

SECTION 32 1823.29 – SYNTHETIC TURF SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish all labor, materials, tools, and equipment necessary to install, in place, all new synthetic turf materials as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the Manufacturer's written installation instructions, and in accordance with all approved shop drawings.

1.2 PROJECT DOCUMENTATION

- A. Prior to order of materials, the Synthetic Turf Contractor shall submit the following:
 - 1. Product data.
 - 2. Test Results, for the new turf product specified.
 - 3. Installation details.
 - 4. Sample Warranty and specimen Warranty.
 - 5. Insurance Policy.
 - 6. Details on construction, especially any details that may deviate from plans and specifications.
- B. Prior to Final Acceptance, the Synthetic Turf Contractor shall submit to the Owner the Executed Turf Warranty Documents, OEM Manuals and Warranty Documents for any equipment provided and Care Cards (Turf Maintenance Manuals), which will include necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.

1.3 SHOP DRAWINGS

- A. Shop drawings shall be prepared at the scale of the construction documents and contain all pertinent information regarding installation. These drawings shall be submitted to the Owner or Owner's representative for approval prior to the ordering, manufacturing, and shipment of materials.
- B. Submit drawings for:
 - 1. Installation details, edge detail, etc., as required by contract.

1.4 QUALITY ASSURANCE

- A. Synthetic Turf Contractor's Experience:

1. The Synthetic Turf Contractor shall have the experience of five (5) installations with edge-to-edge sewn main turf fabric seams. Submit a list of all applicable installations with the bid.
 2. The Synthetic Turf Contractor shall be experienced with a turf system as specified having the following characteristics:
 - a. The Turf Fabric system shall be tufted on a 3/8" gauge at a stitch rate of approximately 8 stitches per 3 inches (8/3) to provide fiber tufts in a uniform pattern with symmetrical spacing between the tufts (equal distance fiber matrix).
 - b. The Primary Backing shall consist of three layers, which include:
 - 1) Polybac – additional grip on fibers,
 - 2) Duraback - provides dimensional stability,
 - 3) Polybac - seats fibers in place,
 - c. A Secondary Backing of high-grade polyurethane shall be applied to the Primary Backing at 20 oz./yd². Secondary Backing adds structural integrity to the entire turf fabric backing, resistance to water degradation and strengthens grip on fibers. Partially coated backings or latex coating materials shall not be acceptable
 - d. The entire backing shall be coated with holes perforated throughout the backing at the Synthetic Turf Manufacturer's recommended interval to allow for drainage.
- B. Turf Warranty: The Synthetic Turf Contractor shall submit its third-party Insured Manufacturer's Warranty, which guarantees the usability and playability of the synthetic turf system for its intended uses for an eight (8) year period commencing with the date of Substantial Completion.
1. The warranty submitted must have the following characteristics:
 - a. Must provide coverage for eight (8) years from date of Substantial Completion and not be limited to the amount of annual usage.
 - b. Must warrant that the materials and workmanship installed meet or exceed the product specifications within manufacturing tolerances.
 - c. Must have a provision to either repair or replace such portion of the installed materials that are no longer serviceable to maintain a serviceable and playable surface,
 - d. Must be a Manufacturer's Warranty from a single source covering workmanship and all self-manufactured or procured materials.

1.5 EXISTING CONDITIONS

- A. The surface on which the new synthetic turf is to be installed is atop an aggregate rock base. The Synthetic Turf Contractor will be responsible for any damage due to negligence to the new base during the installation of the new synthetic turf system provided there are no failures below the surface which contribute to the damage.

1.6 SCHEDULE

- A. The Synthetic Turf Contractor shall complete all work on the synthetic turf system in accordance with the published project schedule, or as mutually agreed upon.

1.7 SURFACE AREA

- A. The Synthetic Turf Contractor is to verify all measurements and dimensions to cross-check the accuracy of project plans and promptly report any deviations to the Project Landscape Architect/Engineer.

1.8 UTILITIES, SITE ACCESS AND SITE PROTECTION

- A. Owner will supply necessary water for synthetic turf installation operations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Shall be tufted, parallel fibrillated slit film polyethylene, grass-like fabric coated with a secondary backing of high-grade polyurethane. The fibers shall be tufted to a finished pile height of approximately 2". The synthetic turf fabric shall be filled with 70% ambiently processed SBR rubber and 30% silica sand (by weight %).
- B. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation.
- C. The finished surface shall appear as mowed grass with no irregularities.
- D. The polyethylene pile yarn shall be a proven athletic caliber yarn designed specifically for outdoor use. The pile fiber shall possess the following physical characteristics:

Parameter	Value	METHOD
Yarn Denier	9,000 ± 500	ASTM D 1577
Yarn Thickness	120 ± 5 microns	ASTM D 3218
Breaking Load	19 – 21 lbf	ASTM D 2256
PE Pile Fiber Weight	41 ± 1 oz./yd2	ASTM D 5848

- E. The Pile fabric shall possess the following physical characteristics:

Parameter	Value	METHOD
Finished Pile Height	2" (51mm) ± 2mm	ASTM D 5823
Product Weight (total)	72 ± 4 oz./yd2	ASTM D 5848
Primary Backings - (Polybac, Duraback, Polybac)	11 ± 1 oz./yd2	ASTM D 5848
Secondary Coating (polyurethane)	20 ± 3 oz./yd2	ASTM D 5848
Fabric Width	15'	ASTM D 5793

Tuft Gauge	3/8"	ASTM D 5793
Grab Tear Strength	> 200 lbf	ASTM D 5034
Tuft Bind Strength	8 ± 2 lbf	ASTM D 1335

- F. Impregnated (Infill) Layer will be 70% ambiently processed SBR rubber and 30% silica sand (by weight %).

2.2 MANUFACTURERS

- A. Manufacturer: ForeverLawn 1.866.992.7876, or a product providing equal performance, either manufactured or fabricated specifically for this project, which shall be submitted in Shop Drawing and Technical Specification form, adequate for full evaluation by the Architect.

- 1. Products:

- a. Synthetic Turf: Playground Grass Ultra, or equal.
- b. Infil: Envirofill, or equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only factory-trained technicians skilled in the installation of athletic caliber synthetic turf systems shall undertake the placement of the system.
- C. Subject to the requirements in Section 1.2(B), the surface to receive the synthetic turf shall be verified by the Synthetic Turf Contractor as ready for the installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.2 NEW SYNTHETIC TURF INSTALLATION

- A. Upon completion of the new base course, the area shall be sufficiently sprinkled with hoses connected to quick- couplers from Owner's irrigation water supply (or by observation and marking during a significant rain event) to denote any areas of ponding or slow water infiltration for further investigation for possible remediation. The Contractor shall provide the necessary hoses, nozzles, and sprinkler heads for testing the field for adequate horizontal drainage away from the building.
- B. The landscape architect shall thoroughly inspect all synthetic turf materials delivered to the site for both mixing and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

- C. Synthetic turf shall be loose-laid across the area, stretched, and attached to the perimeter header detail. Synthetic turf shall be of sufficient length to permit full installation across the area. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.
- D. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the Synthetic Turf Manufacturer. Field seams will also be glued (if applicable) to seaming tape. Seaming tape is to be constructed of high tenacity, coated non-woven fabric. All main fabric seams shall be transverse to the building direction (i.e., run perpendicularly to the building).
- E. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a system of sand and recycled SBR rubber particles. The synthetic turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a settled depth of approximately 1-1/2 inches. The infill materials can only be applied when the synthetic turf fabric is dry.

3.3 CLEAN UP

- A. Synthetic Turf Contractor shall provide the labor, supplies, and equipment, as necessary, for final cleaning of the surfaces.
- B. The Synthetic Turf Contractor shall keep the area clean and clear of debris throughout the project.
- C. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by Owner.
- D. Within three (3) days following sign-off for Substantial Completion all temporary items shall be removed and disposed, and all disturbed areas shall be restored as part of final cleaning:
 - 1. Remove temporary fencing around the designated staging area and thoroughly sweep the areas in and around the staging area and access roads used during construction.
 - 2. Insure all excess materials and any rental equipment have been removed from the jobsite prior to the Final Acceptance inspection.
 - 3. Remove all surface debris including loose infill particles from the surrounding pavement.

END OF SECTION 32 1823.29

SECTION 32 9113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish labor, material and equipment required for placement and amendment of topsoil for areas to be planted, and the establishment of finish grades as shown on the Drawings and as specified herein.
- B. Coordinate work with installation of other site work including earthwork, seeding, and planting.
- C. Related sections include the following:
 - 1. Division 31 Section "Site Prep," stripping and stockpiling of topsoil.
 - 2. Division 31 Section "Earthwork" for preparation of subgrades prior to placement of topsoil and planting soils specified in this section.
 - 3. Division 32 Section "Lawn and Grasses" for the procedures and requisite timing for seeding of lawns following topsoil preparation.
 - 4. Division 32 Section "Plants" for planting placement of amended topsoil backfill.

1.2 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of amended topsoil soil.
- B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Amended Topsoil: Native or imported topsoil or surface soil modified with soil amendments and fertilizers.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- E. Topsoil: See Part 2 – Products.
- F. Soil Ripping: Loosening the soil by dragging a ripping shank or chisel thru the soil to the depths and spacing specified, and further defined in this specification.

- G. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tine tilling machine, roto tiller, (or spade tiller), and further defined in this specification.

1.3 SUBMITTALS

- A. Product Data. Include Material Safety Data Sheets (MSDS) where applicable: For the following:

- 1. Fertilizers, including application rates.
- 2. Soil Amendments.
- 3. Herbicides.

- B. Samples for Verification: For the following:

- 1. 1/2 cubic foot compost.
- 2. 1/2 cubic foot of each imported topsoil. Furnish one sample from each site from which soil is to be furnished.
- 3. Retain soil and compost submittals on site in sealed, accessible container for comparison to delivered soils.

- C. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

- 1. Manufacturer's certified analysis for standard products.
- 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

- D. Qualification Data: For testing agencies.

- E. Material Test Reports: Date of testing on all reports shall be a maximum of 90 days prior to the date of submittal for review.

