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USACE / NAVFAC / AFCEC / NASA | UFGS-32 96 00 (August 2017)
Change 1 - 08/21

Preparing Activity: NAVFAC | Superseding
UFGS-32 96 00 (February 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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

SECTION 32 96 00

TRANSPLANTING EXTERIOR PLANTS

08/17, CHG 1: 08/21

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SECTION 32 96 00

TRANSPLANTING EXTERIOR PLANTS
08/17, CHG 1: 08/21

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

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

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

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

PART 1 GENERAL

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

1.1 REFERENCES

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

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

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICANHORT (AH)

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

ASTM INTERNATIONAL (ASTM)

ASTM A580/A580M	(2023) Standard Specification for Stainless Steel Wire
ASTM C602	(2020) Agricultural Liming Materials
ASTM D4427	(2018) Standard Classification of Peat Samples by Laboratory Testing
ASTM D4972	(2018) Standard Test Methods for pH of Soils
ASTM D5539	(2013) Seed Starter Mix
ASTM D6155	(2019) Nontraditional Coarse Aggregate for Bituminous Paving Mixtures

TREE CARE INDUSTRY ASSOCIATION (TCIA)

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

U.S. DEPARTMENT OF AGRICULTURE (USDA)

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

1.2 RELATED REQUIREMENTS

Section 02 41 00 [DEMOLITION] [AND] [DECONSTRUCTION], [Section 31 00 00 EARTHWORK,] [Section 32 84 24 IRRIGATION SPRINKLER SYSTEMS,] [Section 32 92 19 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: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

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

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

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

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

SD-01 Preconstruction Submittals

State Landscape Contractor's License & 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

Mulches Topdressing

Ground Stakes

Peat

Composted Derivatives

Rotted Manure

Organic Mulch Materials

Staking Material

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]

1.4 QUALITY ASSURANCE

1.4.1 State Landscape Contractor's License & Tree Relocation References

Contractor must 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 five years.

1.4.2 Permits

The Contractor must 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 must provide a clear 100 mm by 150 mm 4 inch by 6 inch minimum size color photograph of the plant material to be relocated.

Trees must be documented by an individual photograph of each. Photographs must indicate the date and species of each plant on the back or front of each photo.

1.4.4 Transplanting Plan

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

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

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.4.6 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 D4972), soluble salts), secondary nutrient groups (calcium, magnesium, sodium, Sodium Absorption Ratio (SAR)), micronutrients (zinc, manganese, iron, copper). Soil required for each test must include a maximum depth of 450 mm 18 inches of approximately one liter one quart volume for each test. Areas sampled should not be larger than 0.4 hectare one acre and should contain at least 6-8 cores for each sample area and be thoroughly mixed. Problem areas should be sampled separately and compared with samples taken from adjacent non-problem areas. The location of the sample areas should be noted and marked on a parcel or planting map for future reference.

1.4.7 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 mm 12 inches. The length of time required for the water to percolate into the soil, leaving the pit empty, must be measured by the project Landscape Architect and verified by the Contracting Officer. Within six hours of the time the water has drained from the pit, the Contractor, with the Contracting Officer and project Landscape Architect present, must again fill the pit with water to a depth of 300 mm 12 inches. If the water does not completely percolate into the soil within 9 hours, a determination must be made 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 must 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 must be provided for bulk deliveries. Store in dry locations and away from contaminants.

1.6 PLANT MATERIAL IDENTIFICATION

Plant material to be transplanted must be tagged and/or shown on drawings. Transplanted plant material must 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 must be inspected for compliance with paragraph PRODUCTS and paragraph PLANT MATERIAL IDENTIFICATION. Open soil amendment containers or wet soil amendments must 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 must be rejected. Topsoil that contains viable plant material and plant parts must be rejected. Unacceptable material must be removed from the job site. The Contracting Officer reserves the right to refuse any unacceptable plant material. All rejected plant material must be removed from the job site on the day of rejection.

1.8 HANDLING OF PLANT MATERIALS

Materials must not be dropped from vehicles. Plant material must be transported without scarring trunks or deforming crown branching. Materials found to be in unacceptable condition must 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 must be the same day. The time limitation between installing the plant material and placing the mulch must be a maximum 48 hours. If project conditions prevent the Contractor from transplanting and installing plant material on the same day, plant materials must be boxed or heeled in as required. Plant material must be maintained and protected by the Contractor.

1.10 GUARANTEE

Transplanted plant material must 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, must 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 must be transplanted from [_____] to [_____].

1.11.2 Evergreen Plant Material Time

Evergreen plant material must be transplanted from [_____] to [_____].

