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USACE / NAVFAC / AFCEC / NASA | UFGS-32 93 00 (August 2017)
Change 1 - 08/21

Preparing Activity: NAVFAC | Superseding
UFGS-32 93 00 (February 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 93 00

EXTERIOR PLANTS

08/17, CHG 1: 08/21

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SECTION 32 93 00

EXTERIOR PLANTS
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****
NOTE: This guide specification covers the requirements for exterior planting.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

****
NOTE: The following information must be shown on the project drawings:

1. All areas to be planted, with plant layout provided.

2. Plant list.

3. Subsurface drainage.

4. Planting accessories.
****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA P5	(2015) Standard for Waterborne Preservatives
AWPA T1	(2023) Use Category System: Processing and Treatment Standard
AWPA U1	(2023) Use Category System: User Specification for Treated Wood

AMERICANHORT (AH)

ANSI/ANLA Z60.1	(2004) American Standard for Nursery Stock

ASTM INTERNATIONAL (ASTM)

ASTM A580/A580M	(2023) Standard Specification for Stainless Steel Wire
ASTM C4	(2004; R 2014) Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile
ASTM C602	(2020) Agricultural Liming Materials
ASTM C700	(2018; R 2022) Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated

ASTM D2729	(2017) Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3034	(2016) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D4427	(2018) Standard Classification of Peat Samples by Laboratory Testing
ASTM D4972	(2018) Standard Test Methods for pH of Soils
ASTM D5268	(2019) Topsoil Used for Landscaping Purposes
ASTM D5539	(2013) Seed Starter Mix
ASTM D5852	(2000; R 2007; E 2014) Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
ASTM D6155	(2019) Nontraditional Coarse Aggregate for Bituminous Paving Mixtures
ASTM D6629	(2001; R 2012; E 2012) Selection of Methods for Estimating Soil Loss by Erosion
ASTM F667/F667M	(2016; R 2021) Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings

L.H. BAILEY HORTORIUM (LHBH)

LHBH	(1976) Hortus Third

TREE CARE INDUSTRY ASSOCIATION (TCIA)

TCIA A300P1	(2017) ANSI A300 Part1: Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance Standard Practices - Pruning
TCIA Z133	(2017) American National Standard for Arboricultural Operations - Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements

U.S. DEPARTMENT OF AGRICULTURE (USDA)

DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.2 RELATED REQUIREMENTS

[Section 31 00 00 EARTHWORK,] [Section 32 84 24 IRRIGATION SPRINKLER SYSTEMS,] [Section 32 96 00 TRANSPLANTING EXTERIOR PLANTS,] [Section 32 92 19 SEEDING,] [Section 32 92 23 SODDING,] [Section 32 92 26 SPRIGGING,] and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.3 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

State Landscape Contractor's License

Time Restrictions and Planting Conditions

Indicate anticipated dates and locations for each type of planting.

SD-03 Product Data

Peat

Composted Derivatives

Rotted Manure

Organic Mulch Materials

Gypsum

[Drainage Pipe

] Mulch; G[, [_____]]

Ground Stakes

Recycled Plastic Edging

Fertilizer

Weed Control Fabric; G[, [_____]]

[Root Control Barrier; G[, [_____]]

] Staking Material

Wood Edging

Metal Anchors

[Antidesiccants

][Erosion Control Materials

][Photographs; G[, [_____]]

] SD-04 Samples

[Mulch; G[, [_____]]

][Submit [0.5 literone pint] of mulch.

] SD-06 Test Reports

Topsoil Composition Tests; [Soil Test of current growing area]; [Soil Test of proposed area]; [Soil Test location map]

Percolation Test; [Percolation Test of current growing area]; [Percolation Test of proposed area]

SD-07 Certificates

Nursery Certifications

SD-10 Operation and Maintenance Data

Plastic Identification

When not labeled, identify types in Operation and Maintenance Manual.

1.4 QUALITY ASSURANCE

1.4.1 Topsoil Composition Tests

Commercial test from an independent testing laboratory including basic soil groups (moisture and saturation percentages, Nitrogen-Phosphorus-Potassium (N-P-K) ratio, pH (ASTM D4972), soil salinity), secondary nutrient groups (calcium, magnesium, sodium, Sodium Absorption Ratio (SAR)), micronutrients (zinc, manganese, iron, copper), toxic soil elements (boron, chloride, sulfate), cation exchange and base saturation percentages, and soil amendment and fertilizer recommendations with quantities for plant material being transplanted. Soil required for each test must include a maximum depth of 450 mm 18 inches of approximately one liter one quart volume for each test. Areas sampled should not be larger than 0.4 hectare one acre and should contain at least 6-8 cores for each sample area and be thoroughly mixed. Problem areas should be sampled separately and compared with samples taken from adjacent non-problem areas. The location of the sample areas should be noted and marked on a parcel or planting map for future reference.

1.4.2 Nursery Certifications

[a. Indicate on nursery letterhead the name of plants in accordance with the LHBH, including botanical common names, quality, and size.

][b. Inspection certificate.

][c. Mycorrhizal fungi inoculum for plant material treated

]1.4.3 State Landscape Contractor's License

Construction company must hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last five years.

[1.4.4 Plant Material Photographs

Contractor must submit nursery photographs, for government approval prior to ordering, for each tree larger than 600 mm 24-inch box/ 50 mm 2-inch caliper size.

]1.4.5 Percolation Test

Immediately following rough grading operation, identify a typical location for one of the largest trees and or shrubs and excavate a pit per the project details. Fill the pit with water to a depth of 300 mm 12 inches. The length of time required for the water to percolate into the soil, leaving the pit empty, must be measured by the project Landscape Architect and verified by the Contracting Officer. Within six hours of the time the

water has drained from the pit, the Contractor, with the Contracting Officer and project Landscape Architect present, must again fill the pit with water to a depth of 300 mm 12 inches. If the water does not completely percolate into the soil within 9 hours, a determination must be made whether a drainage system or a soil penetrant will be required for each tree and or shrub being transplanted.

1.4.6 Erosion Assessment

****

NOTE: The erosion potential of a soil is of concern in vegetated channels, road embankments, dams, levees, spillways, construction sites, [_____].

****

Assess potential effects of soil management practices on soil loss in accordance with ASTM D6629. Assess erodibility of soil with dominant soil structure less than 70 to 80 mm 2.8 to 3.1 inches in accordance with ASTM D5852.

1.4.7 Pre-Installation Meeting

Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section. Review conditions of operations, procedures and coordination with related work. Agenda must include the following:

a. Tour, inspect, and discuss conditions of planting materials.

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

1.5.1.2 Soil Amendment Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, [fertilizer,] [gypsum,] [sulfur,] [iron,] [and] [lime] may be furnished in bulk with a certificate indicating the above information. Store in dry locations away from contaminates.

1.5.1.3 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical and common plant name and

variety as applicable and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels must be legible for a minimum of 60 days after delivery to the planting site.

1.5.2 Storage

1.5.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.

b. Heel-in bare root plants.

c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.

d. Keep plants in a moist condition until planted by watering with a fine mist spray.

e. Do not store plant material directly on concrete or bituminous surfaces.

1.5.2.2 [Fertilizer,] [Gypsum,] [pH Adjusters] and [Mulch] Storage

Store in dry locations away from contaminants.

1.5.2.3 Topsoil

Prior to stockpiling topsoil, eradicate on site undesirable growing vegetation. Clear and grub existing vegetation three to four weeks prior to stockpiling existing topsoil.

[1.5.2.4 [Root Control Barrier] [and] [Weed Control Fabric]

Store materials on site in enclosures or under protective covering in dry location. Store under cover out of direct sunlight. Do not store materials directly on ground.

]1.5.3 Handling

Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle [boxed][balled and burlapped] [bare root] [balled and potted][processed balled][in-ground fabric bag grown] [container] plants carefully to avoid damaging or breaking the earth ball or root structure. Do not handle plants by the trunk or stem.[Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out.] Remove damaged plants from the site.

1.5.4 TIME LIMITATION

Except for container-grown plant material, the time limitation from digging to installing plant material must be a maximum of 90 days. The

time limitation between installing the plant material and placing the mulch must be a maximum of 24 hours.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

****
NOTE: Check with the local Agriculture County Extension Service Office for recommended planting dates for the project area. Allow for planting period in the construction completion time provided in the Additional General Paragraphs. Delete time restrictions for continuous growing conditions.
****

Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.

1.6.1 Planting Dates

[Plant all plants from [_____] to [_____].

][1.6.1.1 Deciduous Material

Deciduous material from [_____] to [_____] for spring [/summer] planting and from [_____] to [_____] for fall [/winter] planting.

][1.6.1.2 Evergreen Material

Evergreen material from [_____] to [_____] for spring [/summer] planting and from [_____] to [_____] for fall [/winter] planting.

]1.6.2 Restrictions

Do not plant when ground is [frozen,] [snow covered,] muddy, or when air temperature exceeds [32] [_____] degrees Celsius [90] [_____] degrees Fahrenheit

1.7 GUARANTEE

****
NOTE: This guarantee is premised on a fall planting season from approximately October 1 to December 15 and a spring planting season from the time ground can be worked to May 15.
****

****
NOTE: Choose one of the following options.
****

[[All plants must be guaranteed for [one year] [_____] beginning on the date of inspection by the Contracting Officer to commence the plant establishment period, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by the Government or by weather conditions unusual for the warranty period.][Transplanted plants require no guarantee.]

][Guarantee plants [except palms] installed during fall planting season until the following [August 1] [_____]; guarantee plants installed during

spring planting season until the following [October 1] [_____].[Transplanted plants require no guarantee.][The minimum guarantee must be 90 days from the time of planting.] [Replace palms which are not alive at the end of a one-year period.]

] [Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.]At end of warranty period, replace planting materials that die or have 25 percent or more of their branches that die during the construction operations or the guarantee period.

1.8 PLASTIC IDENTIFICATION

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NOTE: The marking system indicated below is intended to provide assistance in identification of products for making subsequent decisions as to handling, recycling, or disposal.

****

Provide product data indicating polymeric information in Operation and Maintenance Manual.

Type 1: Polyethylene Terephthalate (PET, PETE).

Type 2: High Density Polyethylene (HDPE).

Type 3: Vinyl (Polyvinyl Chloride or PVC).

Type 4: Low Density Polyethylene (LDPE).

Type 5: Polypropylene (PP).

Type 6: Polystyrene (PS).

Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

PART 2 PRODUCTS

2.1 PLANTS

****

NOTE: Check with local Agriculture County Extension Service Office for the species and varieties of plants recommended for the project area. Specify plants based on a xeriscaping approach, which utilizes indigenous plants and low maintenance plants tolerant of the site's existing soils and climate without supplemental irrigation or fertilization, once established. Indigenous plants typically will perform better than imported species and require less maintenance. It is advisable to sufficiently monitor imported species to determine the relative invasiveness. They can blend into the local ecosystem, but they can also overrun it, suffocating indigenous plants and crippling habitats.

Specify appropriate companion planting, seasonal mixes, and habitat vegetation. Companion planting takes advantage of complementary relationships between some plants such as parsley and roses. Seasonal mixes utilize plants that thrive at various times of the year. Seasonal mixes are closely related to providing habitat vegetation. Many birds, animals, and insects - especially migratory creatures - depend upon certain plants flowering or seeding at specific times of the year and in certain regions.

Existing vegetation must be evaluated for appropriateness to remain. Existing vegetation may be native and require little maintenance. Utilizing existing site features minimizes site disturbance, which reduces erosion and habitat destruction. Items on site such as excavated rocks may also be considered for use as landscaping features.

****

2.1.1 Regulations and Varieties

Existing trees and shrubs to remain must be protected and a planting plan be arranged around them. Furnish nursery stock in accordance with ANSI/ANLA Z60.1, except as otherwise specified or indicated. Each plant or group of planting must have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants, including turf grass, grown under climatic conditions similar to those in the locality of the project. Plants specified must be [indigenous,] low maintenance varieties, tolerant of site's existing soils and climate [without supplemental irrigation or fertilization once established]. [Spray plants budding into leaf or having soft growth with an antidesiccant before digging]. Plants of the same specified size must be of uniform size and character of growth. Plants must be chosen with their mature size and growth habit in mind to avoid over-planting and conflict with other plants, structures or underground utility lines. All plants must comply with all Federal and State Laws requiring inspection for plant diseases and infestation.

2.1.2 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and undamaged root system.

2.1.2.1 Deciduous Trees and Shrubs

Symmetrically developed and of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

2.1.2.2 Evergreen Trees and Shrubs

Well developed symmetrical tops with typical spread of branches for each particular species or variety.

2.1.2.3 Ground Covers and Vines

Number and length of runners and clump sizes indicated, and of the proper age for the grade of plants indicated, furnished in removable containers, integral containers, or formed homogeneous soil section.

2.1.3 Plant Size

Minimum sizes measured after pruning and with branches in normal position, must conform to measurements indicated, based on the average width or height of the plant for the species as specified in ANSI/ANLA Z60.1. Plants larger in size than specified may be provided with approval of the [Contracting Officer] [_____]. When larger plants are provided, increase the ball of earth or spread of roots in accordance with ANSI/ANLA Z60.1.

2.1.4 Root Ball Size

All box-grown, field potted, field boxed, collected, plantation grown, bare root, balled and burlapped, container grown, processed-balled, and in-ground fabric bag-grown root balls must conform to ANSI/ANLA Z60.1. All wrappings and ties must be biodegradable. Root growth in container grown plants must be sufficient to hold earth intact when removed from containers. Root bound plants will not be accepted.

[2.1.4.1 Mycorrhizal fungi inoculum

Before shipment, root systems must contain mycorrhizal fungi inoculum.

]2.1.5 Growth of Trunk and Crown

****
NOTE: The form of growth desired for specimen or special purpose plant material must be described.
****

2.1.5.1 Deciduous Trees

A height to caliper relationship must be provided in accordance with ANSI/ANLA Z60.1. Height of branching must bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees must not be "poled" or the leader removed.

a. Single stem: The trunk must be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, must average the size specified. To be considered a stem, there must be no division of the trunk which branches more than 150 mm 6 inches from ground level.

2.1.5.2 Palms

Palms must have the specified height as measured from the base of the trunk to the base of the fronds or foliage in accordance with ANSI/ANLA Z60.1. The palm must have straight trunk and healthy fronds or foliage as typical for the variety grown in the region of the project. Palms trimmed or pruned for delivery must retain a minimum of 150 mm 6 inches of foliage at the crown as a means of determining plant health.

2.1.5.3 Deciduous Shrubs

Deciduous shrubs must have the height and number of primary stems recommended by ANSI/ANLA Z60.1. Acceptable plant material must be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.5.4 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material must have the height-to-spread ratio recommended by ANSI/ANLA Z60.1. The coniferous evergreen trees must not be "poled" or the leader removed. Acceptable plant material must be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired must be as indicated.

2.1.5.5 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material must have the height-to-spread ratio recommended by ANSI/ANLA Z60.1. Acceptable plant material must be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.5.6 Ground Cover and Vine Plant Material

Ground cover and vine plant material must have the minimum number of runners and length of runner recommended by ANSI/ANLA Z60.1. Plant material must have heavy, well developed and balanced crown with vigorous, well developed root system and must be furnished in containers.

2.2 TOPSOIL

****

NOTE: If topsoil properties are included in another section of Division 31, delete this paragraph and include a cross-reference to the appropriate section. Otherwise, select appropriate paragraphs on topsoil. Check with the local Agriculture County Extension Service Office for soil properties appropriate for the plant materials to be planted. If existing topsoil is used, insert materials, if required, to properly condition for pH and friability. Where suitable topsoil is available within limits of the work area, include stripping and stockpiling of topsoil in the applicable section of Division 31 of the specification. If suitable topsoil is not available within the limits of the work area, consider whether it is more economical to treat the soil of the graded areas with fertilizer and supplements so as to be conducive for plant establishment and maintenance, to transport topsoil to the project site, or to use regionally native plants suited to the on-site soil. If treatment of the soil is more economical, include requirements for fertilizer and supplements. Prior to stockpiling topsoil, remove all weed-grasses. This should occur when the foliage is 150 to 250 mm 6 to 10 inches high and approximately 4 to 6 weeks prior to stockpiling.

****

[2.2.1 Existing Soil

Modify to conform to requirements specified in paragraph COMPOSITION.

][2.2.2 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph COMPOSITION. When available topsoil must be existing surface soil stripped and stockpiled on-site in accordance with Section 31 00 00 EARTHWORK.

][2.2.3 Off-Site Topsoil

Conform to requirements specified in paragraph COMPOSITION. Additional topsoil must be [furnished by the Contractor][obtained from topsoil borrow areas indicated].

]2.2.4 Composition

Evaluate soil for use as topsoil in accordance with ASTM D5268. From 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 19 mm 3/4 inch, with maximum 3 percent retained on 6 mm 1/4 inch screen. The pH must be tested in accordance with ASTM D4972. Topsoil must be free of sticks, stones, roots, plants, and other debris and objectionable materials. Other components must conform to the following limits:

Silt	[25-50][7 to 17][_____] percent
Clay	[10-30][4 to 12][_____] percent
Sand	[20-35][70 to 82][_____] percent
pH	[5.5 to 7.0][_____]
Soluble Salts	[600] [_____] ppm maximum

2.3 SOIL CONDITIONERS

****
NOTE: Prior to including these provisions in project specifications, perform tests of on-site topsoil to determine its suitability and the possible need of pH adjusters or soil conditioners.
****

Provide singly or in combination as required to meet specified requirements for topsoil. Soil conditioners must be nontoxic to plants.

2.3.1 Lime

****
NOTE: Use ASTM C602 calcium carbonate equivalent (C.C.E.) as specified in Table 1: for burnt lime, C.C.E. must not be less than 140 percent; for hydrated lime, C.C.E. must not be less than 110

percent; and for limestone, C.C.E. must not be less than 80 percent.
****

Commercial grade [hydrated] [or] [burnt] limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C602 of not less than [80][_____] percent.

2.3.2 Aluminum Sulfate

Commercial grade.

2.3.3 Sulfur

100 percent elemental

2.3.4 Iron

100 percent elemental

2.3.5 Peat

Natural product of [peat moss] derived from a freshwater site and conforming to [ASTM D4427] [ASTM D5539] as modified herein. Shred and granulate peat to pass a 12.5 mm 1/2 inch mesh screen and condition in storage pile for minimum 6 months after excavation. Peat must not contain invasive species, including seeds.

2.3.6 Sand

Clean and free of materials harmful to plants.

2.3.7 Perlite

Horticultural grade.

2.3.8 Composted Derivatives

Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, invasive species, including seeds, and soil stabilized with nitrogen and having the following properties:

2.3.8.1 Particle Size

Minimum percent by weight passing:

4.75 mmNo. 4 mesh screen	95
2.36 mmNo. 8 mesh screen	80

2.3.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.9 Gypsum

Coarsely ground gypsum comprised of calcium sulfate dihydrate 80 percent,

calcium 18 percent, sulfur 14 percent; minimum 96 percent passing through 850 micrometers 20 mesh screen, 100 percent passing thru 970 micrometers 16 mesh screen.

2.3.10 Vermiculite

Horticultural grade for planters.

2.3.11 Rotted Manure

Well rotted horse or cattle manure containing maximum 25 percent by volume of straw, sawdust, or other bedding materials; free of seeds, stones, sticks, soil, and other invasive species.

2.4 PLANTING SOIL MIXTURES

****
NOTE: Choose one of the following options.
****

[100 percent topsoil as specified herein.

][100 percent on-site topsoil.

][[_____] parts topsoil, [_____] parts [_____], and [_____] parts [_____]. Thoroughly mix all parts of planting soil mixture to a uniform blend throughout.

][Sandy topsoil: one part topsoil to one part peat; clay topsoil: two parts topsoil to one part peat. Thoroughly mix all parts of planting soil mixture to a uniform blend throughout.

]2.5 FERTILIZER

****
NOTE: Check with the local Agriculture County Extension Service Office for recommended fertilizer mixture for local conditions.
****

Fertilizer for groundcover, wildflowers and grasses is not permitted. Fertilizer for trees, plants, and shrubs must be as recommended by plant supplier, except synthetic chemical fertilizers are not permitted. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not permitted.

2.5.1 Granular Fertilizer

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

[_____] percent available nitrogen
[_____] percent available phosphorus
[_____] percent available potassium
[_____] percent sulfur
[[_____] percent iron

]2.5.2 Fertilizer Tablets

Organic, plant tablets composed of tightly compressed fertilizer chips forming a tablet that is insoluble in water, is designed to provide a continuous release of nutrients for at least 24 months and contains the following minimum percentages, by weight, of plant food nutrients:

[20] [_____] percent available nitrogen
[20] [_____] percent available phosphorus
[5] [_____] percent available potassium

2.6 WEED CONTROL FABRIC

****
NOTE: Check with the local Agriculture County Extension Service Office for recommended type of membrane for the project area. Specify only one type of membrane for the project.
****

****
NOTE: Choose one of the following options.
****

[2.6.1 Roll Type Polypropylene or Polyester Mats

Fabric must be woven, needle punched or non-woven and treated for protection against deterioration due to ultraviolet radiation. Fabric must be minimum 99 percent opaque to prevent photosynthesis and seed germination from occurring, yet allowing air, water and nutrients to pass thru to the roots. Minimum weight must be 0.11 kg per square meter 5 ounces per square yard with a minimum thickness of 0.50 mm 20 mils with a 20 year (minimum) guarantee.

][2.7 DRAINAGE PIPE FOR PLANT PITS AND BEDS

****
NOTE: Check with the local Agriculture County Extension Service Office for recommended type of drainage pipe. Specify only one type of drainage pipe for the project.
****

****
NOTE: If Section 33 40 00 STORMWATER UTILITIES is utilized, delete requirements for "DRAINAGE PIPE FOR PLANT PITS AND BEDS."
****

[Plastic polyvinyl chloride pipe, [_____] mm inches in diameter, [unperforated] conforming to ASTM D3034 SDR 35 [perforated] conforming to ASTM D2729.][Plastic HDPE pipe, [_____] mm inches in diameter, [unperforated] [perforated].][Plastic ABS pipe, [_____] mm inches in diameter, [unperforated] [perforated].][Corrugated plastic drainage tubing, [_____] mm inches in diameter, [unperforated] [perforated] conforming to ASTM F667/F667M.][Clay drain tile, [_____] mm inches in diameter, [unperforated conforming to ASTM C4] [perforated conforming to ASTM C4] [[extra strength] [standard strength] conforming to ASTM C700].

]]2.8 MULCH

****
NOTE: Check with the local Agriculture County Extension Service Office for recommended and locally available mulch material. Examine installations design guides if available for approve mulch list.
****

Free from noxious weeds, mold, pesticides, or other deleterious materials.

****
NOTE: Use inert mulch materials only when organic mulch is not available, or when site is located in a dry climate.
****

[2.8.1 Inert Mulch Materials

****
NOTE: Select desired mulch materials. Use materials with recycled content where appropriate for use. Verify suitability, availability within the region, cost effectiveness and adequate competition before specifying products with recycled content.
****

[Provide [recycled] [stone,] [riverbank stone,] [crushed pit-run rock,] [granite chips,] [_____,] [or other recycled material] complying with ASTM D6155, ranging in size from [___(____)] to [____(____)] mm (inches).[Provide materials from site and construction waste to the greatest extent possible.]