- 1. Soil Fertility and Agricultural Suitability Analyses and Recommendations Reports for the following:
 - a. Existing on-site topsoil: From three typical locations as selected by Landscape Architect, minimum 30 days prior to beginning soil preparation work.
 - b. Imported topsoil: Minimum 30 days prior to beginning soil preparation work.
 - c. Amended topsoil: Provide soil analyses and results for soil samples taken from 2 typical locations as selected by Landscape Architect,

minimum 7 days after soil preparation work has been completed and prior to installing plants.

2. Compost Analysis: Provide analysis for one representative sample of compost minimum 30 days prior to compost being delivered to Project Site.
 3. Compost Maturity: Provide results of Compost Maturity Test when submitting Compost Analysis Report and sample.
 4. Soil Compaction Test: Provide results of soil compaction tests minimum of 7 days prior to planting and seeding.
- F. Delivery Slips: Provide delivery slips for each load of delivered material as proof of shipment of specified materials.
- G. Soil Placement Map: Contractor shall provide a plan showing placed location of each load of delivered soil, referenced to delivery slips.

1.4 QUALITY ASSURANCE

- A. Soil Fertility and Agricultural Suitability-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
1. Acceptable Soil Testing Laboratories are
 - a. University of Florida Analytical Services Laboratories, 352.392.1950.
 - b. Central Florida Soil Laboratory, 863.533.5579.
 - c. Phoslab Testing Laboratories, 863.682.5897.
- B. Soil Analyses: Furnish soil analyses by a qualified soil-testing laboratory stating:
1. Soil Composition: USDA particle size analysis indicating percentages of sand, silt and clay, and percent organic matter.
 2. Macro and micronutrient fertility tests as determined by pH, salinity, nitrate nitrogen, ammonium nitrogen, phosphate phosphorous potassium, calcium, magnesium, soluble copper, zinc, manganese, iron, saturation extract boron and sodium analyses.
 3. Sodium Absorption Ratio (SAR).
 4. A Cover Letter shall be provided summarizing existing soil conditions and the Laboratory's recommendations.
 5. Recommendations by the soil testing lab for fertilizer and soil amendments in pounds per 1,000 square foot or tons per acre, as necessary to correct soil deficiencies.
 6. Noxious Weed Germination Test: a minimum of one 36 inch square by 3 inch deep soil sample for each topsoil source considered for use on the project.

Place soil in tray with adequate drainage layer beneath, keep soil moist (not saturated) for 7 days in a temperature controlled greenhouse environment, provide photos and written report summarizing germination results.

- C. Compost Testing Laboratory Qualifications: An independent laboratory, with the experience and capability to conduct the testing indicated following U.S. Composting Council Seal of Testing Assurance (STA) procedures, or equivalent.
 - 1. Acceptable Compost Testing Laboratories are:
 - a. University of Florida Analytical Services Laboratories, 352-392-1950.
 - b. Central Florida Soil Laboratory, 863-533-5579.
 - c. Phoslab Testing Laboratories, (863) 682-5897.
- D. Compost Analysis: Provide documentation from supplier that compost has reached a monitored temperature of 140 degrees Fahrenheit for at least one week. Engage an independent soil testing laboratory to test representative sample(s) of compost and furnish compost analysis report for the following parameters:
 - 1. Percent organic matter, percent moisture, percent inerts (foreign matter), pH, soluble salts, and particle size.
 - 2. Nutrient content, including: Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), and Magnesium (Mg) and Sulfur (S).
 - 3. Trace Metals, including: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), and Zinc (Zn).
 - 4. Maturity Indicator. Provide bio-assay results. Provide Carbon-Nitrogen ratio.
 - 5. Stability Indicator: Provide respiration test results.
- E. Request inspection and allow observation by Landscape Architect of prepared soils before planting.
- F. Soil Compaction Testing: Furnish soil compaction standard tests per ASTM 698. Request inspection and allow observation by Landscape Architect of prepared soils before planting.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver packaged materials in manufacturer's unopened containers fully identified by name, brand, type, weight and analysis.
- B. Store and handle packaged materials to prevent damage and intrusion of foreign matter.

- C. Store stockpiled topsoil in area designated by Landscape Architect. Provide erosion control measures for stockpiled topsoil on site to prevent contamination of the soil. Refer to Division 31 Section "Earth Moving" for control of dust and erosion.

1.6 SOIL AMENDMENT BID QUANTITIES

- A. Bid quantities and types of soil amendments shall be based upon those listed in this Section. Types of amendments required and quantities shall be adjusted as necessary based upon actual results of soil fertility and agricultural suitability analyses and recommendations for on-site topsoils.
- B. Amount per 6-inch lift of topsoil over 1000 square-feet of landscape area:
 - 1. 25 lbs. Gypsum (Calcium sulfate)
 - 2. 35 lbs. Calcium carbonate limestone 'Calpril'
 - 3. 35 lbs. Dolomite limestone 'Dolpril'
 - 4. 8 lbs. Treble superphosphate (0-45-0)
 - 5. 3 lbs. Ammonium nitrate
 - 6. 4 ozs. Zinc sulfate
 - 7. 8 ozs. Manganese sulfate
 - 8. 6 cu-yds Compost

1.7 SITE CONDITIONS

- A. Topsoil placement and soil preparation shall not take place during periods where saturated soil or surface water is present in work areas.
- B. Work shall not take place when temperature is less than 32 degrees Fahrenheit, or when frozen soil exists on site.

1.8 COORDINATION

- A. Coordinate soil preparation with Division 31 Section "Earthwork" such that topsoil, soil amendments and fertilizers are incorporated into ground fill areas in specified lifts and to specified depths below finish grade for planting and lawn areas. Topsoils shall be amended per recommendations of the Soils Testing Laboratory.
- B. Coordinate soil preparation with timing and procedures for installation of related site work including irrigation, seeding, and planting.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil Definition: ASTM D 5268; natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles, conforming to USDA classification for Loam or Sandy Loam; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inches in any dimension; and free of weeds, roots, and other deleterious materials, with the following physical properties:
1. Organic Matter: 6 percent minimum to 10 percent maximum.
 2. Sodium Adsorption Ratio (SAR): less than 6.0.
 3. Saturation Extract concentration for Boron: less than 1.0
 4. pH range of from 6 to 8
 5. Saturation Extract Conductivity: less than 4.0 dS/m @ 25 degrees Celsius as determined in a saturation extract.
 6. Non-soil components: Less than 1 percent by volume.
 7. Heavy metal concentrations: below the USDA per year load limit.
 8. Minimal weed seed.
 - a. If regenerative noxious weeds (including, but not limited to, quack grass, nutsedge grass, and horsetail) are present in the soil, all resultant growth including roots shall be removed throughout one-year period after acceptance of work at no additional cost to Owner.
- B. Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported topsoil. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. Ensure no contamination of the soils occurs during earthwork and grading, and that the soil remains friable and free of debris.
1. Import Topsoil: Supplement on-site topsoil with imported or manufactured topsoil from off-site sources when quantities are insufficient. Import topsoil is subject to approval and shall conform to USDA soil texture class "Loam" or "Sandy Loam" certification by Soil Testing Analysis, no more than 12 months prior to delivery to the site. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.2 INORGANIC SOIL AMENDMENTS

- A. Dolomitic Lime: Natural, agricultural limestone (calcium and magnesium carbonate) containing a minimum of 20 percent calcium and 11 percent magnesium and as follows:
 - 1. Screen Analysis: 100 percent passing through No.30 sieve; 70 percent passing through No. 100 sieve; and minimum 30 percent passing through No.325 sieve.
 - 2. Provide lime in form of granulated, prilled, dolomitic limestone, 'DoloPril' by Pacific Calcium, Inc., (877) 571-3555, or equal.
- B. Calcitic Lime: Natural, agricultural limestone (calcium carbonate) containing a minimum of 36 percent calcium and as follows:
 - 1. Screen Analysis: minimum of 100 percent passing through No. 10 sieve and a minimum of 80 percent passing through No. 100 sieve.
 - 2. Provide lime in form of granulated, prilled, limestone, 'CalPril' by Pacific Calcium, Inc., (877) 571-3555, or equal.
- C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- D. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- E. Aluminum Sulfate: Commercial grade, unadulterated.
- F. Gypsum: Agricultural gypsum; minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean washed river sand, free of calcium, chlorides and other deleterious substances.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-decomposed, commercially manufactured, stable, and weed-free organic matter, no food waste shall be a part of the compost; pH range of 5.5 to 7.5; 100 percent passing through 1-inch sieve; soluble salt content of 2.5 to 7.5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and shall conform as follows:
 - 1. Tested, at minimum, every six months for noxious weeds.

2. Organic matter source (feedstock): Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
3. Organic Matter Content: 50 to 70 percent of dry weight as determined by ash method.
4. Moisture Content: 40 to 55 percent by weight
5. Free of refuse (less than 1 percent by dry weight), plastics, contaminants or any material toxic to plant growth.
6. Processed to meet U.S. Composting Council's Seal of Testing Assurance (STA) Program, or equivalent.
7. Carbon to Nitrogen Ratio: 30 to 1 or lower.
8. Composted for a minimum of 120 days and reach a monitored temperature of 140 degrees Fahrenheit for at least one week.

2.4 FERTILIZER

- A. Fertilizer composition and rate to be determined based upon soil analysis. For bidding purposes, assume: 10 Nitrogen (N), 10 Phosphorus (P), 10 Potassium (K), 5 Sulfur (S) applied at a rate of 10 pounds per 1000 square feet in all planting beds and seeded areas.
- B. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.
- C. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- D. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent of urea formaldehyde, phosphorous, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
- E. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium derived from natural organic and inorganic sources in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.5 EROSION CONTROL BLANKET

- A. Erosion Control Blanket shall be 100 percent biodegradable woven from machine spun bristle twines with no seams. The blanket shall be Geocoir/DeKoWe 400, Rolanka Bio D Mat 40, or approved equal with the following minimum average roll properties:
 - 1. Thickness 0.35 inches (ASTM D1777).
 - 2. Average Tensile Strength 660lbs/ft (ASTM D4595).
 - 3. Weight 13.6 oz/sy (ASTM D3776).
 - 4. Open Area 65 percent (measured).
 - 5. Roll Width 6.5 and 13.1 feet (measured).
 - 6. Roll Length 165 feet (measured).
 - 7. Include manufacturer's recommended steel wire staples, 6 inches long.

- B. Wooden Stakes: Untreated Douglas Fir, or Pine, 3/4 x 1/2 x 18-inch wood stakes.

2.6 MISCELLANEOUS PRODUCTS

- A. Post-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.
- B. Pre-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.
- C. Contact Herbicide for controlling nutsedges: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.

PART 3 - EXECUTION

3.1 EXAMINATION OF SITE CONDITIONS

- A. Examine for site conditions that will adversely affect execution, permanence, quality of work, and survival of plant material and grasses.
- B. Identify areas to receive planting and lawn on site.
- C. Verify that subgrades and slopes of lawn and planting areas are acceptable to Landscape Architect prior to commencing work of this Section.
- D. Should the Contractor find any discrepancies between the Drawings and the physical conditions, inform the Landscape Architect immediately for clarification.
- E. Begin Work required under this Section only after conditions are satisfactory.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and existing lawns and exterior plants from damage caused by soil preparation operations.
- B. Prepare soils at a time when moisture conditions will permit proper cultivation.
- C. Remove stones over 1-inch diameter, sticks, roots, mortar, concrete, rubbish, debris, and all materials harmful to plant life, and legally dispose of them off Owner's property.
- D. Remove or spray as required to eradicate noxious weed growth and roots.
 - 1. Achieve complete removal or kill of all weeds within all areas receiving new plantings and lawn areas.
 - 2. In planting beds, kill achieved by working soil is permissible for annual non-noxious broad-leaf type weeds.
 - 3. Apply post-emergent herbicide over all areas of weed or grass growth within landscaped area to eradicate weed growth and roots. Apply in two applications at manufacturer's maximum recommended rate, as follows:
 - a. First application: Apply 7 days prior to performing soil preparation.
 - b. Second application (to kill new vegetation): Apply after soil preparation has been completed and minimum of 48 hours prior to planting.
 - c. Observe manufacturer's recommended period prior to working in treated areas.
 - 4. Apply contact herbicide directly onto foliage of nutsedges. In areas of established lawn grasses infested with nutsedge, apply herbicide by wicking. Do not spray.
- E. Locate and securely mark or flag irrigation sprinkler heads, area drains, catch basins, clean outs, manholes, valve boxes, and other site improvements not extending above finish grade.
- F. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with Division 31 Section "Erosion and Sedimentation Control."

3.3 SOIL PREPARATION FOR PLANTING AREAS

- A. This article pertains to those shrub bed areas indicated as “Shrub and Groundcover Planting Areas” on the Drawings where mass plantings of trees, shrubs and ground cover plants are scheduled.
- B. Excavate 24 inch deep by 12 inch wide pits for percolation testing where planting areas occur in soils compacted due to construction traffic, materials staging, stockpiles exceeding 72 inch height and areas of soil surcharging. Prepare a minimum of three (3) test pits representing the full range of planting areas on site.
 - 1. Fill holes to the top with water and let stand for 1 hour minimum.
 - 2. Refill hole to top with water and measure total depth.
 - 3. Allow hole to drain for 2 to 3 hours and measure total depth of water.
 - 4. If soil drains at a rate of less than 2 inches per hour prepare subgrades in accordance with procedures for poor draining soils.
- C. Planting area subgrade preparation:
 - 1. Prepare subgrades by excavating and removing soil, rock and other construction material to 15 inches below finish grade. Cross-rip subgrades to depth of 6 inches prior to placing topsoil.
 - 2. In areas of poor draining soils prepare subgrades by excavating and removing soil, rock and other construction material to 24 inches minimum below finish grade. Cross-rip subgrades to depth of 6 inches prior to placing topsoil.
 - 3. See Division 31 Section “Earthwork” for excavation and preparation of subgrades.
- D. Place 6 inches topsoil, compost, soil amendments, and fertilizers as recommended in Agricultural Soil Suitability Report per 1,000 square feet and rototill thoroughly to a depth of 8 inches. Compost shall constitute 5% of the amended soil. Place remainder of topsoil, compost, soil amendments, and fertilizers as recommended in Agricultural Soil Suitability Report per 1,000 square feet and rototill thoroughly to a depth of 8 inches, allowing for compaction, natural settlement, and depth of specified mulch.
 - 1. It is the Contractor’s option to set up a facility on-site for the preparation and amendment of topsoils, instead of preparing and amending the topsoils in place as indicated in the paragraph above.
 - 2. Set up facility in location as directed by Landscape Architect.
- E. Water lightly and allow planting mix to settle. Add additional material at mixture indicated in paragraph above to bring soil level to grades shown on the Drawings with allowance at pavement edges for mulch placement. Provide compaction to 80 percent maximum relative density or as indicated in Division 31 Section “Earth Moving.”

- F. Meet lines, grades and elevations shown, after light rolling and natural settlement. Fine grade shrub and ground cover areas to smooth even surface with loose, uniformly fine texture. Rake and drag shrub and ground cover areas to remove ridges and fill depressions to obtain firmness and finish grades preparatory to receiving planting.
- G. Remove stones over 1/2-inch in any dimension and sticks, roots, rubbish and other extraneous matter.

3.4 SOIL PREPARATION FOR PLANTING PITS OF TREES

- A. This article pertains to tree planting when occurring on an individual basis.
 - 1. Backfill Mix: Prepare backfill mix and place in planting pits as specified in Division 32 Section "Plants."
 - 2. Grade smooth to elevations shown.

3.5 FINE GRADING

- A. Finish grade after full settlement including mulch, shall be 1 inch below tops of curbs, walks, or existing grades in shrub areas and 3/4 inch lower in lawn areas.
- B. Slope all areas to prevent puddling and drain surface water toward catch basins, drains, curbs, or off-site as shown on Drawings.
- C. Soil in all areas shall be thoroughly settled, with a smooth surface free of humps and hollows, and shall be firm enough to resist undesirable impressions when stepped upon.
- D. Use levels, screens, drags, or any other equipment necessary to establish and verify grades and surfaces.
- E. Finish grade lawn, grass and planting areas to smooth, even surface with loose, uniformly fine texture.
- F. Roll, rake, and drag lawn areas, remove ridges and fill depressions with amended topsoil to obtain firmness and finish grades as indicated.
- G. Notify Landscape Architect 36 hours in advance to review fine grading of lawn, grass and planting areas. Finish grades shall be prepared to the satisfaction of the Landscape Architect prior to planting.
- H. See Division 32 Section "Plants," for mulch placement.

I. Erosion Control Blanket:

1. Install erosion control blanket on all slopes greater than, or equal to, 3:1.
2. Prior to installing blankets, apply any necessary lime, fertilizer, and seed.
3. Anchor beginning of blanket in 6 inch deep by 6 inch wide trench with approximately 12 inches of blanket extending beyond trench. Anchor blanket with a row of staples/stakes approximately 6 inches apart. Backfill and compact trench after stapling. Apply seed and compacted soil and fold and secure remaining 12 inches of blanket back over on itself with row of staple/stakes placed 12 inches apart.
4. Roll blankets either down slope or horizontally across slope. Unroll blankets per manufacturer's specifications and secure with staples in appropriate locations as shown in the manufacturer's staple pattern guide.
5. The edges of parallel blankets must be stapled together with a minimum of 6 inch overlap. Consecutive spliced together blankets must be placed end over end with a minimum of 6 inches of overlap. Staple through overlapped area, approximately 12 inches apart across entire blanket width.

3.6 CLEAN-UP

- A. Clean up excess materials and debris from project site upon completion of work or sooner if directed by the Landscape Architect.
- B. Leave in neat and tidy condition daily.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 32 9113

SECTION 32 9200 - LAWN AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.
2. Herbicides.
3. Erosion-control material(s).

B. Related sections include the following:

1. Division 32 Section "Soil Preparation," for topsoil and preparation requirements for new lawns and grasses.
2. Division 32 Section "Plants" for planting bed border edgings.
3. Division 32 Section "Establishment Maintenance" for maintenance of new plantings after Substantial Completion.

1.2 GENERAL REQUIREMENTS

- A. Comply with governing regulations applicable to landscape materials.
- B. Do not make substitutions. If specified landscape material is not obtainable, submit to the Landscape Architect proof of non-availability and material proposed for use as equivalent material.
- C. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submit the following within 30 days from Award of Contract:
1. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

2. Vendor's proof of order for each seed mix specified. Deliver the seed bag tags to Landscape Architect.
3. Fertilizers: Submit manufacturer's guaranteed analysis.
4. Mulch: Submit samples and vendor's product certificates for top dressing mulch and hydroseed mulch.
5. Certification of each seed mixture for sod, identifying source, including name and telephone number of supplier.
6. Submit copy of herbicide applicator's Commercial Applicator's License to Landscape Architect before application of herbicides (includes pesticides). Submit a copy of the application record to the Landscape Architect immediately after each herbicide or pesticide application.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
 1. Installer's Field Supervision: Installer shall maintain an experienced full-time supervisor on the Project site when planting is in progress.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.6 PROJECT CONDITIONS

- A. Coordinate work with installation of other site work including irrigation and planting.
- B. Verify soil preparation has been completed. Identify conditions not indicated on the Drawings and those which will adversely affect the execution this work. Notify the Landscape Architect of unsatisfactory conditions immediately.
- C. Confirm the irrigation system coverage test has been performed, if applicable, any required corrections have been completed and the system is fully functional prior to installation of lawns and grasses.
- D. The Landscape Architect shall determine areas beyond those indicated on the Drawings which require preparation and seeding due to construction disturbance. This work shall be performed by the Contactor at no additional cost to the Owner.
- E. Notify the Landscape Architect of conditions unfavorable to the propagation and growth of lawn such as; rubble, construction debris, rock fill, glazed soil, hardened soil or adverse drainage conditions before commencing planting or adding soil amendments.

Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Landscape Architect.

