SECTION 02900 – PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Labor, equipment, materials, plants, soil preparation, planting, and maintenance requirements for all landscaping work as indicated on Drawings.

1.02 RELATED SECTIONS

A. Section 02300 - EARTHWORK

B. Section 02360 –VEGETATION CONTROL

C. Section 02810 – IRRIGATION SYSTEM

1.03 DEFINITIONS

A. Injury; defined, without limitation, as any bruising, scarring, tearing, or breaking of roots, trunk, bark, branches or foliage which may lend to or result in permanent damage to plant health or significantly alter the desired aesthetics of the plant for which it was selected.

B. Dead Tree; is a tree that has died or that has been damaged or stressed to an advanced state of decline and has been determined to be so by the Architect's Certified Arborist.

C. Drip Line; defined as the outer most limits of the tree canopy.

D. Certified Arborist; an individual with a current certification from the International Society of Arboriculture (ISA) or member of the American Society of Consulting Arborists trained and experienced in all aspects of proper tree care.

1.04 REFERENCES

A. International Society of Arboriculture (ISA) "Guide for Plant Appraisal 8th Edition 1992," prepared by the Council of Tree and Landscape Appraisers (CTLA).

B. Standardized Plant Names; as established by Hortus III.

C. ANSI A 300 - American National Standards for Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices: 1995.

D. ANSI Z 60.1 - American Standards for Nursery Stock: 2004., as approved by the American Association of Nurseryman.

E. Cabling, Bracing, and Guying Standards for Shade Trees, as published by the National Arborist Association (NAA), 174 Rt. 101, Bedford, NH 03102.

1.05 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Division 01.

B. Unit prices apply to authorized work covered by quantity allowance.

C. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.06 QUALITY ASSURANCE

A. In accord with Section 01440 - QUALITY ASSURANCE AND QUALITY CONTROL.

B. Qualifications of workmen:

1. Contractor to be licensed by the State of Hawaii and a member in good standing of the Landscape Industry Council of Hawaii (LICH).

2. Contractor shall have a minimum of 5 years of documented experience with successful landscape installations similar to the size and scope of work for this project.

3. Contractor shall maintain a competent supervisor or foreman on site who is fluent in English and satisfactory to the Architect. Supervisor shall not be changed, except with prior consent of the Architect. Supervisor shall be present on-site during all operations and specified work in progress.

4. Provide at least one person who is a Certified Arborist, to direct and be present during all tree pruning operations.

C. Tests and Inspections:

1. Plant Material:

a. All plant material shall be received in a healthy condition, free from pests and disease. Plants delivered to Contractor that are found to be damaged, root bound, diseased or distressed shall be brought to the Architect's attention prior to accepting delivery.

b. Plants shall be subject to inspection and approval by the Architect at nursery, growing grounds and upon delivery to site, for conformity to Specifications. Such approval shall not impair the right of further inspection or rejection during progress of work.

c. Pre-selection and tagging of plant material by the Architect or Landscape Architect is to meet design intent only and does not constitute any guarantee by the Architect of the selected plants. Health and vigor of plant material shall remain the sole responsibility of Contractor.

d. The Architect reserves the right to have plant samples analyzed at any time to verify plant health and conformity to Specifications. Furnish samples upon request. Testing to be done by the Architect's designated laboratory.

1) Cost of testing plant samples will be responsibility of Contractor. Lab fees for testing found to be negative will be reimbursed by Change Order to the Contract.

2) Rejected material shall be promptly removed and replaced at no cost to the Architect.

2. On-site Soils:

a. Pre-Construction Testing: Preconstruction testing of existing on-site soil shall be performed on native soil not previously impacted by prior

construction. Native soil boundaries are defined in “Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii” by United States Department of Agriculture, Soil Conservation Service, Issued August 1972.

b. After rough grading has been completed and prior to planting operations, on-site soils are to be tested for agronomic suitability, biological function, and chemical characteristics. Soils report shall include amending requirements in order for on-site disturbed soils to be restored to optimal biological function and chemical characteristics. Contractor shall make all adjustments to improve the soils’ characteristics and comply with final soils analysis recommendations as directed by soils report.

c. In the event that soil amendment recommendations are substantially different than those described for base bid, adjustments will be made by Change Order to Contract as agreed upon by the Architect.

d. The Contractor shall engage the services of a qualified agricultural soils testing laboratory to perform soil testing services of all areas to be planted.

    1) Soils testing shall be performed by Crop Nutrient Solutions, Inc., Post Office Box 40, Waimanalo, Hawai‘i, 96795; Phone: (808) 386-4120.

e. Laboratory services shall include the following:

    1) A minimum of six samples or one sample per every 5,000 sq. ft. (whatever quantity is greater) of base soil after completion of rough grading in landscape areas as directed by the Architect.

    2) Chemical analysis and written report of each individual sample to cover the following:

        a) Soil structure and percentage of organic matter.

        b) pH, Salinity and Lime content

        c) Mineral nutrients, including concentrations of nitrogen, phosphorus, potassium, calcium, magnesium, iron, manganese, zinc, copper, sulfur, and molybdenum.

        d) Potential hazards to healthy plant growth such as high salinity, sodium chloride, boron, impaired soil structure, or drainage.

