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 5000 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-inch 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.

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.

(1,700 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 is complete and fully operational.

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

END OF SECTION

SECTION 10100 – TACKBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Wood trimmed tackboards.
2. Mechanically-fastened installations throughout.

B. Related Sections include the following:

1. Section 09900 - PAINTING for surface preparations prior to installations.
2. Divisions 15 and 16 for coordination of unit installations with adjacent mechanical and electrical work.

1.02 SUBMITTALS

A. Product Data: For each type of board indicated.

B. Shop Drawings: For each type of board required.

1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
2. Include sections of typical trim members.
3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

C. Samples: For each type of visual display surface:

1. Visual display surface: 12-inch square mounted on substrate indicated for final work. Include one panel of each type, color and texture.
2. Trim: 6-inch long sections for each profile and finish.

D. Product Certificates: Signed by manufacturers of tackboards certifying that tackboard materials furnished comply with requirements specified for flame-spread ratings.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain boards through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of boards and are based on the products indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Fire-Test-Response Characteristics: Provide fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify fabric-faced tackboards with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 25 or less.
2. Smoke Developed: 10 or less.

1.04 PROJECT CONDITIONS

A. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating boards without field measurements. Coordinate wall construction to ensure actual dimensions correspond to established dimensions.

1.05 WARRANTY

A. General Warranty: Manufacturer standard warranty form in which manufacturer agrees to repair or replace components of tackboard assembly that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 1-year

PART 2 - PRODUCTS

2.01 MANUFACTURER/PRODUCTS

A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Basis-of-Design Product: Tactics Communication Board (FB2634) as manufactured by Peter Pepper Products.
2. Marsh Industries.
3. Poly Vision Corp.
4. Ghent Manufacturing, Inc.
5. Or approved equal

2.02 MATERIALS

A. Fabric Faced Tackboards: Fabric factory laminated to 1/2-inch thick fiberboard backing with 5/8-inch wide clear anodized aluminum trims.

1. Fabric: Mildew resistant, washable, complying with FS CCC-W-408A, Type I, weighing not less than 13 oz./sq. yd.; with surface-burning characteristics indicated.

   a. Color and Pattern: 070 Stucco

2. Fiberboard Backing: ASTM C 208; having a Class A Fire-rating when tested in accordance with ASTM E 84.

3. Unit Size: 36-inch (W) x 24-inch (H) x 2-inch (D)

2.03 ACCESSORIES

A. Wood Trim and Accessories: Fabricate frames and trim of not less than 1-1/2 inch by 3/4-inch wood, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to a neat, hairline closure.

2.04 FABRICATION

A. Assembly: Provide factory-assembled units, unless field assembled units are required.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.

2. Provide manufacturer's standard vertical joint system between abutting sections of boards.

3. Provide manufacturer's standard mullion trim at joints between tackboards.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of boards.

1. Surfaces to receive tackboards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of tackboards.

2. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Deliver factory-built boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Install wall-mounted units using manufacturer's approved or supplied fasteners, clips and related components, fastening mechanically at each location without using adhesives, at mounting heights indicated. Keep perimeter lines straight,

plumb, and level. Provide grounds, clips, backing materials, brackets, anchors, trim, and accessories necessary for complete installation.

C. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.03 ADJUSTING AND CLEANING

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units according to manufacturer's written instructions.

END OF SECTION

SECTION 10240 – SOUND BARRIER WALL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Ground mounted Sound Barrier wall enclosure including support framing, sound barrier panels enclosing the Mechanical Yard. The system shall include swing gates and gate hardware.
2. Requirements for Delegated structural analysis and calculations.
3. The system shall be delivered in accordance with contract plans in ready for install condition including all necessary holes in columns, retention plates, base plates, nuts, bolts, washers, plus other which may be included within the scope of supply of the barrier wall system manufacturer.

B. Related Sections include the following:

1. Section 03300 – CAST-IN-PLACE CONCRETE
2. Section 05120 – STRUCTURAL STEEL
3. Section 05500 - METAL FABRICATIONS

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware’
4. ASTM A449 – Standard Specification for Quenched and Tempered Steel Bolts and Studs.
5. ASTM A 563 – Standard Specification for Carbon and Alloy Steel Nuts.
6. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM A992 – Standard Specification for Structural Steel Shapes.
8. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
9. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
10. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

11. ASTM D790 – Standard test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
12. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM D6944 – Standard Practice for Determining the Resistance of Cured Coatings to Thermal Cycling.
14. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
15. ASTM F 463 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
16. ASTM F959 – Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series.
17. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
18. ASTMF3125 - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
19. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
20. ASTM G154 – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials.