]]2.8.2 Organic Mulch Materials

****
NOTE: Hydraulic mulch is an EPA designated product for recycled content. Recycled content percentages listed are recommended by EPA; additional information can be found on the EPA's "Comprehensive Procurement Guidelines (CPG)" page within EPA's website at http://www.epa.gov.
****

Provide [wood cellulose fiber,] [wood chips,] [shredded hardwood,] [shredded redwood bark,] [pine straw mulch,] [pine needles,] or [recycled] [_____] from site when available. Wood cellulose fiber must be processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application. Paper-based hydraulic mulch must contain 100 percent post-consumer recycled content. Wood-based hydraulic mulch must contain 100 percent total recovered materials content.

[2.8.3 Recycled Organic Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 65 by 65 mm 2-1/2 by 2-1/2 inch screen. It must be cleaned of all sticks a minimum 25 mm one inch in diameter and

plastic materials a minimum 75 mm 3 inches length. The material must be treated to retard the growth of mold and fungi.

]2.9 STAKING AND GUYING MATERIAL

2.9.1 Staking Material

2.9.1.1 Tree Support Stakes

Rough sawn hard wood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Stakes must be minimum 50 mm 2 inches square or 64 mm 2-1/2 inch diameter by 2.4 m 8 feet long, pointed at one end.[Paint or stain wood stakes dark brown.].

2.9.1.2 Ground Stakes

Rough sawn hard wood or plastic, 50 mm 2 inches square are by 0.91 m 3 feet long, pointed at one end.

2.9.2 Guying Material

2.9.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A580/A580M.

2.9.2.2 Guying Cable

Minimum five-strand, 5 mm 3/16 inch diameter galvanized steel cable [plastic coated].

2.9.3 Hose Chafing Guards

New or used 2 ply 19 mm 3/4 inch diameter reinforced rubber or plastic hose, black or dark green, all of same color.

2.9.4 Flags

White [surveyor's plastic tape,] [12.70 mm1/2 inch diameter PVC pipe], [150 mm6 inches] [300 mm12 inches] long, fastened to guying wires or cables.

2.9.5 Turnbuckles

Galvanized or cadmium-plated steel with minimum 75 mm 3 inch long openings fitted with screw eyes. Eye bolts must be galvanized or cadmium-plated steel with 25 mm one inch diameter eyes and screw length 38 mm 1-1/2 inches, minimum.

2.9.6 Deadmen

****
NOTE: Avoid the use of concrete or brick materials.
****

100 by 200 mm4 by 8 inch rectangular or 200 mm 8 inch diameter by 900 mm 36 inch long, [pine] [fir] [_____] wood material.

2.9.7 Metal Anchors

2.9.7.1 Driven Anchors

Malleable iron, arrow shaped, galvanized, sized as follows:

Tree Caliper	Anchor Size
50 mm	75 mm
75 to 150 mm	100 mm
150 to 200 mm	150 mm
200 to 250 mm	200 mm
250 to 300 mm	250 mm

Tree Caliper	Anchor Size
2 inches and under	3 inches
3 to 6 inches	4 inches
6 to 8 inches	6 inches
8 to 10 inches	8 inches
10 to 12 inches	10 inches

2.9.7.2 Screw Anchors

Steel, screw type with welded-on 75 mm 3 inch round helical steel plate, minimum 10 mm 3/8 inch diameter, 375 mm 15 inches long.

2.10 EDGING MATERIAL

2.10.1 Wood Edging

****
NOTE: Indicate type of wood, e.g., Redwood, Cypress, Western Red Cedar, [_____]. If a decay resistant species is specified, preservative treatment will not be required. Specify decay-resistant species when feasible.
****

As specified in Section 06 10 00 ROUGH CARPENTRY. [Redwood] [Cypress] [Western Red Cedar] [_____] wood edging must be free of solvent at time of delivery. Minimum 200 by 13 mm 8 by 1/2 inch [treated in accordance with AWPA U1 and AWPA T1 with preservatives conforming to AWPA P5 before installation]. Anchoring stakes must be the same material as wood edging, [13 by 50] [_____] mm [1/2 by 2] [_____] inches, 300 mm 12 inches long.

****

NOTE: Plastic or rubber garden edging, and plastic lumber, are EPA designated products for recycled content. Recycled content percentages listed are recommended by EPA; additional information can be found on the EPA's "Comprehensive Procurement Guidelines (CPG)" page within EPA's website at http://www.epa.gov. Research shows that the product is commonly available via US national manufacturers meeting the percentage of recycled content listed below.

****

2.10.2 Recycled Plastic Edging

Plastic lumber as specified in Section 06 10 00 ROUGH CARPENTRY. 100 percent recycled [polyethylene][_____] edging, resistant to insects, termites, boring worms, splintering and rotting, and must not absorb moisture or promote bacterial growth. Minimum [1 by 4][1 by 6][2 by 4][2 by 6][_____] inch, capable of bending a minimum [24][36][_____] radius, integrally colored [brown][_____] with [slip joint][_____] connections. Anchors and stakes must be of the same manufacturer and color as the edging.

2.10.3 Concrete Edging

[Extruded] [Cast-in-place] [150 by 150] [_____] by [_____] mm [6 by 6] [_____] by [_____] inch concrete mowstrip. Provide [tooled] [saw cut] [_____] contraction joints to a depth of [19] [_____] mm [3/4] [_____] inch after the surface has been finished. Provide joints every [1500] [_____] lineal mm [5] [_____] lineal feet. Provide [12.70] [_____] mm [1/2] [_____] inch thick expansion joints at change of direction and where mowstrip abuts rigid pavement. [Provide [#4] [_____] reinforcement bar and other devices necessary to install and secure reinforcement.] Provide a floated finish, then finish with a flexible bristle broom. [20] [_____] MPa [2500] [_____] psi compressive concrete strength at 28 days as specified under Section 03 30 00 CAST-IN-PLACE CONCRETE.

[2.11 ANTIDESICCANTS

Sprayable, water insoluble vinyl-vinledine complex which produce a moisture retarding barrier not removable by rain or snow. Film must form at temperatures commonly encountered out of doors during planting season and have a moisture vapor transmission rate (MVT) of the resultant film of maximum 10 grams per 24 hours at 70 percent humidity.

][2.12 EROSION CONTROL MATERIALS

Erosion control material must conform to the following:

[2.12.1 Erosion Control Blanket

[100 percent agricultural straw][70 percent agricultural straw/30 percent coconut fiber matrix] stitched with a degradable nettings, designed to degrade within [12 months][18 months].

][2.12.2 Erosion Control Fabric

Fabric must be knitted construction of polypropylene yarn with uniform

mesh openings 19 to 25 mm 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips must have a minimum life of 6 months.

][2.12.3 Erosion Control Net

Net must be heavy, twisted jute mesh, weighing approximately 605 grams per meter 1.22 pounds per linear yard and 1200 mm 4 feet wide with mesh openings of approximately 25 mm one inch square.

][2.12.4 Hydrophilic Colloids

Hydrophilic colloids must be physiologically harmless to plant and animal life without phytotoxic agents. Colloids must be naturally occurring, silicate powder based, and must form a water insoluble membrane after curing. Colloids must resist mold growth.

]2.12.5 Erosion Control Material Anchors

Erosion control anchors must be as recommended by the manufacturer.

][2.13 ROOT CONTROL BARRIER

[Flexible and permeable geotextile fabric with permanently attached time-released nodules. Color to be [black] [gray] [_____].] [Pre-formed, [round, tapered cylinder] [linear] barrier with integral vertical root deflecting ribs constructed of ultraviolet resistant polypropylene material. Color to be [black] [_____].

]]2.14 WATER

****

NOTE: When water is Government furnished, locate the source. Recycled or reclaimed irrigation water may be available through a tertiary treatment plant on or off site. It is preferred that this type of water be used for irrigation whenever possible. Check project specific conditions.

Unless otherwise directed, water must be the responsibility of the Contractor. Water source must be potable or non-potable. Non-potable is preferred. If non-potable edit specification accordingly. Source of water must be approved by the Contracting Officer and must be of suitable quality for irrigation, containing no elements toxic to plant life.

Coordinate information presented here with Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.

****

Source of water to be approved by Contracting Officer and suitable quality for irrigation and must not contain elements toxic to plant life, including acids, alkalis, salts, chemical pollutants, and organic matter. Use collected storm water or graywater when available.

[2.15 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum must be composed of multiple-fungus inoculum as recommended by the manufacturer for the plant material specified.

]2.16 SOURCE QUALITY CONTROL

The [Contracting Officer][and Landscape Architect of Record] [_____] will inspect plant materials at the [project] site and approve them. Tag plant materials for size and quality.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide soil preparation, including [soil conditioners] [and] [soil amendments] prior to planting. Provide [tree,] [shrub,] [vine,] [groundcover,] [seed,] [and] [sod] planting, [post-planting fertilizer,] [edging,] [staking,] [guying,] [weed control fabric,] [erosion control material,] [root control barrier] installation,[_____,] [and] [mulch topdressing] of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.2 ALTERNATIVE HERBICIDE TREATMENT (SOLARIZING SOIL)

Within 48 hours of subsoil preparation, saturate soil with water to a depth of 914 mm 3 feet. Immediately stake polyethylene sheeting over area to be planted. Stake tightly to surface of soil. Maintain sheeting in place for a minimum of 6 weeks. Immediately after removing sheeting, cover area to be planted with topsoil. Do not till soil prior to applying topsoil.

3.3 PREPARATION

3.3.1 Protection

Protect existing and proposed landscape features, elements, and sites from damage or contamination. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than the drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on Drawings.

3.3.2 Layout

Stake out approved plant material locations and planter bed outlines on the project site before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions. Do not plant closer than [300] [600] [900] [_____] mm [12] [24] [36] [_____] inches to a [building wall,] [pavement edge,] [fence or wall edge] [and] [other similar structures]. Provide on-site locations for excavated rock, soil, and vegetation.

3.3.3 Erosion Control

Provide erosion control and seeding with native plant species to protect slopes.

3.3.4 Soil Preparation

****
NOTE: Elevation of subgrade will vary depending upon the needs for additional topsoil, mulch topdressing, or other treatment.
****

[3.3.4.1 pH Adjuster Application Rates

****
NOTE: Check with the local Agriculture County Extension Service and specify amounts applicable for the project area.
****

Apply pH adjuster at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

[Lime [_____] kg per square meter pounds per acre [_____] kg per 100 square meters [_____] pounds per 1000 square feet

][Sulfur [_____] kg per square meter [_____] pounds per acre [_____] kg per 100 square meters [_____] pounds per 1000 square feet

][Iron [_____] kg per square meter [_____] pounds per acre [_____] kg per 100 square meters [_____] pounds per 1000 square feet

][Aluminum Sulfate [_____] kg per square meter [_____] pounds per acre [_____] kg per 100 square meters [_____] pounds per 1000 square feet

]][3.3.4.2 Soil Conditioner Application Rates

****
NOTE: Check with the local Agriculture County Extension Service and specify amounts applicable for the project area.
****

****
NOTE: Waste gypsum board must be pulverized and spread evenly over the entire site area. Do not deposit gypsum in areas that lack adequate drainage. Verify appropriate application rates with a landscaping consultant. Application rates may be as high as 22 tons per acre; however, in some areas there may be regulatory restrictions on the disposal of construction waste on site and a variance may be required.
****

Apply soil conditioners at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

[Peat [_____] cubic meters per square meter [_____] cubic yard per acre [_____] cubic meters per 100 square meters [_____] cubic

yards per 1000 square feet

][Sand [_____] cubic meters per square meter [_____] cubic yard per acre [_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet

][Compost Derivatives [_____] cubic meters per square meter [_____] cubic yard per acre [_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet

][Gypsum [_____] cubic meters per square meter [_____] cubic yard per acre [_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet

][Rotted Manure [_____] cubic meters per square meter[_____] cubic yard per acre[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet

]]3.3.4.3 Fertilizer Application Rates

****
NOTE: Check with the local Agriculture County Extension Service and specify amounts applicable for the project area.
****

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

[Organic granular fertilizer [[_____] kg per square meter[_____] pounds per acre] [[_____] kg per 100 square meters[_____] pounds per 1000 square feet].