    3) Recommendations for types, quantities, and application schedule for organic materials, fertilizers, and other materials found necessary to amend base soil for optimum plant growth.

    4) Recommendations for backfill mix or mix as appropriate to be utilized in installation of all plants for the project.

    5) Testing laboratory shall follow standards set forth in the USDA Agricultural Suitability Test in accord with Handbook-60 and in accord with the Methods of Soil Analysis by the Soil Science Society of America, Inc.

f. Testing laboratory may be employed by the Architect to provide additional periodic sampling and testing of amended landscape planting areas to ensure compliance with recommendations.

3. Imported Soil Amendment Material:

    a. The Contractor shall be responsible for submitting a soils analysis of the amended and restored soils at the end of the project for review and approval by the Architect in order to demonstrate that restored soils have optimum biological function and chemical characteristics and meet recommendations provided by soil analysis report. Types, quantities, and application schedule of required organic materials, fertilizers, and other amendments required to mitigate soil deficiencies identified in the soil analysis report shall be included for review by the Architect.

    b. All proposed imported soil amendments for planting areas shall meet specified requirements and be pre-approved by the Architect based on soil test results.

    c. Cost for soils tests for this purpose shall be paid by Contractor. Provide chemical analysis report, written recommendation, and intended source of imported soil amendments for each individual sample to the Architect.

    d. In the event that the initial proposed imported soil amendment is found unsuitable, additional sources shall be found and tested at Contractor's expense.

4. Imported Screened Soil Material:

    a. The Contractor shall be responsible for submitting a soils analysis of the imported screen soil material at the beginning of the project for review and approval by the Architect in order to demonstrate adherence to recommendations provided by soils report.

    b. All proposed imported soils for planting areas shall meet specified requirements and be pre-approved by the Architect based on soil analysis results.

    c. Cost for soils tests for this purpose shall be paid by Contractor. Provide chemical analysis report, written recommendation, and intended source of imported soil for each individual sample to the Architect.

    d. In the event that the initial proposed import soil is found unsuitable, additional sources shall be found and tested at Contractor's expense.

5. Observation Schedule

    a. Observation and inspection of the work will be made on an ongoing basis and at the following stages of the work. Provide Architect prior notification to of the following with the advanced times indicated:

        1) Pre-installation conference: 10 working days.

        2) Completion of finish grading and soil preparation: 10 working days.

        3) Plant delivery to site: 10 working days.

        4) Tree locations prior to excavation of pits: 10 working days.

        5) Shrub layout prior to excavation pits: 10 working days.

        6) Pre-mulch inspection: 10 working days.

7) Premaintenance: 10 working days.

8) Final walk-through: 10 working days.

1.07 SUBMITTALS

A. In accord with Section 01300 – SUBMITTAL PROCEDURES

B. Submit manufacturer's data sheets for all proposed products to be used in work. Indicate specific items and product numbers.

C. Contractor shall furnish all plant material indicated on Drawings. Any and all substitutions due to unavailability shall be requested in writing prior to confirmation of ordering.

1. Submit for Architect's approval within 30 days after award of contract and prior to any start of work:

a. Documentation listing all required plant material by size, source, and quantity. Sort list by construction zone sequence if applicable.

b. Weed control program. Include all product information and schedule of operations.

c. Proposed schedule and sequence of work plan for all planting operations, with start dates and completion dates for planting trees, shrubs and groundcover.

d. List of proposed equipment to be used for tree planting and plan for plant storage on-site.

e. Soil test results and schedule of recommended fertilizers and amendments to correct soil deficiencies. Schedule of fertilizers and amendments shall include applications rates for pre-planting, planting, and post planting operations.

1.08 EXISTING CONDITIONS

A. Protect all existing plant material that is to remain within or directly adjacent to the work to be performed. This shall include installing and maintaining protective barriers and/or temporary fencing.

B. Maintain foliage of existing plants free of dust and debris from all construction operations. Wash plants down daily with potable water if necessary. Ensure water pressure and water stream do not damage plant material nor cause erosion or runoff.

C. Vehicles and equipment shall not be parked, serviced, or operated within the drip line of existing trees or within newly planted areas. Access to all planting areas shall be limited to the personnel required for landscape installation.

1.09 MOCK-UP

A. Provide mock-up samples for all materials as shown on drawings. Construct with all materials, methods, and procedures intended to be used in the final Work, including temporary supports, welded wire mesh support structure, and wire support. Mock-up shall be constructed a minimum of three months prior to

commencement of work and shall be protected from construction. Maintenance service shall be provided for 90 days. At the end of 90 days, provide samples for Architect to review.

B. Supervisors and installers that construct and finish mock-up are to be the same workman that install finish Work.

C. Approved mock-up will be used as basis for judging and approval of final installation.

D. If initial mock-up is not approved by the Architect, prepare subsequent mock-up(s) or provide modifications to initial mock-up until approved.