1.03 SUBMITTALS

A. Product Data: For each type of product, component and accessories.

B. Shop Drawings: Plans, elevations, sections, full size and fully drawn details showing layout, dimensions, spacing of components, and anchorage and installation details. The shop drawings shall reflect and incorporate information from the structural calculations.

1. Include fastener layout drawings.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts.

C. Welding certificates.

D. Qualification Data: For Installer and fabricator.

E. Samples:

1. Provide 12 long samples of sound barrier panel showing design and selected color coating.
2. Submit 12-inch square sample of sound absorptive wall panel .

F. Coordinated Calculation Submittal:

1. Provide structural calculations, sealed by a licensed professional structural engineer in the State of Hawaii prepared in compliance with referenced documents and these specifications.
2. Where specifications and code differ, the more severe requirements shall govern. Test reports are not an acceptable substitute for calculations. Calculations shall include the following information:
    a. Analysis for all applicable loads on framing members and panels.
    b. Anchor requirements specific to conditions of the project
    c. Analysis for all applicable loads on anchors, including anchors embedded in concrete.
    d. Section property computations for framing members.
    e. Certification of conformance with structural test pressures and design pressures indicated. Include evidence of compliance by submission of product test reports with notations as required by professional structural engineer

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials for system from a single manufacturer, or materials certified by the system manufacturer as compatible with other system components.

B. Installer Qualifications: A qualified installer specializing in performing the work of this section with minimum five years documented experience.

C. Fabricator Qualifications: A qualified fabricator specializing in performing the work of this section with minimum five years documented experience.

D. Delegated Design Engineer Qualifications: Professional structural engineer legally authorized to practice in the State of Hawaii and experienced in providing structural engineering services of kind indicated that have resulted in work similar to this Project, and, who has a record of successful in-service performance.

E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

F. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

G. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original, unopened packages and containers with manufacturer’s labels identifying products legible and intact.

B. Store materials to permit easy access for inspection and identification and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
2. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.06 DELEGATED DESIGN REQUIREMENTS

A. Delegated Engineering Requirements:

1. Delegated Engineering Responsibility: Require sound barrier wall system manufacturer to employ a delegated engineering professional to provide engineering for work of this Section to comply with concept expressed in Contract Documents.
2. Engineer system to withstand structural design loads within limits and under conditions indicated, specified, or required, without material failure or permanent deformation of structural frame or work specified.
3. Prepare engineering calculations, shop drawings, and other submittals and affix professional seal according to respective jurisdictional licensing regulations.

1.07 PERFORMANCE REQUIREMENTS

A. Thermal Movement: Fabricate exterior components which have been designed to provide for expansion and contraction resulting from ambient temperature range of 120 degrees F and metal surface temperature extreme of 185 degrees.

B. Structural Performance: Provide sound barrier enclosure capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Structural supports and wall panels shall be designed with adequate strength and stiffness to withstand the loads as determined by IBC 2018 and ASCE 7 using the following criteria:
   a. Wind Design Criteria: As indicated on the Structural Drawings.
   b. Seismic Criteria: As indicated on the Structural Drawings.
2. Under the calculated loading conditions, the assembled acoustic structure shall not exhibit any panel joint deflection in excess of L/360, where L is the unsupported span length of any panel section in the erected structure.

C. Acoustic Performance:

1. The manufacturer shall provide certified independent test data indicating sound absorption and transmission loss characteristics of the panel assembly. Test data must be obtained through independent tests conducted in a NVLAP accredited laboratory in accordance with ASTM E90, Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and ISO 354 or

ASTM C423, Standard Method of Test for Sound Absorption of Acoustic Materials in Reverberant Rooms.

2. Sound Barrier Panels shall exhibit a minimum STC 35 and NRC 0.85.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. All components and accessories for Sound Barrier Wall Systems are products of RMP Global, Inc.