1.11.3 Transplanting Conditions

All transplanting operations must be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work must be stopped when directed. When special conditions warrant a variance to all transplanting operations, proposed transplanting times must be submitted for approval. The installing site for the plant material must 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 must be boxed or heeled in as required. Plant material must 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 must be verified and marked. Damage to underground utilities and facilities must 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 must be protected during the operation. Existing trees, shrubs, and plant beds at the [removal] [and][or] [installing site[s]] that are to be preserved must be barricaded and protected from damage by a tree barricade or other measure. Damage to existing plant material must be mitigated by the Contractor at no additional cost to the Government. Damage must 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

Protect plant material slated for transplanting that is not transplanted at the beginning of construction operations. Prior to construction operations, tag plants to be transplanted with plastic or vinyl tape tied to the plant caliper. Plants to be transplanted must be protected from root compaction and any other damage (with barrier of metal poles a maximum of 2.5 meters 8 feet on center with plastic fluorescent netting) at a minimum of 6 meter 20 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 meter 10 feet from the tree's trunk, locate barrier fencing at the drip line of the tree. Plastic tape and barrier fencing must not be removed until transplanting operations are ready to begin and or instructed by the Contracting Officer. Water and prune plant material as necessary to keep healthy and vigorous, particularly when water is shut off. Water 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 must be continually shaded and protected from the wind. Bare root plants must be heeled in. Plants stored on the project must 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 must be protected during transplanting to prevent desiccation and damage to the branches, trunk, and root system. Branches of shrubs, palms, vines must be protected by tying-in. Exposed branches must be covered during transport. [The root area must be treated with mycorrhizal fungi inoculum.] Plant material must 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 must be replaced at no cost to the government.

PART 2 PRODUCTS

2.1 TOPSOIL

****

NOTE: If topsoil properties are included in another section of Division 31, delete this paragraph and include a cross-reference to the appropriate section. Otherwise, select appropriate 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 31. If suitable topsoil is not available within the limits of the work area, consider whether it is more economical to treat the soil of the graded areas with fertilizer and supplements so as to be conducive for plant

establishment and maintenance, to transport topsoil to the project site, or to use regionally native plants suited to the on-site soil. If treatment of the soil is more economical, include requirements for fertilizer and supplements. Prior to stockpiling topsoil, remove all weed-grasses. This should occur when the foliage is 150 to 250 mm 6 to 10 inches high and approximately 4 to 6 weeks prior to stockpiling.

****

Topsoil to be placed around root balls of transplanted material at new planting site must 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 must include: ph, organic matter, soluble salts, percentages of silt, clay and sand.[Existing soil must be used as topsoil.][Stockpiled on-site surface soil must be used as topsoil.][Additional topsoil must 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

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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.

****

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

2.2.1 Lime

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NOTE: Use ASTM C602 calcium carbonate equivalent (C.C.E.) as specified in Table 1: for burnt lime, C.C.E. must not be less than 140 percent; for hydrated lime, C.C.E. must not be less than 110 percent; and for limestone, C.C.E. must not be less than 80 percent.

****

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

2.2.2 Aluminum Sulfate

Commercial grade.

2.2.3 Sulfur

100 percent elemental

2.2.4 Iron

100 percent elemental

2.2.5 Peat

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

2.2.6 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 mmNo. 4 mesh screen	95
2.36 mmNo. 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

2.2.9 Gypsum

****

NOTE: Gypsum must be 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 comprised of calcium sulfate dihydrate 80 percent, calcium 18 percent, sulfur 14 percent; minimum 96 percent passing through 850 micrometers 20 mesh screen, 100 percent passing thru 970 micrometers 16 mesh screen.

2.2.10 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

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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.

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

[2.3.1 Inert Mulch Materials

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

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

]2.3.2 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. Recycled content percentages listed are recommended by EPA; additional information can be found on the EPA's "Comprehensive Procurement Guidelines (CPG)" page within EPA's website at http://www.epa.gov.
****

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

2.3.3 Recycled Organic Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 65 mm by 65 mm 2-1/2 inch by 2-1/2 inch screen. It must be cleaned of all sticks a minimum 25 mm one inch in diameter and plastic materials a minimum 75 mm 3 inch length. The material must 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 hard wood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Stakes must be minimum 50 mm 2 inches square or 64 mm 2-1/2 inch diameter by 2.4 m 8 feet long, pointed at one end.[Paint or stain wood stakes dark brown.].

2.4.1.2 Ground Stakes

Rough sawn hard wood or plastic, 0.91 m 3 feet long.

2.4.2 Guying Material

2.4.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A580/A580M.

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 mm1/2 inch diameter PVC pipe], [150 mm6 inches] [300 mm12 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 must be galvanized or cadmium-plated steel with 25 mm one inch diameter eyes and screw length 38 mm 1-1/2 inches,

minimum.

2.4.2.6 Deadmen

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

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

2.4.2.7 Metal Anchors

a. Driven Anchors

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

Tree Caliper	Anchor Size
50 mm	75 mm
75 to 150 mm	100 mm
150 to 200 mm	150 mm
200 to 250 mm	200 mm
250 to 300 mm	250 mm
Tree Caliper	Anchor Size
2 inches and under	3 inches
3 to 6 inches	4 inches
6 to 8 inches	6 inches
8 to 10 inches	8 inches
10 to 12 inches	10 inches

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

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

****

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

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 must be root pruned a minimum of 6 months before transplanting[_____]. Minimum root ball sizes must be in accordance with ANSI/ANLA Z60.1.

3.1.1.2 Canopy Pruning

Canopy pruning must conform to TCIA A300P1.

3.1.2 Plant Material Preparation

Plant material designated for transplanting must be watered thoroughly several days before root pruning, digging or moving. Broken or interfering growth must be pruned. Large canopy and specimen plant material must 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 must 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 must be completed prior to digging the root ball. Palms trimmed or pruned must 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

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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.
****

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, 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

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NOTE: The erosion potential of a soil is of concern in vegetated channels, road embankments, dams, levees, spillways, construction sites, etc.
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Provide erosion control in accordance with Section 32 93 00 EXTERIOR PLANTS, 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 must be submitted for Government approval.

3.3.2 Turf Removal and Replacement

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 must 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 must 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 must be dug a minimum of 2 times the diameter of the root system to allow for root expansion. The pit must 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 must not be used. Pits must be dug immediately before plants are placed in the pit.

3.4 INSTALLATION

3.4.1 Setting Plant Material

Plant material must 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 must be set even with the grade at which it was grown. The root system must be spread out and arranged in its natural position. Damaged or girdled roots must be removed with a clean cut. The beginning of the root flare must be visible at soil level when the tree is planted, since it is critical not to plant the tree too deep. The following must be performed:

a. Plumb plant materials and backfill half of the hole with topsoil.

b. Prior to backfilling, all metal, wood, and synthetic products must be removed from the ball or root system avoiding damage to the root system. Biodegradable burlap and tying material must 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, must 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 must be added as recommended by the manufacturer for the plant material specified.

]3.4.3 Watering

A regular watering schedule must be established. Slow deep watering must be used. Plant pits and plant beds must be watered immediately after backfilling, until completely saturated. Run-off and puddling must be

prevented. Watering of other plant material or adjacent areas must be prevented.

3.4.4 Staking and Guying

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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 guying 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.

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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 must apply:

3.4.4.1 One Bracing Stake

Trees 1200 to 1800 mm 4 to 6 feet high must be firmly anchored in place with one bracing stake. The bracing stake must be placed on the side of the tree facing the prevailing wind. The bracing stake must be driven vertically into firm ground and must not injure the ball or root system. The tree must be held firmly to the stake with a double strand of guying material. The guying material must be firmly anchored at a minimum 1/2 tree height and must prevent girdling. A chafing guard must 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 must be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes must be driven vertically into firm ground and must not injure the ball or root system. The tree must be held firmly between the stakes with a double strand of guying material. The guying material must be firmly anchored at a minimum 1/2 tree height and must prevent girdling. Chafing guards must 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 must be held firmly in place with 3 bracing or ground stakes spaced at equal intervals around the tree. Ground stakes must be avoided in areas to be mowed. Stakes must be driven into firm ground outside the earth berm. The guying material must be firmly anchored at a minimum 1/2 tree height and must prevent girdling. For trees over a minimum 75 mm 3 inch diameter at breast height, turnbuckles must be used on the guying material for tree straightening purposes. One turnbuckle must be centered on each guy line. Chafing guards must be used when metal is the guying material.

3.4.5 Deadmen or Earth Anchors

Trees over a minimum 150 mm 6 inch caliper must 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 must be firmly anchored at a minimum 1/2 tree height and must prevent girdling. Turnbuckles must be used on the guying material for tree straightening purposes. One turnbuckle must be centered on each guy line. Chafing guards must be used.

3.4.6 Flags

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

3.5 FINISHING

All planting operations must conform to TCIA Z133.

3.5.1 Plant Material

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

3.5.2 Placing Mulch

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

3.5.3 Pruning

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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.

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Pruning must be accomplished by a certified arborist. The pruning of trees and palms must be in accordance with TCIA A300P1. Only dead or broken material must be pruned from installed plants. The typical growth habit of individual plant material must be retained. Broken branches must be removed.

3.6 MAINTENANCE

Plant maintenance must 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, must be graded smooth and sodded with the same species. All pavements and facilities that have been damaged from the transplanting

operation must be restored to original condition at the Contractor's expense.

3.7.2 Backfill Removal Site Plant Pits

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 must be replaced in kind in relation to size and species and must be installed in accordance with Section 32 93 00 EXTERIOR PLANTS. Turf must be replaced with sod, and must be installed in accordance with Section 32 92 23 SODDING.

3.7.3 Clean Up

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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.

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

3.8 PLANT ESTABLISHMENT PERIOD

The establishment period for transplanted materials must be the same as for newly planted exterior plants and must conform to the same requirements thereof as found in Section 32 05 33 LANDSCAPE ESTABLISHMENT, paragraph EXTERIOR PLANT ESTABLISHMENT PERIOD.

-- End of Section --