1.10 WARRANTY

A. Warranty all plant material, smaller than 15-gallon container size, to be in healthy and flourishing condition of active growth for a period of one (1) year from the date of Substantial Completion.

B. Warranty all plant material, 15 gallon or larger, to be in healthy and flourishing condition of active growth for a period of one (1) year from the date of Substantial Completion.

C. Promptly replace all plant material found dead, dying, or damaged during the warranty period.

D. Replacement shall be with material of same variety, size, form and character. Final selection to be approved by the Architect.

E. Replacement shall include cost of plant material, delivery, labor, equipment and materials required for installation.

F. Specimen trees that require replacement shall be removed and replaced in a timely and expedient manner. Coordinate with the Architect for selection of replacement tree and timing of work.

G. Contractor will not be held responsible for failures that are directly attributed to Acts-of-God, vandalism or proven negligent care by Owner. Acts of God do not include diseases, pests, or moisture extremes noted herein.

H. Special Warranty:

1. All plant materials furnished shall be warranted as to the species, hybrid, flower color and/or variety specified.

2. If after acceptance of the project, any warranted plant material proves to be of a different species, hybrid, flower color and/or variety not initially determinable, replace that plant with a new plant of the originally specified species, hybrid, flower color and/or variety. The new plant shall be equal in size to that of the incorrect plant at the time of its removal. The new plant shall meet the quality standards, be subject to the warranty, and be installed according to the specifications.

3. There is no time limit to this warranty, although it does not include plants reverting to the general species. The Architect will determine the nonconformance of plant materials and notify the Owner in writing of the required replacement work. All materials and work shall be at the expense of the Owner.

1.11 PRODUCT HANDLING

A. Procedures: In accord with Section 01660 – PRODUCT STORAGE AND HANDLING REQUIREMENTS.

B. Delivery:

1. Deliver fertilizers to site in original unopened packages and containers, bearing manufacturer's name, trademark, guaranteed chemical analysis and conformance to State Law. Deliver bulk materials to site with certificate that includes manufacturer name, trademark, guaranteed chemical analysis, conformance to State Law and quantity delivered.
2. Furnish delivery receipts for all amendments to the Architect.
3. Notify Architect seven (7) days in advance of plant material deliveries.
4. Submit an itemized list of plants included in each delivery.

C. Deliver all plants with legible identification labels.

1. Label trees, bundles, or containers of like shrubs or ground cover plants.
2. State correct botanical name and container size.
3. Use durable waterproof labels with UV and water-resistant inks. Do not remove labels until so directed by the Architect.
4. Protect plant material from damage during delivery. Plants loaded for delivery from nurseries should not be double stacked or vertically layered in any way to cause damage or stress.
5. Inspect all plant material for injury, disease and insect infestation. Evaluate trees and shrubs for improper pruning. In the event such conditions are found, bring to the Architect's attention for direction and remedial action to be taken.

D. Handling:

1. Exercise care in handling, loading, unloading, and storing of plant material. Plants that have been damaged prior to or during installation shall be replaced at Contractor's expense.
2. Provide equipment of suitable size and capacity to safely off-load, transport and plant all trees.
3. The "choke" strapping method of lifting trees is strictly forbidden (except for single trunk palms); any trees hoisted in this manner will be rejected.

E. Storage:

1. Plant materials shall be maintained in a healthy growing condition. Protect plants from physical damage by construction operations as well as inclement weather conditions such as high winds, excessive heat or dust.
2. Plants stored on-site shall be spaced to allow clearance for light and air and not be spaced tightly together such that limbs are crowded.
3. Maintain root balls with adequate moisture at all times.
4. Plants grown in shade conditions shall be stored and maintained in equivalent shade conditions.

5. Do not store plants directly on asphalt paving.

1.12 VERIFICATION OF DIMENSIONS AND QUANTITIES

A. All scaled dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and quantities. Immediately inform Architect of all discrepancies between Drawings, Specifications, and actual conditions. Do not do work in any area where there is a discrepancy until approval to proceed has been given by the Architect.

1.13 REGULATORY REQUIREMENTS

A. Provide for all inspections and permits required by federal, state, and local authorities for furnishing and transporting plant materials.

B. Perform work in accord with all applicable laws, codes, and regulations including licensing and training requirements for pesticide and herbicide applications.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Contractor shall provide imported screened soil as source of soil material or imported amendments for amendments to existing soil. Source and location to be approved by the Architect. Contractor to submit soils reports for Architect's approval.

B. Soil shall meet the following requirements.

1. General: Free of roots, clods, and stones larger than 1/2 inch in the greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush, and other litter. It shall not be infested with nematodes or other undesirable disease organisms such as insects and plant pathogens. Soil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil. Total pore space content on a volume/volume basis shall be at least 15% when moisture is present at field capacity. Soil shall have a field capacity of at least 15% by weight.

2. Gradation: Soil shall be a sandy loam, or loam, and similar to the native site soil. The definition of soil texture shall be in accord with USDA classification scheme. Obtain Architect's approval prior to grading operations.

Class	**Particle Size Range**	**Maximum Percentage**	**Minimum Percentage**
Coarse Sand	0.5-2.0 mm	40%	0%
Clay	<0.05 mm	20%	10%
Silt	<0.05 mm	40%	10%
Gravel	2-13 mm	20%	0%
Rock	13-25 mm		10% volume
Organic		15%	0%

3. Permeability: Hydraulic conductivity rate shall be not less than 1 inch per hour or more than 20 inches per hour when tested in accord with USDA Handbook No. 60, Method 34b or other Owner-approved methods.
4. Acidity: Soil pH range measured in the saturation extract (USDA Handbook No. 60, Method 21a) shall be 6.0 to 7.9.
5. Salinity: Salinity range measured in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 0.5 to 2.0 dS/m. If calcium ions and sulfate tons both exceed 20 milliequivalents per liter in the saturation extract, the max salinity shall be 4.0 dS/m.
6. Chloride: Maximum concentration of soluble chloride in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 150 mg/l (parts per million).
7. Boron: Maximum concentration of soluble boron in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 1 mg/l (parts per million).
8. Sodium Absorption Ratio (SAR): Maximum SAR shall be 6 measured in accord with USDA Handbook No. 60, Method 20b.
9. Organic Matter Content: Sufficient soil organic matter shall be present to impart good physical soil properties, but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. Soils shall have a minimum 5% Organic Matter as Humus content, utilizing Walkley-Black soil testing method.
10. Heavy metals: Maximum permissible elemental concentration in soil shall not exceed the following:

Metal	**Parts per million (mg/kg)[1]**
Arsenic	3
Cadmium	2
Chromium	10
Cobalt	2
Lead	30
Mercury	1
Nickel	5
Selenium	3
Silver	0.5
Vanadium	3

[1] Ammonium Bicarbonate/DTPA Extractable, dry weight basis.

11. Fertility - Range of essential elemental concentration in soil shall be as follows:

Element	Low[1]	High[1]
Phosphorus	2	40
Potassium	40	220
Iron	2	35
Manganese	0.3	6
Zinc	0.6	8
Copper	0.1	5
Boron	0.2	1
Magnesium	50	150
Sodium	0	100
Sulfur	25	500
Molybdenum	0.1	30

[1] Ammonium Bicarbonate/DTPA Extractable, parts per million) (mg/kilogram), dry weight basis.

a. If soil pH is between 6 and 7, maximum permissible elemental concentration shall be reduced 50%. If soil pH is less than 6.0, maximum permissible elemental concentration -12. Phytotoxic constituent, herbicides, hydrocarbons, and similar materials: Germination and growth of plant shall not be restricted more than 10% compared to standard controls. Standard controls shall be both monocots and dicots. Total petroleum hydrocarbons shall not exceed 100 mg/kg dry soil measured in accord with modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, zylene, and ethylbenzene) shall not exceed 2 mg/kg dry soil measured in accord with EPA Method No. 8020.

12. Red Humic latasol soils, or types known as “Palolo Clay” or “Lualualei Clay” or similar materials shall not be accepted.

13. Screened to pass through 1/2-nch screen.

C. Contractor responsible for providing imported screened soil over all planting areas. Refer to Drawings for locations of various soil depths.

D. Backfill Mix for Trees and Shrubs and Groundcovers: Mix thoroughly prior to placing:

60% screened soil

25% 3/8 inch minus black cinder

15% “Menehune Magic”/organic composted soil amendment

1 lb. Sustane Fertilizer per cubic yard of mix

E. Backfill Mix for Palms: Mix thoroughly prior to placing:

85% washed beach sand

15% “Menehune Magic”/organic composted soil amendment

2 lb. Sustane Fertilizer per cubic yard of mix

2.02 AMENDMENTS

A. Organic Amendments:

1. Types of acceptable products are composts low in salts and heavy metals, free from weed seeds, pathogens and other deleterious materials meeting U.S. Composting Council specifications.
2. Composted wood products are conditionally acceptable (stable humus shall be present). Wood based products which are based on red wood or cedar are not acceptable.
3. Sludge-based materials are not acceptable.
4. The compost shall be aerobic without malodorous presence of decomposition products.
5. Humus material with an ash content of not less than 8% and not more than 50%.
6. The pH shall be between 6 and 7.5.
7. Salt content shall be less than 10 milliohm/cm at 25 degrees Celsius (ECe less than 10) in a saturated paste extract. The maximum rate of application shall not exceed 15% by volume unless the salinity is lower than 10 milliohm/cm at 25 degrees Celsius.
8. Boron content of the saturated extract shall be less than 1.0 parts per million.
9. Silicon content (acid-insoluble ash) shall be less than 20%.
10. Calcium carbonate shall not be present.
11. Carbon: nitrogen ratio shall be less than 20:1.
12. Approved organic amendments and suppliers include Ferto (6-4-2) or Gro-Power Plus (5-3-1) or Architect approved equal.

B. Sand: Washed, No 16 granite.

Sieve No. (US Standard)	Percent Dry Weight Passing
10	100
16	65-100
20	0-20
35	0-5
40	0-2

C. Perlite: Coarse or No. 2 perlite, free of weeds and impurities.

D. Calcium Carbonate: Minimum 95% calcium carbonate, 100% passing a No. 60 sieve.

E. Single Super Phosphate (0-20-0): Granular commercial grade, minimum 20% P205.

F. Soil Conditioner: Menehune Magic by Hawaiian Earth Products, ph (808) 682-5895.

2.03 FERTILIZER

A. Organic Fertilizer Tablets: N-P-K as recommended by soil analysis, uniform in composition, slow releasing, free-flowing and suitable for application with approved equipment, delivered to the site in unopened containers. Each fully labeled, conforming to the applicable fertilizer laws, and bearing the name or mark of the manufacturer. Sustane Enhanced with Sumicoat Controlled Release Fertilizer in Root Zone Feeder Pack, by Sustane, ph (507) 263-3003, www.sustane.com

B. Organic fertilizer: N-P-K as recommended by soil analysis, uniform in composition, slow-release nitrogen, free-flowing and suitable for application with approved equipment, pathogen and weed free, no sewage, blood or meat products, delivered to the site in unopened packaging. Each fully labeled, conforming to the applicable fertilizer laws, and bearing the name or mark of the manufacturer; apply according to manufacturer's written instructions. Sustane Fertilizer, ph (507) 263-3003, www.sustane.com

2.04 HERBICIDE

A. Pre-emergent Herbicide: Chipco Ronstar-G as manufactured by Bayer.

B. Pre-planting Herbicide: Round-Up or equal

C. Soil Fumigant: Basamid G® Granular Soil Fumigant as manufactured by Cetris USA, Ltd.

2.05 PLANT MATERIALS

A. Nomenclature: Plant names listed on Drawings conform to "Standardized Plant Names" established by Gardens of Hawaii by movie C. Neal and/or Hortus III. Except for changes covered therein, established criteria of horticulture nomenclature is followed.

B. The plant nursery shall certify the native Hawaiian plants are native to Hawaii and true to the species.

C. Plants shall be symmetrical as is typical for their variety and species, in a condition of healthy and vigorous growth with healthy normal root systems well filling their containers, but not to the point of being rootbound. They shall be free from plant disease, insects or their eggs or soil borne pathogens.

D. Height and spread of all plants shall be measured with branches in their normal position. Where specific dimensions of any plant material are omitted from Plant List, plants shall be as approved by the Architect.

E. All liners, plugs, dug sprigs, and flatted material shall be fully rooted. Plants should not be pruned prior to delivery, except as authorized by the Architect.

F. Balled and burlap plant material shall meet standards of American Standards for Nursery Stock. Burlap shall be 100% natural fiber. No leno will be accepted.

G. Palm Trees: Palms shall have square shaped root balls cut a minimum of 30 inches from base of trunk face. Retain a minimum of six fronds on head of palm, or as directed by Architect.

H. Caliper measurement shall be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper, and at a point 12 inches above the natural ground for trees over 4 inches in caliper

I. Hydromulch: Mulch shall be (paper or virgin wood cellulose fiber mulch) specifically processed fiber containing no growth or germination inhibiting factors. It shall be such that after addition and agitation in the hydraulic equipment with seeds, fertilizer, water and other additives not detrimental to plant growth, the fibers will form a homogeneous slurry. The hydromulch equipment shall be capable of mixing all the necessary ingredients to a uniform mixture and to apply the slurry to provide uniform coverage. Fertilizer and mulch mix shall be applied in one operation by approved hydraulic equipment. The equipment shall have a built-in agitation system with an operating capacity sufficient to keep the mix in uniform distribution until pumped from the tank. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with hydraulic discharge spray nozzles, which provide a uniform distribution of the slurry.

2.06 MISCELLANEOUS MATERIALS

A. Water: Furnished by Owner. Distribution and connections by Contractor.

B. Tree Stakes: Lodgepole Pine wood stakes treated with wood preservative in strict compliance with state and federal regulations 2-inch diameter x length as required per Drawings.

C. Staking Ties: Cinch Ties, 32 inch by V.I.T. Products, Inc., Tel: (760) 735-2450

D. Tree Guys:

1. Type A: #12 ga galvanized iron wire for 15- and 25-gallon trees, #9 ga. Galvanized iron wire for field stock trees, up to 3-inch caliper, or Architect - approved equivalent. Hose shall be 1/2-inch diameter black rubber hose.

2. Type B: Duckbill DTS Guy Kit, Model DTS-88 and Model DTS-138 for trees 10-inch caliper and larger by Forsight Products, Inc., www.earthanchor.com, Tel: (800) 325-5360.

3. Type C: Duckbill DTS Guy Kit, Model RBA-88 and Model RBK-138 for rootball anchoring systems of palm trees. Forsight Products, Inc., www.earthanchor.com, Tel: (800) 325-5360.

E. Rebar: #4 24-inch minimum length for trees 25 gallon and smaller. #7 36-inch minimum length for larger trees.

F. Marker: Plastic surveyor tape. Bright color, minimum 18 inches length. Use same color throughout project.

G. Aluminum Edging: Standard-profile extruded-aluminum edging - 1/8 inch thick by 5-1/2 inches deep, ASTM B221, Alloy 6063-T6, Black anodized, aluminum stakes – ASTM B221, Alloy 6061-T6 approximately 1-1/2 inches wide by 12 inches long. Provide from one of the following manufacturers:

1. Permaloc Corporation, ph (616-399-9600)
2. Sure-loc Edging Corporation

H. Root Control Barriers: DeepRoot Tree Root Barriers, www.deeproot.com, ph (415) 781-9700.

I. Filter Fabric: Style 307, as manufactured by Belton Industries, ph (800) 851-5049.

J. Gravel: No. 3b fine blue rock, 3/4 inch minus.

K. Black Cinder: 3/8 inch minus crushed black cinder.

L. Ili ili Stone: “Tumbled Lava” by Geobunga, blended 50% 1 inch x 2 inches, 50% 2 inches x 3 inches, http://geobunga.com/puka-lava-tumbled-beach-rock , ph (808-422-4567), provide additional 10% in quantity for Owner’s future use.

M. Natural Moss Rock Boulders: Local weathered Field stones, 18 inches – 36 inches diameter, for placement in landscape areas as shown on Drawings.

N. Synthetic Lawn: Style BAREFOOT / SoftLawn (PL960), Camofill infill, as manufactured by NyLawn, ph (808-485-8885).

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Weed Control:

1. Before and during preliminary and finish grading, dig out all noxious or invasive weeds and grasses by roots and dispose of off-site. Any non-perennial type grasses, except for Torpedo and Nut Grass, less than 2-1/2 inches high and not bearing seeds, may be turned under. Prior to planting, eliminate any weeds present in delivered plant stock.
2. Site shall be maintained weed-free throughout planting operations and until final acceptance. Prior to mulching, apply pre-emergent herbicide to all shrub and groundcover areas.
3. Fumigate soil for all sodded or seeded planting areas with Basamid® G granular fumigant. Apply per manufacturer’s directions.

B. Soil Preparation (pre-tillage) for all planted areas on grade:

1. All planting areas that are compacted 85% to 90% are to be cross-ripped to 12 inches depth. Areas with over 90% compaction shall be cross-ripped to 24 inches depth, and all unacceptable materials removed.
2. In areas to receive import soil, scarify top of the existing soil to 4 inches minimum depth prior to backfilling.
3. Soil for planting shall be free of rocks over 1/2 inch in diameter, and any foreign debris, refuse, plant roots, clods, weeds, sticks, solvents, petroleum products, concrete, plaster, or other deleterious, undesirable and unwanted materials.

Such materials shall be removed, including all temporary road bases or pavement already in place.

4. Soil shall be free of soil-borne diseases and capable of sustaining healthy plant life.

C. Landscape Erosion Control:

1. Provide and maintain temporary erosion control for all planting areas. This shall include, but not necessarily limited to; installation of silt fences at top and bottom of slopes and at 10-foot intervals along the face. Do not block irrigation coverage with silt fences.

2. Provide sand bags, sod, and/or erosion control silt fence at drainage swales until planting is established and soil has been stabilized. See Section 02370 for additional requirements.

3. Repair all scars caused by erosion to original grades.

3.02 LAYOUT

A. Confirm locations and depth of all underground utilities and obstructions. If underground construction or utility lines are encountered during excavation for planting, alternate locations for may be selected by Architect.

B. Preliminary layout for trees shall be accomplished with colored flags or wooden stakes, each indicating plant name and container size (or other Architect approved method). Shrub material shall be spotted and approved in place by Architect prior to planting.

3.03 FINISH GRADING

A. Minor grading modifications may be required to establish final grades.

B. Finish grading shall ensure proper drainage of site as indicated on Civil Engineering Drawings.

C. Planting areas shall be graded such that final grades will be 2 inches below adjacent paving, sidewalks, headers and similar conditions unless otherwise indicated on Drawings.

D. Surface drainage shall be away from building foundations at 1/4 inch per foot to aid in water runoff.

E. Remove or redistribute excess soil before application of fertilizer. Make allowances when establishing finish grades for earth excavation from planting pits and mulch.

F. Trenches: If sprinkler system has been installed after grading and fertilizing has been completed, re-till trench backfill and fertilize to depth specified for area, to conform to specified requirements.

G. Eliminate all erosion scars after each erosion event and prior to commencing maintenance period, unless directed otherwise by Owner.

3.04 INSTALLATION

A. General:

1. Ensure that final grades to ±0.10 feet have been established. Provide for inclusion of all amendments, settling, and other preparatory needs. Ensure that finish grading of all planting areas is as indicated on Drawings and as directed by Architect. Ensure all drainage swales and flow lines have been established.
2. Do not commence any planting until completion of all soil import, soil amendment and grading operations have been completed and approved by Architect.
3. Do not commence shrub planting until the landscape irrigation system has been installed and approved for proper coverage. Trees may be planted in advance of final landscape irrigation system provided provisions for adequate interim watering have been made. Interim watering may include providing automatic drip irrigation to all trees. Refer to irrigation Drawings and Specifications for requirements.
4. Actual planting shall be performed only during periods of suitable weather and soil conditions and during daylight hours.
5. Only as many plants as can be planted and watered on that same day shall be distributed in a specific planting area.
6. Relative position of each tree and plant as shown on the Drawings is subject to Architect approval and shall, if necessary to achieve project design objectives, be relocated prior to planting at no additional cost to Owner. Verify exact layout and locations of all plants with Architect prior to planting.

B. Planting:

1. Excavate plant pit sizes as indicated on Drawings.
    a. Auger drain holes in bottom of planting pits.
    b. Excavation for planting shall include stripping and stacking of all acceptable topsoil encountered within areas to be excavated for trenches, tree pits, plant pits, and planting beds.
    c. Excess soil generated from planting pits not used as backfill, water basins, or in establishing final grades shall be removed from site.
2. Handle each plant in such a manner as to not cause injury or damage during placement or planting. Any plants damaged as a result of Contractor's operations shall be rejected and replaced at Contractor's expense.
3. The "choke" strapping method of lifting trees is strictly forbidden (except for single trunk palms); any trees hoisted in this manner will be rejected.
4. Scarify root ball as needed and to cut any circular root systems. Properly cut off broken or frayed roots.
5. Center plants in pits or as directed by Architect.
6. Face plants with fullest growth facing forward or as directed by Architect.

7. Plant trees and shrubs to expose original container soil and set with root crown approx. 1 inch above finished grade. Backfilling will not be permitted around trunks.
8. All plants which settle deeper than their surrounding grade are to be carefully raised and replanted at correct elevation at no additional cost to Owner.
9. Set each plant plumb and hold rigidly in position until soil has been tamped firmly around rootball. All palm apical meristems shall be plumb. Fill pit with prepared soil, progressively settling soil by water jetting and flooding to remove air pockets and voids.
10. Water thoroughly immediately following planting. Backfill all voids which develop with additional prepared planting soil to bring to finish grade
11. Box container removal:
    a. Remove bottom of wood boxes before planting. If it is not possible to remove box bottom because of size, soil type or condition of rootball, remove every other bottom board, or other method approved by Architect.
    b. Remove sides of box without damage to root ball after positioning plant and partially backfilling.
12. Ball and burlap removal: Remove burlap away from the crown of the tree or palm. Cut away as much of burlap as possible without injury to root ball. Remove wire basket to 18 inches below finish grade

C. Backfill:
1. Planting pits shall be backfilled with amended soil mix. Water jet to remove all air pockets.
2. In a suitable area "central mix" all backfill soil to achieve a uniform blend with amendments. The intent is to achieve a consistent well blended soil in one location and not amend soil adjacent to each planting pit. Clean-up unused excavated soil and dispose of off-site. Protect mix from water until it has been placed around plants.

D. Fertilizer Tablets:
1. Apply in accord with manufacturer’s recommendations.
2. Initially set required number of tablets on the top of each root ball while plants are still in their containers to facilitate planting and verification by Architect.
3. Locate plant tablets 1/3 depth of root ball in accord with manufacturer's instructions.

E. Watering Basins:
1. Where no other temporary watering system is required, construct an earthen basin around each tree. Each basin shall be of a depth sufficient to hold at least 4 inches of water. Maintain water basins until removal is required for installation of shrubs or turf.
2. Monitor tree and shrub root balls for adequate moisture content. Deep water and/or flood water basins as needed to maintain proper soil moisture.

F. Tree Staking and Guying:

1. Staking and guying of all trees shall be completed immediately after planting. Provide new stakes and ties or guying cables and anchors as shown on Drawings.

2. Remove and dispose of all original nursery stakes and ties.

G. Pruning: shall be limited to the minimum amount necessary to remove injured branches and to shape tree for design intent as directed by Architect. This shall include, but not be limited to: lifting of branch structure, thinning of canopy, and elimination of cross branching. Pruning is not to be done in nursery prior to delivery. Pruning paint shall not be used.

H. Auger Holes: Provide 12-inch diameter augured drain holes at 15 feet o.c. in all planting areas and in each tree pit and as indicated on drawings. Triangular space auger holes in large areas. Backfill with amended planting soil. Required depth of drain holes is to be to free draining soil layer below planter or a maximum of 6 ft. below bottom of planting pit.

I. Root Control Barriers: Prior to backfilling, install root control barriers around rootballs as required for specified trees shown on drawings. Connect panels to form a continuous barrier around root ball. Install per manufacturer's directions.

J. Soil Preparation:

1. For sodded, sprigged, and ground cover areas (except slopes 2:1 or greater): After approximate finished grades have been established, uniformly apply required amendments and thoroughly cultivate by means of mechanical tilling into the top 6 inches of soil.