1. Sound Barrier Panels: Modular, molded plastic sound absorptive wall panels; Adelaide Panel with a running bond pattern embossed on one side and vertical slat pattern embossed on the other side. Vertical slat pattern shall be visible from the exterior of the enclosure

2.02 MATERIALS

A. Structural Steel Shapes: ASTM A 992 Grade 50.

B. Channels, Angles: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Steel Sheet: Galvanized steel, ASTM A 653, commercial steel, Type B with G90 coating.

E. Welding Electrodes: Comply with AWS requirements.

F. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-Dip Zinc Coating, ASTM A153.

2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type.

a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

G. Anchor Rods: ASTM F1554, Grade 36 or ASTM A449

1. Nuts: ASTM A563 heavy-hex carbon steel

2. Plate Washers: ASTM A36 carbon steel.

3. Washers: ASTM F436, Type1, hardened carbon steel

4. Finish: Hot-dip zinc coating, ASTM A153, Class C.

2.03 FABRICATION

A. Structural Steel:

1. Structural members shall be designed as a field bolt-together system. All holes in column webs, backer angles and base plates shall be factory drilled. All nuts, bolts and washers to be supplied by barrier wall system manufacturer. Field welding of structural components is not permitted.

2. Columns and base plates shall be supplied as factory-welded assemblies by the barrier wall system manufacturer.

3. Provide welded steel plate caps at the open end tops of tube columns sealing the tube from water infiltration. Grind welds smooth.

B. Barrier Panels: Barrier panels and their components shall be factory fabricated, sectional. and modular designed for easy and accurate field assembly. The panels and components shall not be susceptible to damage due to extended exposure to vibration, UV exposure, salt air, rain, air temperature or humidity with the passage of time.

1. All panels shall be 6-inches thick, with a mass of 4-5 lbs per square foot. The modular panel system shall be connected together by means of a interlocking connection.

   a. All panels internal reinforcing members shall be horizontal tube steel elements running horizontally at the top and bottom of each panel. Such steel reinforcing shall galvanize steel, Type G90 and hidden within the panel design.

2. Panels should have a density of at least 3lbs/ft2 of face area.

3. Panel Performance Requirements:

   a. Sound Transmission: ASTM E90; STC 35

   b. Acoustic Absorption: ASTM C423; NRC 0.85

   c. Thermal Cycling: ASTM D6944; Pass

   d. Fire Resistance: AS 1530; Pass

   e. UV Resistance: ASTM G154; Pass

   f. Flexural Strength: ASTM D790; ≥ 15 MPa

   g. Impact Resistance: ASTM D256; ≥ 90 J

   h. Salt Fog: ASTM B117; No change in appearance at 1,000 hours of exposure.

C. Gates

1. Gates shall be double-door swinging type unless noted otherwise on the Contract Documents.

2. Gate panels shall match the adjacent wall panels in material, thickness, finish, and acoustic performance to the maximum extent practical.

3. Gate assemblies shall be designed to maintain overall wall performance including STC and noise reduction intent when gates are in the closed position.

4. Gate frames shall be structural steel and designed to resist wind, seismic, and operational loads.

5. All gate hardware, including hinges, latches, locking devices, stops, and fasteners, shall be suitable for exterior use.

6. Gates shall be capable of manual operation and shall swing as indicated on approved shop drawings.

2.04 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to:

1. Structural steel according to ASTM A 123.
2. Steel sheet metal according to ASTM A 653

2.05 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Steel Finishes:

1. Powder-Coat Finish: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
   a. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
   b. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
   c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
   d. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of bearing plates, and other embedments, with installer present, for compliance with requirements.

B. Verify substrate is level, smooth, capable of supporting units and imposed loads, and properly prepared for installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Beginning installation means acceptance of conditions.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 INSTALLATION, GENERAL

A. Install sound barrier wall enclosure in strict accordance with the manufacturer's written instructions and approved shop drawings and structural analysis.

3.04 INSTALLATION, STRUCTURAL SUPPORTS

A. Erect all structural members in strict accordance with the manufacturer's piece-marked installation drawings and details.

B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.

3. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

3.05 INSTALLATION, BARRIER PANELS

A. Install barrier panels in accordance with manufacturer's installation instructions.

B. Install panels level and plumb with the specified Site tolerances.

C. As each panel is installed check to make sure that it is seated properly on the support channel or tube and secure panel to the support with supplied fasteners. Repeat these steps for each panel.

D. Door panels are assemble in the same manner as the regular wall panels. Install supplied door hardware in accordance with the manufacturer's written instructions.

3.06 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION