
USACE / NAVFAC / AFCEA / NASA UFGS-32 93 00 (April 2006)

Preparing Activity: NAVFAC Replacing without change
UFGS-02930 (May 2004)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 1 April 2006

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SECTION 32 93 00

EXTERIOR PLANTS

04/06

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SECTION 32 93 00

EXTERIOR PLANTS 04/06

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

NOTE: The following information shall 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 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.

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 NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|-------------|--|
| ANSI A300 | (1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance |
| ANSI Z133.1 | (2001) Arboricultural Operations -- Safety Requirements for Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush |
| ANSI Z60.1 | (1996) Nursery Stock |

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

- | | |
|---------|---|
| AWPA C2 | (2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes |
|---------|---|

ASTM INTERNATIONAL (ASTM)

- | | |
|-------------------|---|
| ASTM A 580/A 580M | (1998; R 2004) Stainless Steel Wire |
| ASTM C 4 | (2004) Clay Drain Tile and Perforated Clay Drain Tile |
| ASTM C 602 | (1995a; R 2001) Agricultural Liming Materials |
| ASTM C 700 | (2002) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated |
| ASTM D 2729 | (2003) Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings |
| ASTM D 3034 | (2004a) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings |
| ASTM D 4427 | (1992; R 2002e1) Peat Samples by |

Laboratory Testing

ASTM D 4972

(2001) pH of Soils

ASTM F 405

(1997) Corrugated Polyethylene (PE) Tubing and Fittings

L.H. BAILEY HORTORIUM (LHBH)

LHBH

(1976) Hortus Third

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 to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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.

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" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

State Landscape Contractor's License

SD-03 Product Data

Mulch[; G][; G, [____]]

Fertilizer

Weed control fabric[; G][; G, [____]]

Root control barrier[; G][; G, [____]]

Metal edging

Metal anchors

Antidesiccants

[Erosion control materials]

[Photographs[; G][; G, [____]]]

SD-04 Samples

[Mulch][; G][; G, [____]]

[Submit [one pint][0.5 liter] 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

Indicate names of plants in accordance with the LHBH, including type, quality, and size.

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 D 4972), 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 shall include a maximum depth of 450 mm18 inches of approximately 1 liter1 quart volume for each test. Areas sampled should not be larger than 0.4 hectare1 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 shall 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 shall submit nursery photographs, for government approval prior to ordering, for each tree larger than 24-inch600 mm box/ 2-inch50 mm 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 mm12 inches. The length of time required for the water to percolate into the soil, leaving the pit empty, shall 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, shall again fill the pit with water to a depth of 300 mm12 inches. If the water does not completely percolate into the soil within 9 hours, a determination shall be made whether a drainage system or a soil penetrant will be required for each tree and or shrub being transplanted.

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 contaminants.

1.5.1.3 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical 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 shall 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 shall be a maximum of 90 days. The time limitation between installing the plant material and placing the mulch shall 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.

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 shall be guaranteed for [one year] [_____] beginning on the date of inspection by the Contracting Officer to commence the plant establishment 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 shall be 90 days from the time of planting.] [Replace palms which are not alive at the end of a one-year period.]]

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.

2.1.1 Regulations and Varieties

Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. [Spray plants budding into leaf or having soft growth with an antidesiccant before digging]. Plants of the same specified size shall be of uniform size and character of growth. All plants shall 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, shall conform to measurements indicated, based on the average width or height of the plant for the species as specified in ANSI 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 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 shall conform to ANSI Z60.1. All wrappings and ties shall be biodegradable. Root growth in container grown plants shall 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 shall 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 shall be described.

2.1.5.1 Deciduous Trees

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

- a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.
- b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk which branches more than 150 mm 6 inches from ground level.

2.1.5.2 Palms

Palms shall have the specified height as measured from the base of the trunk to the base of the fronds or foliage in accordance with ANSI Z60.1. The palm shall 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 shall 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 shall have the height and number of primary stems recommended by ANSI Z60.1. Acceptable plant material shall 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 shall have the height-to-spread ratio recommended by ANSI Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.5.5 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANSI Z60.1. Acceptable plant material shall 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 shall have the minimum number of runners and length of runner recommended by ANSI Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system and shall be furnished in containers.

2.2 TOPSOIL

NOTE: If topsoil properties are included in another section of Division 2, 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 2 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, treat all weed-grasses, with two separate applications of herbicide.. This treatment should occur when the foliage is 150 to 250 mm 6 to 10 inches high and approximately 4 to 6 weeks prior to stockpiling.

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[2.2.1 Existing Soil

Modify to conform to requirements specified in paragraph entitled
"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 entitled
"Composition." When available topsoil shall be existing surface soil
stripped and stockpiled on-site in accordance with Section [31 00 00
EARTHWORK] [31 23 00.00 20 EXCAVATION AND FILL].

] [2.2.3 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Composition."
Additional topsoil shall be [furnished by the Contractor] [obtain from
topsoil borrow areas indicated].

] 2.2.4 Composition

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 shall be tested
in accordance with ASTM D 4972. Topsoil shall be free of sticks, stones,
roots, and other debris and objectionable materials. Other components
shall 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

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2.3 SOIL CONDITIONERS

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

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2.3.1 Lime

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NOTE: Use ASTM C 602 calcium carbonate equivalent
(C.C.E.) as specified in Table 1: for burnt lime,
C.C.E. shall not be less than 140 percent; for
hydrated lime, C.C.E. shall not be less than 110
percent; and for limestone, C.C.E. shall not be less
than 80 percent.
*****

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Commercial grade [hydrated] [or] [burnt] limestone containing a calcium carbonate equivalent (C.C.E.) as specified in **ASTM C 602** 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 D 4427**] [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.

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, and soil stabilized with nitrogen and having the following properties:

2.3.8.1 Particle Size

Minimum percent by weight passing:

4.75 mm No. 4 mesh screen	95
2.36 mm No. 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 91 percent, calcium 22 percent, sulfur 17 percent; minimum 96 percent passing through **850 micrometers 20 mesh screen**, 100 percent passing thru **970 micrometers 16 mesh screen**.

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.**

2.5.1 Granular Fertilizer

[Organic][synthetic], 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][synthetic], 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 shall be woven, needle punched or non-woven and treated for protection against deterioration due to ultraviolet radiation. Fabric shall 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 shall 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 02630 is utilized, delete requirements for "DRAINAGE PIPE FOR PLANT PITS AND BEDS."

[Plastic polyvinyl chloride pipe, [_____] mm. inches in diameter, [unperforated] conforming to ASTM D 3034 SDR 35 [perforated] conforming to ASTM D 2729.] [Corrugated plastic drainage tubing, [_____] mm inches in diameter, [unperforated] [perforated] conforming to ASTM F 405.] [Clay drain tile, [_____] mm inches in diameter, [unperforated] conforming to ASTM C 4] [perforated conforming to ASTM C 4] [[extra strength] [standard strength] conforming to ASTM C 700].]

] 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, or other deleterious materials.

2.8.1 Inert Mulch Materials

[Riverbank stone] [crushed pit-run rock] [granite chips] [marble chips] [crushed bricks] [volcanic rock] [_____] ranging in size from [_____] to [_____] mm inches.

2.8.2 Organic Mulch Materials

[Wood chips] [ground or shredded bark] [shredded hardwood] [bark peelings] [pine straw mulch] [pine needles] [_____].

[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 shall be cleaned of all sticks a minimum 25 mm 1 inch in diameter and plastic materials a minimum 75 mm 3 inches length. The material shall 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 shall 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

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 A 580/A 580M.

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 mm 1/2 inch diameter PVC pipe], [150 mm 6 inches] [300 mm 12 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 shall 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 mm 4 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:

<u>Tree Caliper</u>	<u>Anchor Size</u>
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

<u>Tree Caliper</u>	<u>Anchor Size</u>
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, etc. If a decay resistant species is specified, preservative treatment will not be required.

[Redwood] [Cypress] [Western Red Cedar] [_____] wood edging shall be free of solvent at time of delivery. Minimum 200 by 13 mm 8 by 1/2 inch [treated in accordance with AWPAC2 with CCA Type C or ACA before installation]. Anchoring stakes shall be the same material as wood edging, [13 by 50] [_____] mm [1/2 by 2] [_____] inches, 300 mm 12 inches long.

2.10.2 Metal Edging

NOTE: Check manufacturer's literature for the type best suited for the project.

Galvanized steel with slots for stakes and [16] [5] [3] mm thick by [100] [125] mm [1/4] [3/16] [1/8] inch thick by [4] [5] inch deep in [4.90] [6.10] m [16] [20] foot lengths. Treat steel edging with rust preventative and factory finish in color [green.] [brown.] Anchoring stakes shall be tapered galvanized steel with same finish as metal edging, 400 to 450 mm 16 to 18 inches long.