- F. Environmental Requirements: Do not place, spread, or roll fill materials during unfavorable weather conditions. When work is interrupted by adverse weather conditions, do not resume fill operations until moisture content and density of fill are satisfactory.
- G. Protection of subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations or other areas prepared for the Project. Protect subgrades, fills and excavation areas from surface waters flowing into the work areas.
- H. Continuity of Soil Preparation and Seed Application: Prepared soil conditions shall not be allowed to lie fallow. Seeding operations shall commence within 72 hours of approval of finish grading. Should precipitation in excess of 0.25-inches occur within this time period, the soil surface shall be examined upon drying, areas greater than 6-inches in any dimension which are smooth or glazed in appearance shall be re-cultivated. If glazing is evident in multiple portions of the seedbed, the entire bed shall be re-cultivated to establish a friable soil surface. If for any reason, seeding does not occur within the designated 72 hours, the soil shall be re-cultivated and raked prior to seeding to achieve a finish grade condition as identified within the "Soil Preparation" specifications. Any and all re-raking and supplemental cultivation procedures shall be considered incidental to the project Work and performed at no additional cost to the Owner.
 - 1. Season: Seeding shall take place during normal weather and temperatures appropriate and typical for such work. Non-irrigated areas shall be seeded between May and November.
 - 2. Seeding on other dates or during adverse conditions is at the risk of the Contractor and will require additional site inspections to determine seed establishment, areas of seed re-application and the extension of the maintenance and warranty periods as determined by the Landscape Architect. All required inspections, labor & materials to execute this work shall be at the Contractor's expense and performed in accordance with the requirements of this specification section.

1.7 PROTECTION

- A. Provide adequate measures to protect workers and passers-by the site. Execute all work in an orderly and careful manner with due consideration for any and all surrounding areas, plantings, or structures which are to remain. Protect all adjacent property and improvements from work damage, and replace any portions damaged.
- B. Any structures or facilities damaged due to Work of this Section shall be restored equal to or better than their original condition at the Contractor's expense and to the satisfaction of the Landscape Architect, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 SEED

- A. General: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America.
- B. Grass Seed Mix: Subject to compliance with requirements, provide the following proprietary seed mixes:
 - 1. Stormwater Seed: Fresh, clean, dry, new seed, mixed species acceptable to the Virgin Islands Department of Planning and Natural Resources. Application rate shall follow manufacturers recommendations.

2.2 TOPSOIL

- A. Topsoil: See Division 32 Section "Soil Preparation."

2.3 INORGANIC SOIL AMENDMENTS

- A. Inorganic Soil Amendments: See Division 32 Section "Soil Preparation."

2.4 ORGANIC SOIL AMENDMENTS

- A. See Division 32 Section "Soil Preparation."

2.5 TOP DRESSING

- A. Top dressing for hand seeding small areas where machine seeding is not feasible (not needed with seeding machine or hydroseeding):
 - 1. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed peat moss, having a water-absorbing capacity of 1100 to 2000 percent.
 - 2. Compost: See Division 32 Section "Soil Preparation."

2.6 HERBICIDES

- A. Post-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.

- B. Pre-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.

2.7 FERTILIZER

- A. Meet requirements of applicable State fertilizer laws. Fertilizers shall be uniform in composition, dry and free flowing. Deliver to the site in original unopened containers each bearing manufacturer's guaranteed analysis.
- B. Composition and rate of fertilizer used to amend topsoil is to be determined by soil analyses. Refer to Division 32 Section "Soil Preparation" for soil fertility testing requirements.
- C. Commercial Fertilizer: Slow release, granular fertilizer that is derived from natural organic and inorganic sources.
 - 1. Starter Fertilizer: 15-15-15 w/Minors.
 - 2. Maintenance Fertilizer: 21-4-21 with 50 percent of the nitrogen controlled release.
 - 3. Hydroseeding Fertilizer: Nutriculture Super Start® 12-45-10 PLUS Water Soluble Hydroseed Starter, by Plant Marvel Laboratories, Inc., Tel: (708) 757-7500. To be considered for substitution, any "or equal" product shall have a formulation within 2% +/- for N-P-K of the approved product formulation.

2.8 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Peat Mulch: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed peat moss, having a water-absorbing capacity of 1100 to 2000 percent.
- C. Compost Mulch: See Division 32 Section "Soil Preparation."
- D. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 2.8 to 6.8.
 - 1. Non-Irrigated Lawns and Grasses: Interlocking crimped polyester fibers combined with wood fibers and cross-linked tackifier, Profile Products, LLC "Conwed Fibers Flexterra HP-FGM", or equal.

- E. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application with seed, mulch and fertilizer; nontoxic and free of plant-growth or germination inhibitors.

2.9 EROSION-CONTROL MATERIALS

- A. Extended-Term Degradable Erosion Control Blanket: 100% biodegradable 70% agricultural straw/30% coconut fiber mixture stitched with biodegradable thread between two natural fiber nets. Provides effective erosion control for 18 months.
 - 1. Available Product: "BioNet" Model SC150BN as manufactured by North American Green; Tel.: (800) 772-2040; or equal.
- B. Accessories: 6-inch biodegradable staples. "Biostakes" as manufactured by North American Green; Tel.: (800) 772-2040; or equal.

2.10 TEMPORARY BARRICADE MATERIALS

- A. Agricultural metal stakes, minimum 42-inch exposed height.
- B. Twine or wire.
- C. Plastic flagging tape, 12-inch lengths.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with specification requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.

- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN AREA PREPARATION

- A. See Division 32 Section "Soil Preparation."

3.4 HERBICIDE APPLICATION

- A. Spray pre-emergent and post-emergent herbicides as required to eradicate and prevent emergence of noxious weed growth.
 - 1. Apply pre-emergent and post-emergent herbicides or a mixture of pre-emergent and post-emergent herbicides over all areas of weed or grass growth within landscaped area to eradicate weed growth. Apply in single application at manufacturer's maximum recommended rate, as follows:
 - a. Apply after soil preparation has been completed and approved by Landscape Architect.
 - b. Do not till pre-emergent herbicide into soil.
 - c. Observe manufacturer's recommended period prior to working and seeding in treated areas.

3.5 SEEDING NEW LAWNS

- A. Notify Landscape Architect for approval of seed bed prior to seeding.
- B. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.
- C. Apply Starter Fertilizer at a rate of 1 pound of actual Nitrogen per 1,000 square feet immediately prior to sowing seed. Do not sow seed and fertilizer simultaneously.
 - 1. Include Starter Fertilizer in hydrosurry mix.
- D. Sow seed using a drill seeding machine that places seed into soil. Do not seed when wind velocity exceeds 5 miles per hour. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. For small areas where seeding machine is not feasible, use seed broadcaster and hand rake seed into soil.
 - 2. For slope areas greater than 3 to 1 gradient of slope, use hydroseeding application.

- E. Protect seeded areas with slopes with a gradient not exceeding 4 horizontal to 1 vertical by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- F. Top Dressing: (not needed with seeding machine or hydroseeding). Protect hand seeded areas from hot, dry weather or drying winds by applying compost mulch or peat mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a depth of 3/16 inch, and roll surface smooth. Cover area evenly with top dressing at the rate of two 4-cubic foot peat moss bales per 1,000 S.F. of area, or equivalent density cover with compost.
- G. Reseeding: Reseed areas failing to show uniform stands of grass at 10-day intervals until a satisfactory stand is achieved.

3.6 HYDROSEEDING

- A. Seed lawns with hydroseeding equipment where gradient of slope of planting area exceeds 3 horizontal to 1 vertical. Method shall be approved by Landscape Architect.
- B. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch with tackifier in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Areas with slope gradient less than 3 horizontal to 1 vertical: Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 2500 pounds per acre dry weight and seed component is deposited at not less than the specified seed-sowing rate.
 - 2. Areas with slope gradient equal or greater than 3 horizontal to 1 vertical: Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 1000 pounds per acre dry weight and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 2000 pounds per acre.
- C. Keep hydromulch and seed out of planting beds and off walks, structures and areas not to be seeded. Clean up overspray of hydromulch onto these areas. Keep mulch and seed out of plant beds and other areas by mechanical means or selective herbicide if encroachment occurs. Clean up these areas to the satisfaction of the Landscape Architect.

3.7 EROSION CONTROL NETTING

- A. Provide erosion control netting on hand-seeded slopes of gradient greater than 3 horizontal to 1 vertical, and at bottoms of seeded drainage and biofiltration swales. Install netting after applying seed, fertilizer, and mulch.
- B. Install from top of slope, working downward, and as recommended by material manufacturer for site conditions.
- C. Fasten as recommended by material manufacturer. Secure the netting with 6 inch minimum staples on a 4 foot square grid with one in the middle and an additional staple at the top (1,000 staples per 4,000 square feet). Place top edge of netting in a trench for additional stability.

3.8 LAWN MAINTENANCE

- A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, edging, trimming, replanting and other operations necessary to establish a Satisfactory Lawn.
- B. The maintenance of all lawns and grasses shall be for a period of 60 calendar days minimum after written Notice of Substantial Completion or until Final Acceptance, whichever is later. Maintenance of seeded lawns and grasses shall commence after observation and approval of the seed bed by the Landscape Architect.
- C. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 2. Protect lawns and grasses from damage including vandalism and adverse weather conditions.
- D. Weed Eradication: Remove germinated lawn seed in planting areas without harming other plant material. Spray under and 6 inches outside of fences with approved herbicide to kill all grasses and weeds.
- E. If lawns have not achieved a Satisfactory Lawn condition before substantial completion, maintenance shall recommence for a minimum of 60 calendar days and continue until achieving Satisfactory Lawn status.
- F. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- G. Mowing: Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. All grass clippings shall be collected and disposed of off-site in a legal manner. Schedule initial and subsequent mowings to maintain the following grass height:
1. Stormwater Basin: Once growth has reached 6 inches, mow and cut no more than 1/3 total height of grass. Mow weekly thereafter to maintain a height of 3 inches. Maintain until Final Acceptance.
- H. Lawn Post-Fertilization: Apply fertilizer after initial mowing and when grass is dry.
1. Fertilize lawns at end of 30 days with Maintenance Fertilizer at the rate of 1 pound per 1,000 square feet.
 2. Continue fertilizing lawns at 30 days intervals with Maintenance Fertilizer at the rate of 1 pound per 1,000 square feet until the end of the Maintenance Period.

3.9 SATISFACTORY LAWNS

- A. Lawn installations shall have achieved the following Satisfactory Lawn criteria for Final Acceptance; as determined by the Landscape Architect.
1. Satisfactory Seeded Lawn: A healthy, uniform, dense stand of grass has been established, free of weeds and surface irregularities, humps and depressions, with coverage exceeding 95 percent over any 10 sq. ft. and bare spots not exceeding 2 by 2 inches.
- B. Areas of work which do not meet the criteria for Satisfactory Lawns shall be replaced using the specified materials and methods to re-establish lawn. Maintenance shall continue until a Satisfactory Lawn has been achieved.
- C. Seeded lawns shall have achieved Satisfactory Lawn status prior to Substantial Completion. Seeded lawns which are not satisfactorily established at this time; as determined by the Landscape Architect, shall be sodded at no additional cost to the Owner.

3.10 LAWNS AND GRASSES WARRANTY

- A. Guarantee all sod, seeded lawns and grasses in writing for a period of 1 year after Final Acceptance, or till the end of one full growing season after date of Final Acceptance, whichever is longer.
- B. During and at the end of the warranty period, remove and replace lawns and grasses which are dead, in unhealthy condition or exhibit low germination and growth rates. Provide new lawns and grasses which comply with the Drawings and Specifications, at no additional cost to the Owner. Guarantee replacement lawns and grasses for 1 year from the date of the work.
- C. All replacement work shall be executed by the Contractor within 14 days of receiving notification from the Landscape Architect, weather permitting. If repairs are not executed within 14 days, the Owner without further notice may provide materials and labor to perform such repairs at the expense of the Contractor.

3.11 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from foot and vehicular traffic and to protect against trespassing and damage. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.
- C. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 32 9200

SECTION 32 9300 – PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Trees.
2. Shrubs.
3. Ground Cover.
4. Plants.
5. Herbicide.
6. Planting Fertilizers.
7. Erosion Control Matting.
8. Mulches.
9. Tree Stabilization.
10. Planting Accessories.

B. Related Sections:

1. Division 31 Section "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
2. Division 32 Section "Soil Preparation" for preparation of planting soils.
3. Division 32 Section "Lawn and Grasses" for lawn and meadow planting.
4. Division 32 Section "Establishment Maintenance" for maintenance of plants during the maintenance period.

1.2 REFERENCES

A. Standards: Comply with botanical names, sizes, and conditions provided in:

1. Botanical Names: American Joint Committee on Horticultural Nomenclature, "Standardized Plant Names."
2. Sizes and Conditions: ANSI Z60.1 "American Standards for Nursery Stock", (latest edition).

1.3 QUALITY ASSURANCE

- ##### A. Contractor: Provide one person who shall: Be present at all times during execution of work in this section; be familiar with the materials and best methods for installation; direct work performed under this section.
- ##### B. Government Inspection: All plants and planting material shall meet or exceed the specifications of Federal, State, and County laws requiring inspection for plant disease and control.

- C. Secure plant material and maintain in a climate similar to that of the project site.
- D. All plant material to be grown from cuttings or seed. Collected plants are not acceptable.

1.4 SUBMITTALS

- A. Within 30 days after Contract award, submit:
 - 1. A list of local/regional suppliers for each plant species to be installed. List to include plant quantities, sizes and root conditions. Certify in writing, confirmed orders for plants by submitting a Bill of Sale for each plant to be installed. Each plant species shall be supplied by one grower only unless otherwise approved by Owner's Representative. The Contractor shall warrant all plant material to be true to botanical name and specified size.
 - a. Requests for substitutions of plants not available in size, quantity or type specified must be made within 30 days after Contract award. Submit written evidence that a specified plant cannot be obtained and has been unobtainable since Contract award.
 - 2. Plant Material Inspection Certificates for all plant material shipped from out of state.
 - 3. 1/2 cubic foot sample of bark mulch for approval prior to delivery.
- B. Provide all Product Data submittals simultaneously in a single package for review.
 - 1. Submit product data for the following:
 - a. Mulch.
 - b. Anti-desiccant.
 - c. Post-emergent herbicide.
 - d. Pre-emergent herbicide.
 - e. Erosion control matting.
 - f. Tree stabilization products.
 - g. Tree wrap.
 - h. Mycorrhizal inoculum.
- C. Submit copy of herbicide applicator's Commercial Applicator's License to Owner's Representative before application of herbicides (includes pesticides). Submit a copy of the application record to the Landscape Architect immediately after each herbicide or pesticide application.
- D. Shrub and Tree Samples:
 - 1. Typical samples, three each of all varieties and sizes (5 gallon and under for shrubs, 15 gallon and under for trees) of all plant materials shall be submitted for inspection approval at the site a minimum of fifteen (15) days prior to planting operations. Approved samples shall remain on site and shall be maintained by the Contractor as standards of comparison for plant materials to be furnished. Approved samples shall be incorporated into the work.

2. Tree Photographs: For all trees over #15, submit photographs of each specific tree to be purchased (minimum 2 photos per plant showing differing sides), a minimum of sixty (60) days prior to planting.
 - a. Format: Digital, high resolution, color jpeg
 - b. Scale: Include a yardstick in each photograph to provide scale.
 - c. Background: Ensure form and condition of plant is clearly distinguishable from background.
 - d. Identification: On the back of each print and/or as an email attachment, provide the following information:
 - 1) Name of Project & Owner.
 - 2) Name & address of Grower.
 - 3) Date photograph was taken
 - e. Landscape Architect may elect to tag trees in the field following review of tree submittal.
- E. Upon completion of the Work, submit:
1. Written notification to Landscape Architect requesting review for Substantial Completion.
 2. Written notification to Landscape Architect of Punch List Completion.
- F. With application for final payment, submit:
1. Duplicate copies of delivery invoices, labels, or other acceptable proof of quantities of materials used.
 2. Copies of delivery invoices, labels, or other proof of quantities of plant materials and fertilizers.

1.5 SITE OBSERVATION

- A. Site observations herein specified shall be made by the Landscape Architect. The Contractor shall provide a minimum of three (3) days' notice before Observation is required.
1. Pre-Construction Meeting: Explain Owner Representative's role to Contractor, review construction sequence.
 2. Incorporation of soil conditioning and fertilizers into the soil.
 3. Application of pre-emergent herbicide.
 4. Soil testing after soil preparation for approval to plant.
 5. Upon the completion of grading prior to planting.
 6. Approval of samples of plant materials delivered to site.
 7. When trees and shrubs are spotted in place for planting, but before planting holes are excavated.
 8. Plant installation: Check size of planting holes and backfill mix.
 9. Verification of finish grades.
 10. After planting and all other specified work has been completed.
 11. Substantial Completion Inspection and preparation of a Punch List.
 12. Maintenance observation after thirty (30) days to coincide with fertilizer application.
 13. Final Acceptance Inspection at completion of the Maintenance Period.

- B. No sites visits shall occur until all soil submittals have been made and approved. Construction Observation visits shall be made in proper sequence with the installation of work. The Landscape Contractor shall be responsible for reimbursement of time and travel expenses at current billing rates, incurred by the Architect due to out of sequence site visits.
- C. Contractor shall be on site during each site observation visit. Contractor shall speak English.
- D. No site visits shall occur until all items in previous Observation Reports have been completed or remedied unless the Owner has waived such compliance in writing.
- E. Upon completion of planting and ancillary landscape work, the Contractor shall notify the Landscape Architect in accordance with the procedures outlined in the Substantial Completion Section of this specification.

1.6 QUALITY CONTROL

- A. Inspection: Plants shall be subject to inspection by the Landscape Architect at the job site upon delivery to the site. Plants not conforming to specifications shall be rejected and removed immediately from the site.
- B. The presence of noxious weeds in plant balls shall be cause for rejection of any or all plants from that source.

1.7 DELIVERY

- A. Deliver packaged materials to site in original unopened containers bearing manufacturer's guarantee chemical analysis, name, trade name, and trademark.
- B. Remove unacceptable plant material immediately from project site.
- C. Plant Materials:
 - 1. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately.
 - 2. Do not prune prior to delivery unless otherwise approved by Landscape Architect.
 - 3. Do not bend or bind-tie trees or shrubs in such a manner as to damage bark, break branches, or destroy natural shape.
 - 4. Provide protective covering during delivery.
 - 5. Protect plants during delivery to prevent damage to root ball or desiccation of leaves.
 - 6. Apply anti-desiccant using a pump sprayer to provide adequate film over trunks, branches, stems, twigs and foliage of plants.
 - 7. If deciduous trees or shrubs are moved in full-leaf, spray with anti-desiccant at nursery before moving, and sprayed again 2 weeks after planting.
 - 8. Label one of each tree and shrub species with securely attached waterproof tag bearing botanical name and supplier's name.

1.8 STORAGE

- A. Contractors shall schedule and conduct planting operations to minimize storage of plant materials on the project site. The location and conditions of storage shall be reviewed for approval by the Contractor, Owner, and Landscape Architect.
- B. Plants that cannot be planted within 24 hours after arrival shall be "heeled-in" in accordance with accepted horticultural practices and the following requirements:
 - 1. Protect root ball of balled and burlapped plants with moist earth, sawdust or other acceptable material.
 - 2. Protect plants at all times from injury, extreme weather conditions, and keep moist.
 - 3. Store plants in shade and protected from wind until planted.
 - 4. Store plants in upright position and allow sufficient ventilation.
- C. All plants that are to be stored longer than one month shall be planted in nursery rows and irrigated using a temporary irrigation system, plants shall be maintained at the Contractor's expense.

1.9 HANDLING

- A. Do not drop plants. Do not free-fall, drag, roll or abuse the tree or put a strain on the crown (bud area) at any time.
- B. Do not pick up container or balled plants by stems, trunk, or foliage. Handle balled & burlapped plants by the ball of earth.

1.10 NOTIFICATIONS

- A. Notify Landscape Architect a minimum of 48 hours in advance of plant material delivery so that plants may be inspected upon site delivery. Unapproved materials shall be immediately removed from the job site.
- B. Notify Landscape Architect a minimum of one week in advance for request of Substantial Completion and Final Acceptance inspections.

