherwise indicated.

Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

Maintain supervision of excavations during working hours.

Keep excavations covered or otherwise protected when unattended by Installer's personnel.

Retain subparagraph below if applicable.

If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

Revise "Backfill Soil" Paragraph below to suit Project. Planting practices for trees often allow use of unamended native subsoil or topsoil as backfill soil.

* + - * 1. Backfill Soil: Backfill pits with planting soil.
        2. Obstructions: Notify Director’s Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

Retain "Hardpan Layer" subparagraph below if hardpan or caliche is expected. Revise treatment to suit Project. Revise hole size and depth if required.

Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

Retain "Drainage" Paragraph below if no below-grade drainage systems are indicated.

* + - * 1. Drainage: Notify Director’s Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
      1. TREE AND SHRUB PLANTING

Retain applicable Paragraphs in this article. Retain "Inspection" Paragraph below for visual control of root-ball depth during planting.

* + - * 1. Inspection: At time of 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 top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
        2. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
        3. Landscape Fabric: Install over the planting area to limits indicated. Cut fabric as required to avoid shrubs.
        4. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch above**] [**2 inches above**] adjacent finish grades.

Retain "Backfill" subparagraph below if backfill or planting-soil type is not indicated on drawings; revise to suit Project.

Backfill: Planting soil

After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets (if present) from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

Continue backfilling process. Water again after placing and tamping final layer of soil.

* + - * 1. [**Balled and Potted**] [**and**] [**Container-Grown**] Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch above**] [**2 inches above**] adjacent finish grades.

Retain "Backfill" subparagraph below if backfill or planting-soil type is not indicated on drawings; revise to suit Project.

Backfill: Planting soil.

Carefully remove root ball from container without damaging root ball or plant.

Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

Continue backfilling process. Water again after placing and tamping final layer of soil.

* + - * 1. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch above**] [**2 inches above**] adjacent finish grades.

Retain "Backfill" subparagraph below if backfill or planting-soil type is not indicated on drawings; revise to suit Project.

Backfill: Planting soil.

Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.

Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

Continue backfilling process. Water again after placing and tamping final layer of soil.

* + - * 1. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare [**1 inch above**] [**2 inches above**] adjacent finish grade.

Retain "Backfill" subparagraph below if backfill or planting-soil type is not indicated on drawings; revise to suit Project.

Backfill: Planting soil.

Spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.

Carefully work backfill in layers around roots by hand. Bring roots into close contact with the soil.

When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

Continue backfilling process. Water again after placing and tamping final layer of soil.

* + - * 1. Slopes: 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.

Delete 2 Paragraphs below if not indicated on drawings.

* + - * 1. Wrapping: Wrap deciduous trees within 4 days after planting from the ground line to the height of the second branches. Wrap in a single layer wound spirally starting from base and overlapping 1-1/2 inches. Secure wrapping in place by use of approved staples or other approved methods and materials.

Delete paragraph below if not required.

* + - * 1. Anti-Desiccant: Apply anti-desiccant spray to broadleaved ericaceous plants planted in the Fall season, as directed.Delete paragraph below if not indicated on drawings.
      1. MECHANIZED TREE-SPADE PLANTING
         1. Trees [**shall**] [**may**] be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
         2. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
         3. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
         4. Cut exposed roots cleanly during transplanting operations.
         5. Plant trees following procedures in "Tree and Shrub Planting" Article.
         6. Where possible, orient the tree in the same direction as in its original location.
      2. TREE AND SHRUB PRUNING
         1. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Director’s Representative, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
         2. Do not apply pruning paint to wounds.
      3. TREE STABILIZATION

Retain this article if tree stabilization is required; coordinate with details on drawings.

Retain "Trunk Stabilization by Upright Staking and Tying" Paragraph below for tree trunk stabilization by upright staking with horizontal tie wires.

* + - * 1. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

Upright Staking and Tying:

Retain one of two subparagraphs below or revise to suit Project.

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 indicated on Drawings**] [**at least 72 inches**] [**one-third of trunk height**] above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

In subparagraph below, one stake may be acceptable for high-branched trees in semi-protected locations.

Stake trees with 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.

Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

Retain "Trunk Stabilization by Staking and Guying" Paragraph below for tree trunk stabilization with diagonal guy wires secured to stakes driven at an angle into the ground.

* + - * 1. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet in height with 3 or more stems, evergreens over 6 feet in height, and trees more than 3 inches in caliper unless otherwise indicated.

Retain "Site-Fabricated, Staking-and-Guying Method" or "Proprietary Staking and Guying Device" subparagraph below for stabilization method, or revise to suit Project. Compression springs provide more line flexibility than turnbuckles.

Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide [**turnbuckle**] [**compression spring**] for each guy wire and tighten securely.

For trees more than [**6 inches in caliper**], anchor guys to wood deadmen buried at least 36 inches below grade. Provide [**turnbuckle**] [**compression spring**] for each guy wire and tighten securely.

Retain one of first two subparagraphs below.

Support trees with bands of flexible ties at contact points with tree trunk and reaching to [**turnbuckle**] [**compression spring**]. Allow enough slack to avoid rigid restraint of tree.

Support trees with [**guy cable**] [**or**] [**multiple strands of tie wire**], connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to [**turnbuckle**] [**compression spring**]. Allow enough slack to avoid rigid restraint of tree.

Connect multi-stem trees with protected connecting wires maintaining each stems relationship to one another.

Retain one of first two subparagraphs below.

Attach flags to each guy wire, 30 inches above finish grade.

Paint [**turnbuckles**] [**compression springs**] with luminescent white paint.

Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

Retain "Root-Ball Stabilization" Paragraph below if required.

* + - * 1. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

Retain "Wood Hold-Down Method" or "Proprietary Root-Ball Stabilization Device" subparagraph below for stabilization method, or revise to suit Project.

Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

Install stakes of length required to penetrate at least [**to the dimension indicated on Drawings**] [**18 inches**] below bottom of backfilled excavation. Saw stakes off at horizontal stake.

Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.

Install second set of stakes on other side of root trunk for larger trees.

Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

* + - 1. INSTALLATION OF ROOT BARRIER
         1. Install root barrier where trees are planted within [**60 inches**] [**48 inches**] of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.
         2. Align root barrier [**vertically**] [**with bottom edge angled at 20 degrees away from the paving or other hardscape element**], and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
         3. Install root barrier continuously for a distance of [**60 inches**] in each direction from the tree trunk, for a total distance of [**10 feet**] per tree. If trees are spaced closer, use a single continuous piece of root barrier.

Position top of root barrier [**flush with finish grade**] [**1/2 inch above finish grade**] [**according to manufacturer's written recommendations**].

Overlap root barrier a minimum of 12 inches at joints.

Do not distort or bend root barrier during construction activities.

Do not install root barrier surrounding the root ball of tree.

* + - 1. PLACING SOIL IN PLANTERS
         1. Place a layer of drainage gravel at least 4 inches thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric [**4 inches**] [**6 inches**] <**Insert dimension**> up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.
         2. Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches below top of planter, allowing natural settlement.
      2. GROUND COVER AND PLANT PLANTING

Revise spacing in first Paragraph below to suit Project. Insert spacing for each plant if preferred or indicate spacing on drawings.

* + - * 1. Set out and space ground cover and plants other than trees and shrubs [**9 inches apart**] [**12 inches apart**] [**18 inches apart**] [**24 inches apart**] [**as indicated on Drawings**] in even rows with triangular spacing.

Retain first Paragraph below if planting-soil type is not indicated on drawing; revise if other types of backfill are required.

* + - * 1. Use planting soil for backfill.
        2. Dig holes large enough to allow spreading of roots.
        3. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
        4. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
        5. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
        6. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.
      1. PLANTING AREA MULCHING

Retain first Paragraph below if required.

* + - * 1. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of [**6 inches**] [**12 inches**] and secure seams with galvanized pins.
        2. Mulch backfilled surfaces of planting areas and other areas indicated.

Retain required mulch applications in two subparagraphs below.

Trees[**and Treelike Shrubs**] in Turf Areas: Apply organic mulch ring of [**2-inch**] [**3-inch**] average thickness, with [**12-inch**] [**24-inch**] [**36-inch**] radius around trunks or stems. Do not place mulch within [**3 inches**] [**6 inches**] of trunks or stems.

Organic Mulch in Planting Areas: Apply [**2-inch**] [**3-inch**] average thickness of organic mulch [**extending 12 inches beyond edge of individual planting pit or trench**] [**and**] [**over whole surface of planting area**], and finish level with adjacent finish grades. Do not place mulch within [**3 inches**] [**6 inches**] of trunks or stems.

* + - 1. INSTALLATION OF EDGING

Retain applicable Paragraphs in this article; revise to suit Project. Mow strips are edgings that separate turf areas from other kinds of planted or mulched areas to facilitate easy mowing. Revise terms to suit Project.

* + - * 1. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.
        2. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately [**36 inches**] [**48 inches**] apart, driven below top elevation of edging.
        3. Shovel-Cut Edging: Separate mulched areas from turf areas[**, curbs, and paving**] with a 45-degree, 4- to 6-inch-deep, shovel-cut edge[**as indicated on Drawings**].

Retain "Mow-Strip Installation" if mow strips are required; revise to suit Project.

* + - * 1. Mow-Strip Installation:

Excavate for mow strip [**as indicated on Drawings**].

Compact subgrade uniformly beneath mow strip.

Install [**steel**] [**aluminum**] edging, delineating the edge of mow strip.

Install weed-control barrier before mulching, covering area of mow strip, and overlapping and pinning edges of barrier at least 6 inches and according to manufacturer's written instructions.

Place indicated thickness of organic mulch, fully covering weed barrier.

Rake mulch to a uniform surface level with adjacent finish grades.

* + - 1. INSTALLATION OF TREE GRATES
         1. Tree Grate Frames: Install steel angle frames in concrete, flush and level with surrounding paving.

Use spreaders or stakes to keep frame from being distorted by concrete pressure. Clean concrete and debris from frame prior to grate installation.

* + - * 1. Tree Grates: Install according to manufacturer's written instructions. Set grate segments flush with adjoining surfaces. Shim from supporting substrate with soil-resistant plastic. Maintain a 3-inch-minimum growth radius around base of tree; break away portions of casting, if necessary, according to manufacturer's written instructions.
      1. PLANT MAINTENANCE
         1. Maintain plantings immediately following planting operations and continue throughout the guarantee period.
         2. 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.

Water all plants at least once a week between April 1 and October 31 with approximately 5 gallons per square yard (1 inch layer of water) per watering unless otherwise directed. Provide additional watering during periods of dry weather when required or when directed.

* + - * 1. 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.
        2. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
      1. INSPECTIONS
         1. Physical Completion Inspection and Replacements: Notify the Director’s Representative in writing at least ten days prior to requested date of physical completion inspection. Remove and replace dead, unhealthy or badly impaired plants according to the original specification, if so directed. Replace plants during the next planting season if this inspection is not within a planting season.
         2. End of Guarantee Inspection and Replacements: Remove stakes, guy wires and tree wrapping at the end of the one year guarantee period unless otherwise directed. Remove and replace dead, unhealthy or impaired plants according to original specification, as directed. Replace plantings during the next planting season if end of guarantee period is not within a planting season.
      2. REPAIR AND REPLACEMENT
         1. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Director’s Representative.

Submit details of proposed pruning and repairs.

Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.

Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Director’s Representative.

* + - * 1. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the guarantee period or are damaged during construction operations that Director’s Representative determines are incapable of restoring to normal growth pattern.

Retain one or both of first two subparagraphs below; revise to suit Project.

Provide new trees of same size as those being replaced for each tree of [**6 inches**] [**4 inches**] or smaller in caliper size.

Revise first subparagraph below to suit Project. Replacing larger than 6-inch caliper-size trees with trees of equal size is difficult and not always successful; some jurisdictions have established formulas for large-tree replacements.

Provide [**one**] [**two**] new tree(s) of [**6-inch**] [**4-inch**] caliper size for each tree being replaced that measures more than [**6 inches**] [**4 inches**] in caliper size.

* + - * 1. Species of Replacement Trees: [**Same species being replaced**] [**Species selected by Director’s Representative**].
      1. CLEANING AND PROTECTION
         1. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
         2. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off State property.
         3. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 329300