2.10.3 Recycled Plastic Edging

100 percent recycled [polyethylene] [] edging, resistant to insects, termites, boring worms, splintering and rotting, and shall 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 shall be of the same manufacturer and color as the edging.

2.10.4 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 00.00 20 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 shall 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

NOTE: For Navy provide all erosion and sediment control measures in Section 01561N, "Erosion and Sediment Control" instead of here if used for project. The Contractor may propose other types of erosion control material, based on site conditions.

Erosion control material shall conform to the following:

[2.12.1 Erosion Control Blanket

[100 percent agricultural straw] [70 percent agricultural staw/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 shall 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 shall have a minimum life of 6 months.

] [2.12.3 Erosion Control Net

Net shall 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 1 inch square.

] 2.12.4 Hydrophilic Colloids

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

] 2.12.5 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

] 2.13 ROOT CONTROL BARRIER

[Flexible and permeable geotextile fabric with permanently attached time-released nodules impregnated with a herbicide. 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 shall be the responsibility of the Contractor. Water source shall be potable or non-potable. If non-potable edit specification accordingly. Source of water shall be approved by the Contracting Officer and shall be of suitable quality for irrigation, containing no elements toxic to plant life.

Coordinate information presented here with Section 01 50 00.00 20, TEMPORARY FACILITIES AND CONTROLS.

Source of water to be approved by Contracting Officer and suitable quality for irrigation and shall not contain elements toxic to plant life.

] 2.15 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum shall 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, [fertilizing,] [tree,] [shrub,] [vine,] [groundcover,] [and] planting, [edging,] [staking and guying,] [weed control fabric,] [, erosion control material][and] [root control barrier] installation [and] [a 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 PREPARATION

3.2.1 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].

3.2.2 Soil Preparation

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

[3.2.2.1 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.]

] 3.2.2.2 Soil Conditioner Application Rates

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

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.]

] 3.2.2.3 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
].]

[Synthetic 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

	<u>Container/Caliper Size</u>	<u>Tablet Size</u>	<u>No. of Tablets</u>
Shrub:	[]	[]	[]
Tree:	[]	[]	[]

] 3.2.3 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.]

] 3.2.4 Subsoil Drainage for Plant Pits and Beds

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

NOTE: If Section 02630 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] [
31 23 00.00 20 EXCAVATION AND FILL].

] 3.3 PLANT BED PREPARATION

Verify location of underground utilities prior to excavation. Protect
existing adjacent turf before excavations are made. 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 shall be as indicated and provide
proper relation between top of root ball and finished grade. Install plant
material as specified in paragraph entitled "Plant Installation." Do not
install trees within 10 feet of any utility lines or building walls.

3.4 PLANT INSTALLATION

3.4.1 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.

3.4.2 Plant Beds with Multiple Plants

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

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

3.4.3.1 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.

3.4.3.2 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.

3.4.3.3 Container Grown Stock

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

3.4.3.4 Ground Covers and Vines

NOTE: Choose one of the following options. Choose the second option for SOUTHNAVFACENCOM 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. 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. Add mulch topdressing as needed.]

3.4.4 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 shall 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 shall 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.]

[3.4.5 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.

]3.4.6 Erosion Control Material

Install in accordance with manufacturer's instructions.

]3.4.7 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.

3.4.8 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.

[3.4.9 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] [metal] [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 mm] [one inch] [_____] left above ground level.

]3.4.10 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.

3.4.10.1 Fertilizer Tablets

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

3.4.10.2 Granular Fertilizer

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

3.4.11 Watering

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 [300] [_____] mm [12] [_____] inches without run off.

3.4.12 Staking and Guying

3.4.12.1 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.]

3.4.12.2 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.]

3.4.12.3 Chafing Guards

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

[3.4.12.4 Deadmen

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

] 3.4.12.5 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.

] 3.4.12.6 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.

] 3.4.12.7 Steel Screw Anchors

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

] 3.4.12.8 Flags

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

] 3.4.13 Pruning

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 ANSI Z133.1.

3.4.13.1 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 shall remain in place. Pruning shall be accomplished by trained and experienced personnel and shall be accordance with ANSI A300.

3.4.13.2 Wound Dressing

Do not apply tree wound dressing to cuts.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

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

3.5.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite. Adjacent paved areas shall be cleared.

-- End of Section --