1.11 SITE CONDITIONS

- A. Existing Improvements to Remain: Locate underground utilities prior to start of work.
- B. Protect existing improvements from damage, soiling or discoloration. Repair or replace damaged, soiled or discolored improvements as directed by Landscape Architect.
- C. Planting Conditions: Planting is not permitted during the following conditions, unless otherwise approved:

1. Cold weather: less than 32 degrees Fahrenheit.
2. Hot weather: Greater than 90 degrees Fahrenheit.
3. Wet weather: Saturated soil or standing water.
4. Windy weather: Wind velocity greater than 20 m.p.h.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

- A. Provide plant materials as scheduled on Drawings.
- B. Quantities indicated are for Contractor's convenience only. Contractor to verify and provide number of plants required to complete work graphically shown on Drawings.
- C. Sizes and grade quality are maximums as listed. Larger sizes are not acceptable.
- D. Plants shall be vigorous, well-formed and shaped, true to species and type, and free from disease, insects, and defects such as knots, girdled or kinked roots, poor branch attachment, sun-scald, windburn, injuries, abrasion, significant trunk scars, evidence of poor pruning, or disfigurement.
- E. Plants shall be full foliated when in-leaf, showing no signs of prolonged moisture stress or over watering as indicated by wilted, shriveled, or dead leaves.
- F. Conform to ANSI Z60.1, with additions and exceptions noted:
 1. Groundcover Plants: Well-established root systems, and grown in flats or removable containers.
 2. Containerized Plants: Grown in container in which delivered for at least 3 months, but not root-bound.
 3. Greenhouse Grown Plants: Acclimated outdoors for 360 days prior to delivery.
 4. Bare-root Stock: Well-branched, fibrous root system.
 5. Balled and Burlapped Plants and Containerized Trees: All trees over 1-1/2 inch caliper to be balled and burlapped with hemp burlap and twine only or grown in container in which delivered for 9 months minimum. Soil balls to be a minimum of 10 inches per caliper inch of tree.
 6. Trees: Straight-trunked not varying from plumb more than 6 inches over 6 feet; well-branched, with no cross branches, dead or broken leaders, or broken major branches, no fresh cuts over 1 inch diameter, and not "topped" or sheared.
 7. Branches: Shoot growth (length and diameter) throughout the crown should be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.
 - a. Main branches shall be distributed along the central leader not clustered together. They shall form a balanced crown appropriate for the cultivar/species.
 8. Grafted Trees: Base grafted or budded only.

9. Trees shall have one central leader unless a different form is specified in the plant list or drawings.

2.2 HERBICIDES

- A. Post-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.
- B. Pre-Emergent Herbicide: Shall be in compliance with the Virgin Islands Department of Planning and Natural Resources Pesticide program.

2.3 PRE-PLANT FERTILIZER

- A. (1-10-10) shall be a combination of natural organic and inorganic granular fertilizers, free-flowing, and shall contain the following minimum available percentage by weight of plant food:
- | | |
|-----------------|---------------|
| Nitrogen | 1.0% minimum |
| Phosphoric Acid | 10.0% minimum |
| Potash | 10.0% minimum |

2.4 POST-PLANT FERTILIZER

- A. (7-9-4) shall be a long-lasting, organic and controlled release plastic-coated, uniform in composition, free-flowing and shall contain the following minimum available percentages by weight of plant food.
- | | |
|-----------------|--------------|
| Nitrogen | 7.0% minimum |
| Phosphoric Acid | 9.0% minimum |
| Potash | 4.0% minimum |

2.5 MULCH

- A. Provide standard, commercially produced, medium-course, dark brown, bark mulch. Bark shall be uniform in color, free from weeds, seed, sawdust, and splinters and shall not contain resin, tannin, or other compounds detrimental to plant life. All material shall pass a 1 ½ -inch mesh screen.

2.6 ANTI-DESSICANT

- A. Emulsion type, film-forming agent designed to permit plant transpiration but retard excessive loss of moisture from plants. "Wilt-Pruf" or equal.

2.7 PLANTING SOIL MIXES

- A. Refer to Division 32 Section "Soil Preparation."

2.8 EROSION CONTROL MATTING

- A. Erosion Control Blanket shall be 100 percent coir twines with no seams. Matting shall be sisal jute mesh of uniform open weave, single jute yard, chemically treated to be fire-retardant. The blanket shall be Ludlow 'Soil Saver'; Belton Industries; 'Geojute' Geocoir/DeKoWe 700; Rolanka Bio D-Mat 70, or equal with the following minimum average roll properties:
1. Thickness 0.35 inches (ASTM D1777).
 2. Average Tensile Strength 1450 lbs/ft (ASTM D4595).
 3. Weight 14.7 oz/sy (ASTM D3776).
 4. Open Area 60 percent (measured).
 5. Warp 78 per width, minimum. Weft 42 per linear yard, minimum.
 6. Roll Width 6.5 and 9.8 feet (measured).
 7. Roll Length 165 feet minimum (measured).
 8. Color natural earth tone.
- B. Wooden Stakes: Pine, douglas fir 3/4 x 1/2 x 18 inch wood stakes, or equal.
- C. Staples: Manufacturer's recommended steel wire staples, 6 inches long, 11 gage galvanized steel.

2.9 TREE STAKING AND GUYING

- A. Deciduous Tree Tie: Plastic chain-type, minimum 1 inch wide by 1/8 inch thick.
- B. Stakes: 2 inch x 2 inch x 8 feet Pine, Douglas fir, or equal, for staking of deciduous trees; and 2 inch x 2 inch x 36 inch Pine, Douglas fir, or equal, for guying of coniferous trees. Stain dark brown with water-based commercial wood stain prior to installation.
- C. Provide miscellaneous hardware, wire, and accessories as shown on the Drawings.
- D. PVC Flags: 1/2 inch or 3/4 inch diameter x 36 inches long PVC pipe.

2.10 SUBSURFACE TREE STABILIZATION FOR PALMS

- A. Cable: 10 gauge multi-strand steel wire with 1/2 inch rubber hose, black color, to protect tree rootball.
- B. Deadman: 6 inch x 6 inch x 4 feet Concrete plank.
- C. Provide eye bolts for anchoring cable to deadman, miscellaneous steel hardware, and accessories as shown on the Drawings.

2.11 TREE WRAP

- A. Corrugated or crepe paper, designed specifically to resist insect infestation and sun scald.

2.12 MYCORRHIZAL INNOCULUM

A. Available Products:

1. 'MycoApply All Purpose Granular' granular mycorrhizal inoculum. Available from: Mycorrhizal Applications, Inc., Grants Pass, OR (541) 476-3985.
2. 'PHC Plant Saver' blend of ecto and endomycorrhizal fungal spores, beneficial rhizosphere bacteria, 4-7-4 fertilizer, organic amendments, and micronutrients. Available from Plant Health Care, Inc. (800) 421-9051.
3. Or equal.

2.13 DRAINAGE ROCK BACKFILL

- A. 1-1/2 to 1/2 inches round washed river rock; no fines for non-percolating soil.

2.14 FILTER FABRIC

- A. Non-woven filter fabric to cover drain rock: Mirafi 140N as available from TenCate, (360) 699-1426; Propex 451 as available from A.C.F. West Inc., (503) 771-5115; or equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify finish grades are properly achieved and soil preparation has been completed in accordance with the specifications; start of Work denotes acceptance by the Contractor and Contractor assumes responsibility for final results.

3.2 SOIL PREPARATION

- A. As specified in Division 32 Section "Soil Preparation".

3.3 HERBICIDE APPLICATION

- A. Spray pre-emergent herbicide as required to eradicate and prevent emergence of noxious weed growth.
1. Apply pre-emergent herbicide or a mixture of pre-emergent and post-emergent herbicides over all areas of weed or grass growth within landscaped area to eradicate weed growth. Apply in single application at manufacturer's maximum recommended rate, as follows:
 - a. Apply after soil preparation has been completed and approved by Landscape Architect.
 - b. Do not till pre-emergent herbicide into soil.
 - c. Observe manufacturer's recommended period prior to working and planting in treated areas.

3.4 EROSION CONTROL MATTING

- A. Provide erosion control blanket on slopes of gradient 3 horizontal to 1 vertical and greater. Install blanket after soil preparation and prior to planting.
- B. Install erosion control matting after preparing soil and finish grading. Matting shall lie loosely in full contact with the soil without any tension.
- C. Install from top of slope, working downward, and as recommended by material manufacturer for site conditions.
- D. Fasten as recommended by material manufacturer if more stringent than these specifications. Provide temporary wood stakes as required. Remove wood stakes after planting and blanket has been securely stapled to the slope.
- E. Secure the blanket with 6 inch minimum long staples on a 4 foot square grid. Tops, bottoms, and joints of matting shall have staples driven in at 12-inch centers.
- F. Top of each length of erosion control matting shall be anchored in a 6 inch deep trench and shall terminate at the slope bottom with a 6 inch fold turned under. Adjoining lengths of matting shall have 6 inch minimum overlap.
- G. Cut "X" slits into matting to plant trees and shrubs. Fold matting back around plants and staple to hold in place.

3.5 LAYOUT

- A. Mark locations of lines between the planting areas and the lawn areas on the finish with paint, chalk or equal material for approval by the Landscape Architect. The method of marking shall be approved by the Landscape Architect.
- B. Mark locations of trees and shrubs for approval by the Landscape Architect prior to digging. The method of marking shall be approved by the Landscape Architect. After approval of layout, field place trees and shrubs in locations shown on Drawings. Landscape Architect may request rotation or slight movement of tree to give a better appearance with respect to adjacent plants and structures. Placement must meet approval of Landscape Architect prior to excavating planting pits.

3.6 EXCAVATION FOR TREES AND SHRUBS

- A. Excavate planting holes, with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.
- B. For trees and shrubs, make excavations at least 2 times wider than root spread; equal to the rootball height directly beneath the rootball; and 1-1/2 times deeper than rootball height around the perimeter of the planting pit, as indicated in the Drawings.

- C. If non-percolating soils are encountered, fill excavations for trees and shrubs with water and allow to percolate out before planting. If plant holes do not drain: Auger drill holes 36 inches deep by 8 inches wide and fill with drainage backfill. Cover top with filter fabric. Notify Landscape Architect to observe prior to planting.
- D. If conditions detrimental to plant growth are encountered, such as rubble fill, or obstructions, notify Landscape Architect and resolve before planting.
- E. Scarify bottom and sides of hole with shovel to eliminate "glazed" surfaces.
- F. Set plants on native soil where possible.

3.7 PLACING

- A. Set top of root ball slightly higher than finish grade; deep planting not permitted. If hole for trees is too deep, fill hole with native soil only where applicable or prepared soil to correct levels.
- B. Set plants plumb and faced for best appearance.
- C. Remove wire baskets, burlap, fasteners from rootball completely if rootball will not be damaged. If damage is suspected, notify Landscape Architect for concurrence and remove tops and sides of baskets minimum. Use bolt cutters on wire if necessary to remove wire baskets. Bending back not acceptable. Remove all burlap and twine from planting pit.
- D. Remove metal cans or plastic containers completely from rootball.
- E. Neatly cut off broken, girdling, or frayed roots and any root growth growing in a circular manner conforming to its container.

3.8 BACKFILLING - General

- A. Before mixing, clean topsoil of extraneous materials and other materials harmful or toxic to plant growth.
- B. Prepare planting backfill soil mix prior to backfilling. Stockpile on site.
- C. Planting backfill soil mix shall be as follows: 1/4 compost material, 1/4 amended topsoil and 1/2 soil excavated from planting pit.
- D. Backfill half of plant pit around rootball with backfill soil mix, carefully tamp soil around rootballs.
- E. Add 3 ounces mycorrhizal inoculum per caliper-inch to backfill around trees. Add 3 tablespoons mycorrhizal inoculum per gallon planting size. Add 1 teaspoon mycorrhizal inoculum per ground cover plant.

- F. Complete backfilling, firming to surface grade.
- G. Form watering basin from site topsoil as shown on Drawings.
- H. Thoroughly hand water each plant and entire bed immediately after planting. Adjust rootball and soil as required if settlement of soil occurs.
- I. Remove plant tags and ribbons.

3.9 PLANTING TREES AND SHRUBS

- A. Set roots or rootball on layer of compacted planting soil backfill mix or native suitable topsoil from planting pit, plumb and in center of pit or trench with top of rootball at 1 inch above elevation of adjacent finished grade.
- B. Place additional planting soil backfill mix around base and sides of ball and eliminate voids and air pockets. When backfill is approximately 2/3 complete, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill. Cut burlap from top of rootball and roll back to sides of planting hole; form watering basin; stake and guy immediately after planting.
- C. After planting, apply fertilizer at the following rates:
 - 0-1 foot tall shrub = 0.4 oz.
 - 1-2 foot tall shrub = 0.8 oz.
 - 2-4 foot tall shrub or tree = 1.75 oz.
 - 4-8 foot tall shrub or tree = 4 oz.
 - 8+ feet = 4 oz. plus proportional amount per foot.

3.10 PLANTING GROUNDCOVER

- A. Space plants as shown or scheduled on Drawings. Dig holes 3 times the width and 1-1/2 times the depth of the rootball. Plant with planting soil backfill mix. Work soil around roots to eliminate air pockets. Water thoroughly after planting.
- B. After planting, apply fertilizer at the rate of 50 pounds per 1,000 square-feet, or apply 1 slow-release fertilizer tablet per plant during backfill.

3.11 TRUNK WRAPPING

- A. Deciduous trees over 1-1/2 inch caliper when within five feet of pavement shall be wrapped promptly after planting to prevent sun scald, wrapping as approved by American Association of Nurserymen. Wrap spirally from ground line to the height of the first branch. Wrap in neat and snug manner and secure with tape similarly colored to tree wrap at bottom, top and in the middle. Wrap before staking or guying.

3.12 STAKING

- A. Deciduous Trees 1-inch caliper and larger: Provide 2 stakes per tree 180 degrees from each other in the direction of prevailing winds. Drive plumb outside of rootball as shown on Drawings. Place tree ties around tree trunk, approximately 4 feet from ground level, one from each side.
- B. Coniferous Trees 4 feet tall and larger: Provide 3 guys evenly spaced around trunk of tree. Set guys at a 60 degree angle to the trunk at 2/3 the height of the tree. Drive 2 by 2 inch wood stakes perpendicular to angle of cable. Secure guys taunt at trees passing each guy wire through a collar and setting the collar at the tree trunk where contact is made. Secure a warning flag on each cable as shown on Drawings.
- C. Palm Trees: As noted on drawings.

3.13 MULCH

- A. Place mulch by hand, blown-in mulch is not acceptable unless approved by the Landscape Architect. Place mulch 3 inches deep in all planting beds. Rake smooth. Mulch shall be pulled away from crowns of shrubs, perennials and groundcover plants. Mulch shall be flush with adjacent curbs and paving. Taper mulch thickness from full 3-inches depth to 2-inch depth over a 12-inch horizontal run at paving edges so mulch will be flush with adjacent curbs and paving.
- B. Ground Cover Plantings:
 - 1. After fertilizing, mulch areas between groundcover plants; place minimum 2-inch thick specified mulch.

3.14 PRUNING

- A. Prune plant material if necessary and as directed by Landscape Architect to balance root and top growth. Prune, thin, and shape trees and shrubs in accordance with standard horticultural practices.
- B. Prune all dead and broken limbs.
- C. Prune without distorting basic form of the plant and only to the extent necessary for each plant except where directed by Owner's Representative. Do not prune plants into boxes or balls.

3.15 CLEAN-UP AND PROTECTION

- A. During landscape work, keep pavements clean and work area in an orderly condition.
- B. Sweep and wash paved surfaces to remove soil and soil stains.
- C. Clean all mud and debris from catch basins, which is caused by Work of this Section.

- D. Remove plant containers, trimmings, clippings, and all extraneous debris unearthed or resulting from any operations specified herein, from Project Site and dispose in a lawful manner.
- E. Protect landscape work and materials from damage.
- F. Maintain protection during installation and Maintenance Period.
- G. Treat, repair or replace damaged Work as directed by Landscape Architect, at no additional cost to the Owner.

3.16 SUBSTANTIAL COMPLETION

- A. Notify the Landscape Architect in writing of the completion of planting and ancillary landscape work.
- B. Within 10 days of notification the Landscape Architect will inspect the work and prepare a Notice of Substantial Completion, with a Punch List identifying items which require completion or correction.
- C. Notice of Substantial Completion constitutes the commencement of the Maintenance Period and Warranty of all plants for a period of One Year.
- D. The Contractor is responsible for maintaining all plants prior to receiving Notice of Substantial Completion.

3.17 MAINTENANCE

- A. After receiving notice of Substantial Completion, maintain all plant material in a vigorous condition for 1 year according to the requirements outlined in Division 32 Section "Establishment Maintenance" and through any extensions of the Maintenance Period due to failure to supply written documentation of Punch List completion. Maintenance shall continue until Final Acceptance is granted.
- B. Contractor shall:
 - 1. Inspect plants at least once a week and perform maintenance promptly.
 - 2. Maintain trees, shrubs and ground covers by watering, pruning, spraying, cultivating, and weeding as required for healthy growth.
 - 3. Water when soil moisture is below optimum level for best plant growth.
 - 4. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required.
 - 5. Eradicate all weeds, grass, and other undesired vegetation growth from planting areas. Remove dead weeds and dispose of legally off-site. Remove all perennial weeds completely, including all underground parts.
 - 6. Restore all soil settlement to original grade.

- C. Immediately remove and replace plant material which is dead, not surviving or in poor condition during the Warranty Period at no cost to the Owner.
- D. Plants used for replacement shall be the same variety as originally specified. Replacement plant size shall match the physical size of the adjacent, healthy plants of the same species at the time of replacement. Replacement plants shall be furnished, planted and fertilized as originally specified.
- E. Should a dispute arise concerning plant vitality or viability, the Contractor shall provide at his expense, a timely written diagnosis of plant health by a Certified Arborist. The Arborist's report shall indicate reason for lack of vigor, potential remedies, if any, and estimated time required to regain vigor and specified size. Contractor shall repair at no additional cost to the Owner, all damage to vegetation, site improvements and property caused by replacement of plant materials during the Maintenance Period.
- F. Store maintenance materials and equipment where directed by Owner's Representative.
- G. Keep pavements clean and work areas in an orderly condition.
- H. Fertilizing and Liming: Perform as recommended in the soil fertility analysis reports and as necessary to maintain cover crop in a healthy growing condition.
 - 1. Fertilize trees, shrubs and ground cover once at the end of the Maintenance Period. Work the fertilizer thoroughly into the top 2 inches of soil.
 - 2. In March, within the first growing season, fertilize all planting areas with 1 application of each of the maintenance fertilizers, at the rate of 7 pounds per 1,000 square feet of soil surface.
- I. Hand-water plant material as indicated on Drawings for a period of 1 year.

3.18 FINAL ACCEPTANCE

- A. Final inspection of all planting will be made by the Owner, Landscape Architect and the Contractor.
- B. Prior to executing a final inspection, the Contractor must furnish the Landscape Architect with written documentation identifying how each Punch List item has been corrected. If such written documentation is not provided to the Landscape Architect, all requirements of the Maintenance Period shall remain in force indefinitely until the written documentation is provided. Any extension of the Maintenance Period will be considered incidental to the Work and performed by the Contractor at no additional cost to the Owner.
- C. Before Final Acceptance is granted the following must be completed by the Contractor and receive approval from the Landscape Architect:
 - 1. Written documentation identifying how each item on the Punch List has been corrected.

2. Replacement planting and correction of all items identified on the Punch List prior to expiration of the specified Maintenance Period.
- D. The project site must meet all conditions stipulated within the “Maintenance” and “Clean Up and Protection” sections of the specifications.
 - E. If Final Acceptance is not granted at the end of the specified Maintenance Period, the Contractor shall continue maintaining plantings until Final Acceptance is granted, at no additional cost to the Owner.
 - F. Necessary Observations Beyond Final Acceptance:
 1. If any of the items identified on the Notice of Substantial Completion and Punch List have not been fully corrected or repaired to the complete satisfaction of the Landscape Architect, the Contractor must schedule a field observation to substantiate claim of correction. The Contractor shall bear financial responsibility to reimburse the Owner for all time and travel costs incurred by the Landscape Architect to confirm Punch List compliance.

END OF SECTION 32 9300

SECTION 32 9500 - ESTABLISHMENT MAINTENANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this section includes all labor, materials, equipment and operations to maintain all installed work as specified herein and as noted on the Drawings.
 - 1. Maintenance of all installed work for 1 year from the date of Substantial Completion.
- B. Related Sections:
 - 1. Division 32 Section "Soil Preparation" for preparation of planting soils.
 - 2. Division 32 Section "Lawn and Grasses" for lawn and meadow planting.
 - 3. Division 32 Section "Plants" for trees, shrubs and ground cover plantings.
 - 4. Division 32 Section "Plants" for mulches and tree stabilization.