]

[Fertilizer Tablets for Trees and Shrubs]			
	[Container/Caliper Size]	[Tablet Size]	[No. of Tablets]
[Shrub:]	[[_____]]	[[_____]]	[[_____]]
[Tree:]	[[_____]]	[[_____]]	[[_____]]

[3.3.5 Root Control Barrier

****
NOTE: Contact a local arborist or plant nursery person for projects involving root pruning of existing plant material to determine required amount of root structure to be removed.
****

[Install geotextile fabric in the soil in a [vertical] [horizontal] [and] [surrounding] application. Use appropriate holding device to assure fabric position. For vertical or horizontal application, a minimum [50] [_____] mm [2] [_____] inch soil cover is required over the top [surface] [edge]. A minimum [450] [_____] mm [18] [_____] inch extension of fabric

beyond the structure area to be protected is required to prevent root growth from growing around fabric edges.][Install [cylindrical] [linear] polypropylene barrier a minimum [12.70] [25] [_____] mm [1/2] [one] [_____] inch above finish grade to prevent root growth over the barrier. Backfill the outside of the barrier with 19 to 25 mm 3/4 to one gravel a minimum width of [50] [_____] [2] [_____] inches. For linear barrier application use appropriate device to connect two pieces.]

][3.3.6 Subsoil Drainage for Plant Pits and Beds

****
NOTE: Drawings must indicate areas where subsoil drainage will be required to provide for adequate drainage of areas to be planted.
****

****
NOTE: If Section 33 40 00 STORMWATER UTILITIES is utilized, delete requirements for Subsoil Drainage for Plant Pits and Beds.
****

Provide as indicated.[Lay perforated drain pipe with perforations down.] Backfill trenches as specified in Section 31 00 00 EARTHWORK.

]3.4 PLANT BED PREPARATION

Verify location of underground utilities prior to excavation. Protect existing adjacent turf before excavations are made. Do not disturb topsoil and vegetation in areas outside those indicated on Drawings. Where planting beds occur in existing turf areas, remove turf to a depth that will ensure removal of entire root system. Measure depth of plant pits from finished grade. Depth of plant pit excavation must be as indicated and provide proper relation between top of root ball and finished grade. Install plant material as specified in paragraph PLANT INSTALLATION. Do not install trees within 10 feet of any utility lines or building walls.

3.5 PLANT INSTALLATION

3.5.1 Individual Plant Pit Excavation

Excavate pits at least [twice as large][[400] [_____] mm[16] [_____] inches larger] in diameter as the size of ball or container to depth shown.

3.5.2 Plant Beds with Multiple Plants

Excavate plant beds continuously throughout entire bed as outlined to depth shown.

3.5.3 Handling and Setting

Move plant materials only by supporting the [root ball] [container]. [Set plants on hand compacted layer of prepared backfill soil mixture [150] [_____] mm [6] [_____] inches thick][Set plants on native soil] and hold plumb in the center of the pit until soil has been tamped firmly around root ball. Set plant materials, in relation to surrounding finish grade, [[25 to 50] [_____] to [_____] mm[one to 2] [_____] to [_____] inches above] [[_____] mm inches below] depth at which they were grown in the

nursery, collecting field or container. Replace plant material whose root balls are cracked or damaged either before or during the planting process.

Plant material must be set in plant beds according to the drawings. Backfill soil mixture must be placed on previously scarified subsoil to completely surround the root balls, and must be brought to a smooth and even surface, blending to existing areas.

3.5.3.1 Balled and Burlapped Stock

Backfill with [prepared soil mixture] [topsoil] to approximately half the depth of ball and then tamp and water. Carefully remove or fold back excess burlap and tying materials from the top a minimum 1/3 depth from the top of the rootball. Tamp and complete backfill, place mulch topdressing, and water. Remove wires and non-biodegradable materials from plant pit prior to backfill operations.

3.5.3.2 Bare-Root Stock

Plant so roots are arranged in a natural position. Place roots in water a minimum of 30 minutes prior to planting. Carefully work [prepared soil mixture] [topsoil] among roots. Tamp remainder of backfill, place mulch topdressing and water.

3.5.3.3 Container Grown Stock

Remove from container and prevent damage to plant or root system.

3.5.3.4 Ground Covers and Vines

****
NOTE: Choose one of the following options. Choose the second option for NAVFAC SE projects.
****

[Plant after placing mulch topdressing. Do not remove plant materials from flats or containers until immediately before planting. Space at intervals indicated. Plant at a depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of [150] [_____] mm [6] [_____] inches without run off or puddling. Smooth planting areas after planting to provide even, smooth finish. [Mulch as indicated.]

][Smooth planting areas before planting to provide even, smooth finish. Plant after placing weed control fabric and mulch topdressing. Do not remove plant material from flats or containers until immediately before planting. Space at the intervals indicated. Plant at a depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of [150] [_____] mm [6] [_____] inches without run off or puddling. Add mulch topdressing as needed.

]3.5.4 Earth Mounded Watering Basin for Individual Plant Pits

[Form with topsoil around each plant by replacing a mound of topsoil around the edge of each plant pit. Watering basins must be 150 mm 6 inches deep for trees and 100 mm 4 inches deep for shrubs. Eliminate basins around plants in plant beds containing multiple plants.

][Form with topsoil around each plant by placing a mound of topsoil around the edge of each plant pit. Watering basins must be 150 mm 6 inches deep for trees and 100 mm 4 inches deep for shrubs. Construct watering basin in a 1.4 m 4-1/2 foot diameter circle around specimen (not planted in a close group) trees and shrubs.

][3.5.5 Weed Control Fabric Installation

Remove grass and weed vegetation, including roots, from within the area enclosed by edging. Completely cover areas enclosed by edging with specified weed control fabric prior to placing mulch layer. Overlap cut edges [150] [_____] mm [6] [_____] inches.

][3.5.6 Erosion Control Material

Install in accordance with manufacturer's instructions.

]3.5.7 Placement of Mulch Topdressing

Place specified mulch topdressing on top of weed control fabric covering total area enclosed by edging. Place mulch topdressing to a depth of [75] [_____] mm [3] [_____] inches.

3.5.8 Mulch Topdressing

Provide mulch topdressing over entire planter bed surfaces and individual plant surfaces including earth mound watering basin around plants to a depth of [75] [_____] mm [3] [_____] inches after completion of plant installation and before watering. Keep mulch out of the crowns of shrubs. Place mulch a minimum 50 to 75 mm 2 to 3 inches[_____] away from trunk of shrub or tree. Place on top of any weed control fabric.

[3.5.9 Installation of Edging

Uniformly edge beds of plants to provide a clear cut division line between planted area and adjacent lawn. Construct bed shapes as indicated. Install [wood] [plastic] [concrete] edging material [as indicated] [and] [as per manufacturer's instructions]. [Install edging material in a perfect 1.22 m 4 foot diameter circle inside the 1.37 m 4-1/2 foot watering basin, around individual specimen trees and shrubs not planted in a close group.] Install edging with minimum [25 mmone inch] [_____] left above ground level.

]3.5.10 Fertilization

****

NOTE: Fertilizer planting tablets are the most commonly used and convenient method of pre-planting fertilization. Other types of fertilizer including bone meal or other organic fertilizers or granular fertilizers may be specified when appropriate. Number of tablets or quantity of other fertilizers should be inserted in blanks and should be based on agronomist's recommendations.

****

3.5.10.1 Fertilizer Tablets

Place fertilizer planting tablets evenly spaced around the plant pits to the manufacturer's recommended depth.

3.5.10.2 Granular Fertilizer

Apply granular fertilizer as a top coat prior to placing mulch layer and water thoroughly.

3.5.11 Watering

Start watering areas planted as required by temperature and wind conditions. Slow deep watering must be used. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of [300] [_____] mm [12] [_____] inches without run off or puddling. Watering of other plant material or adjacent areas must be prevented.

3.5.12 Staking and Guying

3.5.12.1 Staking

****
NOTE: Select methods of staking each tree based on the size and species of the tree and local wind conditions.
****

Stake plants with the number of stakes indicated complete with [double strand of 12 gage guy wire] [_____] as detailed. Attach [guy wire] [_____] half the tree height but not more than 1.5 m 5 feet high. Drive stakes to a depth of [0.80 to 0.91] [_____] m [2-1/2 to 3] [_____] feet into the ground outside the plant pit. Do not injure the root ball.[Use hose chafer guards where guy wire comes in contact with tree trunk.]

3.5.12.2 Guying

****
NOTE: Select methods of guying each tree based on the size and species of the tree and local wind conditions.
****

Guy plants as indicated. Attach [two strands of guying wire] [guying cable] around the tree trunk at an angle of 0.785 rad 45 degrees at approximately 1/2 of the trunk height [_____]. Protect tree trunks with chafing guards where guying [wire] [cable] contacts the tree trunk. Anchor guys to [deadmen wood blocks] [wood ground stakes] [malleable iron anchors] [steel screw anchors]. Fasten flags to each guying [wire] [cable] approximately 2/3 of the distance up from ground level.[Provide turnbuckles as indicated.]

3.5.12.3 Chafing Guards

Use hose chafing guards, as specified where guy [wire] [cable] will contact the plant.

[3.5.12.4 Deadmen

Place deadmen minimum 450 mm 18 inches below ground surface. Place equal distance from tree trunk and around the plant pit.

][3.5.12.5 Wood Ground Stakes

Drive wood ground stakes into firm ground outside of plant pit with top of stake flush with ground. Place equal distance from tree trunk and around the plant pit.

][3.5.12.6 Iron Anchors

Drive malleable iron anchors into firm ground outside of plant pit a minimum 750 mm 30 inches below finish grade. Place equal distance from tree trunk and around the plant pit.

][3.5.12.7 Steel Screw Anchors

Insert steel screw anchors as recommended in manufacturer's data. Place equal distance from tree trunk and around the plant pit.

][3.5.12.8 Flags

Securely fasten flags on each guy [wire] [and][cable] [approximately two-thirds of the distance up from ground level].

]3.5.13 Pruning

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NOTE: Check with the local Agriculture county Extension Service Office for recommended pruning season for the project area. Insert the dates in the subject paragraph.
****

Prune in accordance with safety requirement of TCIA Z133.

3.5.13.1 Trees and Shrubs

Remove dead and broken branches. Prune to correct structural defects only. Retain typical growth shape of individual plants with as much height and spread as practical. Do not cut central leader on trees. Make cuts with sharp instruments. Do not flush cut with trunk or adjacent branches. Collars must remain in place. Pruning must be accomplished by trained and experienced personnel and must be accordance with TCIA A300P1.

3.5.13.2 Wound Dressing

Do not apply tree wound dressing to cuts.

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation must be restored to original condition at the Contractor's expense.

3.6.2 Clean Up

Excess and waste material must be removed from the installed area and must be [disposed offsite at an approved landfill, recycling center, or composting center][composted on site]. Separate and recycle or reuse the following landscape waste materials: [nylon straps,] [wire,] [ball wrap,] [burlap,] [wood stakes,] [_____]. Adjacent paved areas must be cleared.

-- End of Section --