2. The following rates and quantities shall be used for basis of bid only. Specific recommendations will be made after rough grading operations are complete and soil samples have been tested. In the event conditions are substantially different than described, adjustment will be made by Change Order as agreed upon with the Architect.

   Application rates given are per 1000 sq. ft.:

   a. Organic amendment: 2 cu. yd. (Humus material).

   b. Fertilizers: Single superphosphate (0-20-0) 6 lb.

   c. Potassium sulfate (0-0-50): 4 lb.

   d. Ureaformaldehyde (38-0-0): 1/2 lb.

   e. Polyacrylamide (PAM): 12 lb.

      NOTE: If PAM is unavailable, increase organic amendment to 3 cu. yd. per 1000 sq. ft.

3. For soil preparation with PAM, broadcast the amendments and fertilizers as noted above. Apply PAM with a drop spreader. Use caution to avoid drift onto non-soil areas. PAM must be kept dry until it has been incorporated into the soil. Rototill amendments thoroughly into the soil 6 inches deep within 4 hours after application of PAM. Slightly dampened soils will need an immediate tillage after the PAM application. If the organic amendment is damp and is applied after the PAM, rake the PAM into the soil to the addition of the organic

amendment or allow the amendment to dry prior to application of PAM. Irrigate the soil to allow water to penetrate to a depth of 6 inches. The soil needs to be damp but not saturated. Allow the soil to dry or at least dry to the point where the stringiness has disappeared, then re-rototill the soil 6 inches deep.

K. Hydromulch/Hydrosprigging

1. Areas to be hydro-sprigged shall be brought to a smooth even surface according to civil grading plans. Maintain previously established grades and swales.
2. After ground surfaces have been raked smooth and on an even plane, in accordance to specifications and upon approval by Architect, proper soil moisture must be obtained then broadcast stolons/seed uniformly at rates listed on the Drawings.
3. Determine the proper fertilizer required, for both planting and on-going maintenance, for the plant materials. Determine the quality, analysis and ratio; method of application; and frequency of the fertilizer, to insure sufficient nutrients for the sustained growth of the plant material.
4. Broadcast grass sprigs uniformly over prepared surface at a rate of 10 cu. Ft./1000 sq. ft. and mechanically force sprigs into lightly moistened soil.
5. On the same day and immediately following sprigging operations, indicated field areas are to be capped with wood fiber using conventional "Hydromulch" equipment as manufactured by the Bowie Machine Works, or approved equal. When hydraulically sprayed on the soil, the fibers shall form a blotter like ground cover, which readily absorbs water and allows infiltration to the underlying soil. In every application, complete coverage of the soil shall be attained. Mulch shall be applied at the minimum rate of 40 lb. per 1,000 sq. ft. (1700 lb. per acre) using water at the rate of 25 gallons per 1,000 sq. ft. (1,000 gallons per acre).
6. Hydromulching of turf areas shall consist of mixing the hydromulch slurry, pre-plant fertilizer product, and spraying the mixture over the newly installed grass sprigs and soil.

3.05 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring watering basins, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or list in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.06 CLEAN UP

A. Pick up all trash resulting from this work no less frequently than the last working day of each week or as directed by Architect. All trash shall be removed completely from site. After planting operations have been completed, remove trash, excess soil, empty plant containers and rubbish from property. Scars, ruts, and other marks in ground caused by this work shall be repaired and the site left neat and orderly throughout.

B. Leave site area broom-clean and wash down all paved areas within Contract area, leaving premises in a clean condition.

3.07 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of Landscape Installer. Maintain as required in 3.05 PLANT MAINTENANCE. Begin maintenance immediately after plants area installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: Six months from date of acceptance of planting completion.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of Landscape Installer. Maintain as required in 3.05 PLANT MAINTENANCE. Begin maintenance immediately after plants area installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: Six months from date of acceptance of planting completion.

3.08 FINAL ACCEPTANCE

A. Maintain all planted areas free of debris and insects. Mow, cultivate, weed and water all areas until final acceptance of work is made by Architect. All punch list items shall be completed and all irrigation to be operational prior to Architect's acceptance of project installation.

B. Prior to final approval of work:

1. Re-sod or replant areas where necessary to obtain full and even coverage.
2. Remove all debris resulting from work of this Section.
3. Regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.
4. Fill all depressions and eroded channels with sufficient soil mix to repair grade and ensure proper drainage. Compact lightly, and replant filled areas in accord with Drawing requirements.

C. Final acceptance of work and approval by Architect for Substantial Completion shall include, but may not be limited to:

1. Punch list items completed and approved by Architect.
2. Final grades approved in accord with Drawings and Specifications.

3. Site weed-free and in accord with approved weed control plan.
4. Trees, shrubs, groundcovers, and mulches are all installed in accord with Drawings and Specifications.
5. Landscape irrigation system complete and fully operational.

D. Architect will issue a Letter of Acceptance upon final completion and approval of all work.

END OF SECTION