
USACE / NAVFAC / AFCEA / NASA UFGS-32 96 00 (April 2006)

Preparing Activity: NAVFAC Superseding
 UFGS-32 96 00 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UML dated October 2007

Revised throughout - latest changes indicated by CHG tags

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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 96 00

TRANSPLANTING EXTERIOR PLANTS

07/06

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SECTION 32 96 00

TRANSPLANTING EXTERIOR PLANTS 07/06

NOTE: This guide specification covers the requirements for transplanting exterior plant material.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

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

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).

PART 1 GENERAL

NOTE: The contract drawings will delineate original and new transplanting locations for individual plant material.

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of

SpecsIntact automated reference checking is
recommended for projects based on older guide
specifications.

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	(2006) Arboricultural Operations - Safety Requirements for Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush
ANSI Z60.1	(1996) Nursery Stock

ASTM INTERNATIONAL (ASTM)

ASTM A 580/A 580M	(2006) Standard Specification for Stainless Steel Wire
ASTM C 602	(2007) Agricultural Liming Materials
ASTM D 4427	(2007) Peat Samples by Laboratory Testing
ASTM D 4972	(2001) pH of Soils
ASTM D 5539	(1994; R 2003) Seed Starter Mix
ASTM D 6155	(2006) Nontraditional Coarse Aggregate for Bituminous Paving Mixtures

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2000) Principles and Criteria for Forest Stewardship
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U.S. DEPARTMENT OF AGRICULTURE (USDA)

DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0
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U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)
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1.2 RELATED REQUIREMENTS

Section 02 41 00 SITE DEMOLITION, [Section 31 00 00 EARTHWORK], [Section 32 84 24 IRRIGATION SPRINKLER SYSTEMS], [Section 32 92 23 SEEDING],

[Section 32 92 23 SODDING], [Section 32 92 26 SPRIGGING], [Section 32 93 00 EXTERIOR PLANTS] and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for requirements, with additions and modifications herein.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy 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 & Tree Relocation References
Permits
Photographs

SD-02 Shop Drawings

Transplanting Plan

SD-03 Product Data

Equipment

A listing of equipment to be used for the transplanting operation, including size model, year and type of mechanical tree transplanting equipment.

Gypsum; (LEED)

Mulches Topdressing; (LEED)

Ground Stakes

Hose; (LEED)

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

[Local/Regional Materials; (LEED)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.]

[Peat Composted Derivatives Rotted Manure Organic Mulch Materials

Documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.]

[[Staking Material] [Ground Stakes]

Documentation certifying products are from salvaged/recovered lumber sources and indicating percentage of salvaged/recovered content per unit of product.]

SD-06 Test Reports

Soil Test; [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

Forest Stewardship Council (FSC) Certification

1.4 QUALITY ASSURANCE

1.4.1 State Landscape Contractor's License & Tree Relocation References

Contractor shall be a professional tree moving company holding a landscape contractor's license in the state where the work is to be performed and have a minimum of 10 years tree relocation experience. Submit a copy of license and 3 references of tree relocation work in the past 5 years.

1.4.2 Permits

The Contractor shall obtain and pay for permits and fees for the alteration of overhead lines or any other related moving permit or fee that requires compliance with Federal, State and local regulatory requirements.

1.4.3 Photographs

The contractor shall provide a clear 4 inch by 6 inch100 mm by 150 mm minimum size color photograph of the plant material to be relocated. Trees shall be documented by an individual photograph of each. Photographs shall indicate the date and species of each plant on the back or front of each photo.

1.4.4 Transplanting Plan

A transplanting plan shall be submitted showing existing and proposed locations of transplanted material. The plan shall also delineate methods, dates, and times for root pruning, digging, balling, removing, storing, transporting, planting, watering, and maintenance to ensure survivability. The plan shall also include equipment and anti-desiccant to be used. A listing of the plant material to be transplanted shall be provided by common name and botanical name as listed under "Nomenclature" in ANSI Z60.1; classification; caliper; and height.

1.4.5 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 shall 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.

1.4.6 Soil Test

Commercial test from an independent testing laboratory according to the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42 including basic soil groups (sand, silt, clay, pH (ASTM D 4972), soluble salts), secondary nutrient groups (calcium, magnesium, sodium, Sodium Absorption Ratio (SAR)), micronutrients (zinc, manganese, iron, copper). 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.

1.4.7 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 and submitted by the Contractor and verified and approved by the Contracting Officer, whether a drainage system or a soil penetrant will be required for each tree and or shrub being transplanted.

1.5 DELIVERY OF MATERIALS

1.5.1 Soil Conditioners Delivery and Storage

Soil conditioners shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil conditioners may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries. Store in dry locations and away from contaminants.

1.6 PLANT MATERIAL IDENTIFICATION

Plant material to be transplanted shall be tagged and/or shown on drawings.

Transplanted plant material shall be delivered with attached, durable, waterproof labels and weather-resistant ink or imprinted tags, stating the correct botanical and common plant name and size.

1.7 INSPECTION OF MATERIALS

Materials shall be inspected for compliance with paragraph PRODUCTS and paragraph PLANT MATERIAL IDENTIFICATION. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material larger than 40 mm 1-1/2 inch diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be removed from the job site. The Contracting Officer reserves the right to refuse any unacceptable plant material. All rejected plant material shall be remove from the job site on the day of rejection.

1.8 HANDLING OF PLANT MATERIALS

Materials shall not be dropped from vehicles. Plant material shall be transported without scarring trunks or deforming crown branching. Materials found to be in unacceptable condition shall be replaced at no additional cost to the Government.

1.9 TIME LIMITATION

The time limitation from digging, removing, transporting, to installing transplanted plant material shall be the same day. The time limitation between installing the plant material and placing the mulch shall be a maximum 48 hours. If project conditions prevent the Contractor from transplanting and installing plant material on the same day, plant materials shall be boxed or heeled in as required. Plant material shall be maintained and protected by the Contractor.

1.10 GUARANTEE

Transplanted plant material shall have a guarantee period of [365 days][____]. All plants that die or have 25 percent or more of their branches that die during the construction operations or the guarantee period, shall be replaced in kind in relation to size and species during the planting season from [____] to [____].

1.11 TRANSPLANTED PLANT MATERIAL TIME AND CONDITIONS

NOTE: Project specific climate and conditions, nationally or internationally, will dictate the optimal times for transplanting. Contact the local agricultural office for this information.

Root pruning times should be planned a minimum of one year in advance for specimen trees and as recommended by the design professional for other plant materials and conditions.

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

1.11.1 Deciduous Plant Material Time

Deciduous plant material shall be transplanted from [____] to [____].

1.11.2 Evergreen Plant Material Time

Evergreen plant material shall be transplanted from [____] to [____].

1.11.3 Transplanting Conditions

All transplanting operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to all transplanting operations, proposed transplanting times shall be submitted for approval. The installing site for the plant material shall be prepared and excavated in accordance with paragraph SITE EXCAVATION, prior to removing the plant material. If project conditions prevent the Contractor from transplanting and installing plant material on the same day, plant material shall be boxed or heeled in as required. Plant material shall be maintained by the Contractor until a suitable planting time.

1.11.4 Underground Utilities

The location of underground utilities and facilities at both the removal and installing sites shall be verified and marked. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

1.11.5 Protecting Existing Vegetation

When there are established lawns at either the removal or installing sites, the turf shall be protected during the operation. Existing trees, shrubs, and plant beds at the [removal] [and] [or] [installing site[s]] that are to be preserved shall be barricaded and protected from damage by a tree barricade or other measure. Damage to existing plant material shall be mitigated by the Contractor at no additional cost to the Government. Damage shall be assessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

1.11.6 Protection of Plant Material to be Transplanted

Contractor shall protect plant material slated for transplanting that is not transplanted at the beginning of construction operations. Prior to construction operations, Contractor shall tag plants to be transplanted with plastic or vinyl tape tied to the plant caliper. Plants to be transplanted shall be protected from root compaction and any other damage (with barrier of metal poles a maximum of 2.5 meters8 feet on center with plastic fluorescent netting) at a minimum of 6 meter20 foot diameter from outside of the plant's trunk prior to the start of any construction operations. Where tree drip lines are greater than 3 meter10 feet from the tree's trunk, locate barrier fencing at the drip line of the tree. Plastic tape and barrier fencing shall not be removed until transplanting operations are ready to begin and or instructed by the Contracting Officer.

Contractor shall water and prune plant material as necessary to keep healthy and vigorous, particularly when water is shut off. Contractor shall be responsible for watering existing plant material to be transplanted from the start of construction operations until the maintenance period is over or until regular [irrigation] [water] service is in working order. Outside storage locations shall be continually shaded and protected from the wind. Bare root plants shall be heeled in. Plants stored on the project shall be protected from any drying at all times covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.

1.11.7 Protection of Plant Material During Transplanting

Plant material shall be protected during transplanting to prevent desiccation and damage to the branches, trunk, and root system. Branches of shrubs, palms, vines shall be protected by tying-in. Exposed branches shall be covered during transport. [The root area shall be treated with mycorrhizal fungi inoculum.] Plant material shall be undamaged, vigorous and healthy with a well-branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion after transplanting. Plant material showing desiccation, abrasion, sun scald injury or structural branching damage shall be replaced at no cost to the government.

1.12 SUSTAINABLE DESIGN REQUIREMENTS

1.12.1 Local/Regional Materials

NOTE: Using local materials can help minimize transportation impacts, including fossil fuel consumption, air pollution, and labor. Using materials harvested and manufactured within a 500 mile radius from the project site contributes to the following LEED credit: MR5. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option if Contractor is choosing local materials in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option for USACE projects. Army projects shall include option only if pursuing this LEED credit.

[Use materials or products extracted, harvested, or recovered, as well as manufactured, within a [500][_____] mile [800][_____] kilometer radius from the project site, if available from a minimum of three sources.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Landscaping materials may be locally available.]

1.12.2 Forest Stewardship Council (FSC) Certification

Use FSC-certified wood where specified. Provide letter of certification signed by lumber supplier. Indicate compliance with FSC STD 01 001 and identify certifying organization. Submit FSC certification numbers; identify each certified product on a line-item basis. Submit copies of invoices bearing the FSC certification numbers.

PART 2 PRODUCTS

2.1 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 sources of 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. Protecting topsoil by stockpiling for reuse contributes to the following LEED credit: SS Prerequisite 1. 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 mm⁶ to 10 inches high and approximately 4 to 6 weeks prior to stockpiling.

Topsoil to be placed around root balls of transplanted material at new planting site shall match topsoil of existing site where material is transplanted from, based on soil tests taken at both the current growing area and the proposed growing site. Minimum matching characteristics shall include: ph, organic matter, soluble salts, percentages of silt, clay and sand. [Existing soil shall be used as topsoil.] [Stockpiled on-site surface soil shall be used as topsoil.] [Additional topsoil shall be [furnished by the Contractor] [obtained from topsoil borrow areas indicated]]. Soil conditioners may be added to topsoil to bring into compliance.

2.2 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 shall be nontoxic to plants.

2.2.1 Lime

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.

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.

2.2.2 Aluminum Sulfate

Commercial grade.

2.2.3 Sulfur

100 percent elemental

2.2.4 Iron

100 percent elemental

2.2.5 Peat

NOTE: The 2002 Farm Bill - Section 9002, Federal Procurement of Biobased Products, requires each Federal Agency to develop a procurement program which will ensure that items composed of biobased products will be purchased to the maximum extent practicable and which is consistent with applicable provisions of Federal procurement law.

Natural product of [peat moss] derived from a freshwater site and conforming to [ASTM D 4427] [ASTM D 5539] 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. Biobased content shall be a minimum of [100] [_____] percent. Peat shall not contain invasive species, including seeds.

2.2.6 Sand

Clean and free of materials harmful to plants.

2.2.7 Perlite

Horticultural grade.

2.2.8 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:

2.2.8.1 Particle Size

Minimum percent by weight passing:

4.75 mm	No. 4 mesh screen	95
2.36 mm	No. 8 mesh screen	80

2.2.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.2.8.3 Biobased Content

Minimum [100] [_____] percent.

2.2.9 Gypsum

NOTE: Use of materials with recycled content, calculated on the basis of post-industrial and post-consumer percentage content, contributes to the following LEED credit: MR4. Coordinate all recycled content products with Section 01 33 29 LEED(tm)

DOCUMENTATION.

NOTE: Waste gypsum board shall 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.

Coarsely ground gypsum from recycled scrap gypsum board 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.

2.2.10 Vermiculite

Horticultural grade for planters.

2.2.11 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.

2.3 MULCHES TOPDRESSING

NOTE: Check with the local Agriculture County Extension Service Office for recommended and locally available mulch material. Specify only one type of mulch for the project.

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

2.3.1 Inert Mulch Materials

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

NOTE: Designer must verify that products meeting the indicated minimum recycled content are available, preferably from at least three sources, to ensure adequate competition. If not, write in suitable recycled content values that reflect availability and competition. Use second recycled content option if Contractor is choosing recycled content products in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION.

[Recycled porcelain, concrete, stone, or other recycled material complying with ASTM D 6155] [riverbank stone] [crushed pit-run rock] [granite chips] [marble chips] [crushed bricks] [volcanic rock] [_____] ranging in size from [_____] to [_____] mm inches. Provide materials from site and construction waste to the greatest extent possible. [Mulch shall contain a minimum of [5][10][_____] percent post-consumer recycled content, or a minimum of [20][40][_____] percent post-industrial recycled content.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Mulch may contain post-consumer or post-industrial recycled content.]

2.3.2 Organic Mulch Materials

**NOTE: For projects at Camp Lejeune and New River,
use pine straw mulch only. Delete all other options.**

**NOTE: Hydraulic mulch is an EPA designated product
for recycled content. See Section 01670
RECYCLED/RECOVERED MATERIALS and include recycled
content options unless designer determines that
justification for non-use exists.**

[Wood cellulose fiber] [wood chips] [ground or shredded bark] [shredded hardwood] [bark peelings] [pine straw mulch] [pine needles] [_____] from site when available. Biobased content shall be a minimum of [100][_____] percent. Wood cellulose fiber shall 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 shall contain a minimum of [100][_____] percent post-consumer recycled content. Wood-based hydraulic mulch shall contain a minimum of [100][_____] percent recycled material.

2.3.3 Recycled Organic Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 65 mm x 65 mm 2-1/2 inch x 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 inch length. The material shall be pretreated to retard the growth of mold and fungi.

2.4 STAKING AND GUYING MATERIAL

2.4.1 Staking Material

2.4.1.1 Tree Support Stakes

Rough sawn [FSC-certified or salvaged] 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].

2.4.1.2 Ground Stakes

NOTE: Designer must verify that products meeting the indicated minimum recycled content are available, preferably from at least three sources, to ensure adequate competition. If not, write in suitable recycled content values that reflect availability and competition.

[[FSC-certified or salvaged] wood] or [[100][_____] percent post-consumer recycled content plastic], 0.91 m 3 feet long.

2.4.2 Guying Material

2.4.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A 580/A 580M.

2.4.2.2 Guying Cable

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

2.4.2.3 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.

2.4.2.4 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.

2.4.2.5 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.

2.4.2.6 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.

2.4.2.7 Metal Anchors

a. 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

b. 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.

[2.5 MYCORRHIZAL FUNGI INOCULUM

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

]2.6 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. Non-potable is preferred. 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 01500, "Temporary Facilities and Controls."

NOTE: Reduction of potable water consumption for irrigation contributes to the following LEED credit: WE1.

Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall be [potable][non-potable], and may be supplied by an existing irrigation system or by collected storm water or a graywater

system.

2.6.1 Hose

NOTE: Garden and soaker hoses are EPA designated products for recycled content. See Section 01670 RECYCLED/RECOVERED MATERIALS and include recycled content options unless designer determines that justification for non-use exists.

Hoses used for watering shall be a minimum of [60] [65] [70] [_____] percent post-consumer rubber or plastic.

PART 3 EXECUTION

3.1 PLANT MATERIAL PREPARATION AND HANDLING

3.1.1 Pruning

NOTE: Root pruning should be scheduled well in advance of transplanting. Tree size, location and condition will determine specific requirements. Early root pruning will allow time for the plant to grow new roots inside the root ball to improve recovery.

3.1.1.1 Root Pruning

Large canopy and specimen plant material shall be root pruned a minimum of 6 months before transplanting[_____]. Minimum root ball sizes shall be in accordance with ANSI Z60.1.

3.1.1.2 Canopy Pruning

Canopy pruning shall conform to ANSI A300.

3.1.2 Plant Material Preparation

Plant material designated for transplanting shall be watered thoroughly several days before root pruning, digging or moving. Broken or interfering growth shall be pruned. Large canopy and specimen plant material shall be [wire balled and burlapped] [boxed] [bare rooted] [spaded]. Mark north side of plants prior to excavation. Relocate in new location with north facing same direction.

3.1.3 Palms

In preparation for relocation, remove all dead and green fronds below a horizontal position with clean, sterilized equipment and tools. All fronds above horizontal shall be lifted and tied together in two locations around the crown in an upright position with a light weight cotton rope. Removal of fronds and tying shall be completed prior to digging the root ball. Palms trimmed or pruned shall retain a minimum 150 mm 6 inches of foliage at the crown as a means of determining plant health.

3.2 SITE PREPARATION

3.2.1 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.

3.2.2 Finish Grade and Topsoil

NOTE: Coordinate the placement of topsoil with
Section 31 00 00, "Earthwork". When stockpiled
topsoil is limited, define the areas that will use
this soil.

The Contractor shall verify that finish grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section [31 00 00 EARTHWORK] [31 23 00.00 20 EXCAVATION AND FILL], prior to the commencement of the transplanting operation.

3.2.3 Layout

Relocate plant material as shown on drawings. Plant material locations may be adjusted to meet field conditions, only with Contracting Officer approval. Provide on-site locations for excavated rock, soil, and vegetation.

3.2.4 Erosion Control

NOTE: The erosion potential of a soil is of concern
in vegetated channels, road embankments, dams,
levees, spillways, construction sites, etc. Erosion
control contributes to the following LEED credit: SS
Prerequisite 1.

Provide erosion control in accordance with Section 31 32 11 SOIL SURFACE EROSION CONTROL, and by seeding with native plant species to protect slopes.

3.3 SITE EXCAVATION

3.3.1 Obstructions Above or Below Ground

When obstructions above or below ground affect the work, shop drawings showing proposed adjustments to plant material location, and planting method shall be submitted for Government approval.

3.3.2 Turf Removal and Replacement

NOTE: Reducing site disturbance contributes to the
following LEED credit: SS5.

Do not disturb topsoil and vegetation in areas outside those indicated on Drawings. Where the installation operation occurs in an existing lawn area, the turf shall be removed from the excavation area to a depth that will ensure the removal of the entire root system.

3.3.3 Plant Pits

Plant pits shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits shall be dug a minimum of 2 times the diameter of the root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well-aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used. Pits shall be dug immediately before plants are placed in the pit.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient top soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown. The root system shall be spread out and arranged in its natural position. Damaged or girdled roots shall be removed with a clean cut. The beginning of the root flare shall be visible at soil level when the tree is planted, since it is critical not to plant the tree too deep. The following shall be performed:

- a. Plumb plant materials and backfill half of the hole with topsoil.
- b. Prior to backfilling, all metal, wood, and synthetic products shall be removed from the ball or root system avoiding damage to the root system. Biodegradable burlap and tying material shall be carefully opened and folded back from the top a minimum 1/3 depth from the top of the root ball.
- c. Water the hole to collapse air pockets.
- d. Backfill and gently firm topsoil.
- e. Clear soil mounded against trunk.
- f. An earth berm, consisting of backfill soil mixture, shall be formed with a minimum 100 mm 4 inch height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

[3.4.2 Adding Mycorrhizal Fungi Inoculum

Mycorrhizal fungi inoculum shall be added as recommended by the manufacturer for the plant material specified.

]3.4.3 Watering

A regular watering schedule shall be established. Slow deep watering shall be used. Plant pits and plant beds shall be watered immediately after

backfilling, until completely saturated. Run-off and puddling shall be prevented. Watering of other plant material or adjacent areas shall be prevented.

3.4.4 Staking and Guying

NOTE: The current trend in the horticultural trade has established that staking and guying trees should not be provided unless there is high wind velocity at the project site. However, on military projects staking and guyes serve an additional function of protecting the tree during establishment. The current trend in the horticultural trade has established that tree wrap should not be provided unless wind conditions require protection to the trunk.

Staking will be required when trees are unstable or will not remain set due to their size, shape, or exposure to high wind velocity. When required the following staking and guying procedures shall apply:

3.4.4.1 One Bracing Stake

Trees 1200 to 1800 mm 4 to 6 feet high shall be firmly anchored in place with one bracing stake. The bracing stake shall be placed on the side of the tree facing the prevailing wind. The bracing stake shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly to the stake with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. A chafing guard shall be used when metal is the guying material.

3.4.4.2 Two Bracing Stakes

Trees from 1800 to 2400 mm 6 to 8 feet height shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Chafing guards shall be used when metal is the guying material.

3.4.4.3 Three Bracing or Ground Stakes

Trees over a minimum 2400 mm 8 feet height and less than a maximum 150 mm 6 inch caliper shall be held firmly in place with 3 bracing or ground stakes spaced at equal intervals around the tree. Ground stakes shall be avoided in areas to be mowed. Stakes shall be driven into firm ground outside the earth berm. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. For trees over a minimum 75 mm 3 inch diameter at breast height, turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used when metal is the guying material.

3.4.5 Deadmen or Earth Anchors

Trees over a minimum 150 mm 6 inch caliper shall be held firmly in place with wood deadmen buried a minimum 900 mm 3 feet in the ground or metal earth anchors. Multi-strand cable guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used.

3.4.6 Flags

A flag shall be securely fastened to each guy line between the tree, stake, deadmen, or earth anchor. The flag shall be visible to pedestrians.

3.5 FINISHING

All planting operations shall conform to ANSI Z133.1.

3.5.1 Plant Material

Prior to placing mulch, the installed area shall be uniformly edged to provide a clear division line between the planted area and the adjacent turf area, shaped as indicated. The installed area shall be raked and smoothed while maintaining the earth berms.

3.5.2 Placing Mulch

The placement of mulch shall occur a maximum of 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the installed area with a minimum 75 mm 3 inch uniform thickness. Mulch shall be kept out of the crowns of shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

3.5.3 Pruning

NOTE: The current trend in the horticultural trade
has established that wound dressing or pruning paint
should not be provided. These procedures do not
contribute to wound closure or the
compartmentalization process.

Pruning shall be accomplished by a certified arborist. The pruning of trees and palms shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Broken branches shall be removed.

3.6 MAINTENANCE

Plant maintenance shall be in accordance with Section 32 05 33 LANDSCAPE ESTABLISHMENT.

3.7 RESTORATION AND CLEAN UP

3.7.1 Restoration

Turf areas containing ruts or dead turf, as a result of work under this contract, shall be graded smooth and sodded with the same species. All pavements and facilities that have been damaged from the transplanting operation shall be restored to original condition at the Contractor's expense.

3.7.2 Backfill Removal Site Plant Pits

The Contractor shall ensure that all remaining holes from the removal site have been backfilled with [on-site soil] [___], tamped to [90 percent] [___] compaction, leveled and finished to meet existing grade after settling. Adjacent trees, shrubs, vines and groundcover destroyed by transplanting or construction operations shall be replaced in kind in relation to size and species and shall be installed in accordance with Section 32 93 00 EXTERIOR PLANTS. Turf shall be replaced with sod, and shall be installed in accordance with Section 32 92 23 SODDING.

3.7.3 Clean Up

NOTE: While recycling programs are optional for government contractors the specifier should encourage the practice if the cost to the Government is reasonable. Information regarding location of recycling facilities is available from the local city or county waste management division.

Excess and waste material shall be removed from both removal site and the installed site and shall 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 shall be cleared.

3.8 PLANT ESTABLISHMENT PERIOD

The establishment period for transplanted materials shall be the same as for newly planted exterior plants and shall conform to the same requirements thereof as found in Section 32 05 33 LANDSCAPE ESTABLISHMENT, paragraph titled "Exterior Plant Establishment Period."

-- End of Section --