1.2 OWNER'S RESPONSIBILITY

- A. Water: Contractor will pay for water used for irrigation after the date of Substantial Completion.
- B. Power: Owner will pay for power used by any temporary irrigation systems after the date of Substantial Completion.

1.3 SUBMITTALS

- A. Submit product Data and certificates showing compliance with EPA where applicable for the following:
 - 1. Fertilizers, including application rates.
 - 2. Herbicides, including application rates
 - 3. Pesticides, including application rates.
- B. Submit a Maintenance Schedule indicating frequency and type of maintenance work to be performed at each visit for the duration of the Maintenance Contract complying with the requirements of this Section.
- C. Submit a Weed and Pest Control Plan for approval at least 30 days prior to Substantial Completion of the Work.
- D. Submit a copy of the maintenance log at two-week intervals for the duration of the Project.

1.4 MAINTENANCE AND WARRANTY PERIOD REQUIREMENTS

- A. All plant materials shall be maintained in a healthy condition until the end of the Maintenance and Warranty Periods. Replace dead and unhealthy plants immediately.
- B. All plant materials and equipment replaced under warranty shall be replaced in accordance with all provisions of the Contract Documents. Equipment shall be of the same manufacturer, model, size and quantity as originally installed. Plant material shall be of the same variety, size, and quantity as originally installed.
 - 1. Owner reserves the right to inspect plant materials replaced under warranty and reject those which do not conform to specified standards.
- C. Schedule included in this Section indicates task minimums. Contractor may perform tasks at greater frequency to comply with Contract requirements.

1.5 WEED and PEST CONTROL PLAN

- A. Contractor shall submit a Weed and Pest Control Plan for approval at least 30 days prior to Substantial Completion of the work.
 - 1. The Weed and Pest Control Plan shall define all scheduled applications of herbicides and pesticides as required herein. It shall identify the applicator and license number, the names of the herbicide and pesticide products, along with the location, rate, frequency, season and method of application.
 - 2. The Contractor may submit for pre-approval the use of herbicides and pesticides to be applied on an as needed basis in anticipation of probable weed growth or infestations.
 - 3. No herbicides or pesticides shall be applied until Weed and Pest Control Plan is approved and all applications shall be in accordance with the plan.
 - 4. If unanticipated weed growth or infestations occur, the Contractor shall be required to modify Weed and Pest Control Plan and secure written approval of Owner and Owner's Representative prior to application.
 - 5. The Owner and Owner's Representative shall review and approve the plan.
- B. All applications of herbicides and pesticides shall be performed by licensed commercial applicator. All precautions shall be taken in the handling and applications of all herbicides and pesticides as stated in the Virgin Islands Department of Planning and Natural Resources Pesticide program. No contamination of vicinity water systems or storm drain systems allowed. No cleaning of equipment or disposal of products allowed in project vicinity.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All products shall be as specified in the appropriate Specification Sections.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspection: All grounds will be inspected weekly throughout the maintenance period for weeds, pests, plant health, erosion, paper and debris.
- B. Pest and Disease Control:
 - 1. Inspect all plants for signs of pest or disease once per week during the growing season and report any such conditions in the monthly report.
 - 2. Begin treatment for pests or diseases immediately following observation.
 - 3. Pest and disease control shall be carried out by skilled operators, using methods approved under current laws and regulations.
 - 4. Use the recommended type of equipment and method of application for each chemical as recommended by the chemical manufacturer.
 - 5. All chemicals shall be mixed and applied as stated on the label of the manufacturer.
 - 6. Be extremely cautious in the mixing, handling and application of all chemicals as they may be harmful (if misused) to humans, plants, and animals.
 - 7. The Contractor shall be liable for any damage caused through the misuse of any plant disease or plant insect control method.
 - 8. Rodent Control: The Contractor shall take the necessary action to prevent damage by rodents and moles. Such damage that does occur shall be repaired by the Contractor.
- C. Watering:
 - 1. A permanent irrigation system will not be installed on this project. The Contractor shall irrigate using a water truck or similar. Use of owner provided water is not permitted.

3.2 LAWN AREA OPERATIONS

- A. Fine Mowing:
 - 1. For all Lawn areas the Contractor shall inspect and police the grounds for litter and debris prior to each mowing, and dispose of it.
 - 2. All Lawn is to be mowed every 7 days.
 - 3. Mowing height for non-irrigated lawn areas shall be not less than 3 inches, not to exceed 6 inches between mowing operations.
 - 4. The lawn shall be cut at a uniform height, with reel mowers in open areas and rotaries in closed areas. Scalping and uneven cutting shall be prevented. Any excess clippings shall be dispersed and/or collected to prevent damage to existing lawn areas or if it causes an unsightly appearance.
 - 5. Mower blades shall be maintained in a good condition for an even cut. Mower blades shall be cleaned prior to entering site to prevent dispersal of weed seeds picked up from off site.

6. Contractor shall repair or replace all trees, shrubs and other plantings and other permanent fixtures that are damaged during mowing operations. Mowing equipment will be adjusted and maintained to provide the best possible cut.
- B. Hand Trimming: Trimming shall be performed around all road signs, guard posts, trees, shrubs, utility poles and other obstacles. The grass to be trimmed shall be trimmed no less than the desired height of cut determined by the mowing operation. Trimming is to be done with each mowing operation.
- C. Lawn Fertilization:
1. Fertilizing and Liming: Perform as recommended in the soil analysis reports submitted under Division 32 Section "Soil Preparation," and as necessary to maintain cover crop in a healthy growing condition.
 2. Application of fertilizers carried out by the Contractor to maintain proper nutrient levels and provide a consistent dark green lush appearance throughout the maintenance period. Lawn shall be fertilized a minimum of 1 time per maintenance period applying 8 pounds of nitrogen per 1,000 square feet, to maintain a consistent, lush green appearance.
 3. Deficiencies of sulfur or magnesium or other nutrients as determined by soil analysis shall be corrected as needed. Timing of these applications may vary according to the need for response.
- D. Weed Control:
1. Inspect Lawn areas for weed growth twice per month during the growing season and remove all weeds within one week of observing weed growth.
 2. Maintain all areas in a weed free condition.
 3. The application of herbicides on all mowed lawn areas shall be done according to the approved Pest and Weed Control Plan. One application with follow-up applications as required to maintain a kill of 90 percent of broadleaf weeds shall be required.
 4. Pre-emergent herbicides to be used to control specific annual grasses, such as annual bluegrass and crab grass.
 5. Weed control procedures shall have no detrimental effect on the growth of desired plants.
- E. Re-Seeding: Upon detection of damaged or failing areas and areas showing unsatisfactory growth and coverage, the restore the area as necessary to establish a complete cover crop. Reseed using the seed mixes specified.
- F. Clean Walks: At the conclusion of each visit, walks adjacent to work areas are to be cleaned.
- G. Leaf Removal:
1. Removal of all leaves from all lawns, planter beds and walkways and their disposal offsite shall be completed throughout the maintenance period as needed to maintain a clean appearance throughout the Project.
 2. Main entries, high traffic areas, and walkways shall be cleaned weekly.
- H. Aeration of Lawn Areas: Aeration is an extra service, to be performed as needed with Owner's authorization.

3.3 ORNAMENTAL PLANTING AREAS

A. Fertilizing:

1. Fertilizing and Liming: Perform as recommended in the Soil Analysis reports and recommendations, and as necessary to maintain cover crop in a healthy growing condition. See Division 32 Section "Soil Preparation."
2. Fertilizing of all trees, shrubs and ground cover is to be done once at the end of the maintenance period. Work the fertilizer thoroughly into the top 2 inches of soil.
3. Within the first growing season, fertilize all planting areas with one (1) application of each of the following fertilizers, all at the rate of 7 pounds per 1000 square feet of soil surface:
 - a. Nitroform slow release (38-0-0)
 - b. Treble superphosphate (0-45-0)
 - c. Sulphate of potash (0-0-50)

B. Weed Control:

1. All planter beds, tree circles, sidewalk cracks, and pavers, are to be sprayed once per month to control unwanted grasses and broadleaf weeds according to approved Pest Control Plan. Chemical practices shall not be a substitute for hand-weeding where the latter is required for complete removal.
2. All planter beds are to have one application of pre-emergence herbicide at the end of the maintenance period. Pre-emergence herbicides shall be of the non-leaching type, with minimal soil contaminating levels. Pre-emergence herbicides shall not be used in groundcover areas unless approved by the Owner's Representative.

C. Pruning: done to enhance natural growth. The Contractor shall remove dead, damaged and diseased portions of the plant. Do not remove collar at the branch base when pruning. All major pruning shall be done following flowering or during plant's dormant season. Emergency or minor pruning shall be done when needed. Pruning of trees shall be performed by a certified arborist.

1. Shearing of plantings will be permitted only where directed by the Owner's Representative.
2. Provide remedial attention and repair to shrubs and trees as appropriate by season or in response to incidental damage.
3. Prune shrubbery to maintain proper size in relationship to adjacent planting and intended function.
4. Prune trees as required to remove weak branching patterns and maintain balance of head growth development. Remove lower limbs when obstructing vehicular or pedestrian clearances.
5. Prune groundcover plantings as required to restrain perimeter growth to within planting areas where adjacent to walks and curbs. Tip prune selected branchlets of low growing shrub or groundcover masses to maintain even overall heights and promote fullness.
6. Spent blooms shall be removed from all flowering shrubs to promote better growth habit and flower production.

7. Remove blades of ornamental grasses that lay over flat to the ground. Retain grasses that are able to support their own weight. In the early spring, tie-off ornamental grasses with jute twine or a grass blade at the base of the plant and cut evenly across 6 inches from the base of the plant.

- D. Raking: All planter beds will be raked through once per month to remove debris and promote an attractive fresh appearance.

- E. Mulching: Maintain a 3-inch depth of specified mulch over all shrub planting areas unless directed otherwise by the Owner's Representative. Do not mulch groundcover areas.

- F. Tree Stakes:
 1. Check ties every 4 months to ensure that they are not causing a depression in the bark. Loosen, repair or replace as required.
 2. Retain guy wires in good repair until the tree is strong enough to withstand strong winds. Check at end of maintenance period. Ensure that they do not cause a depression in the bark. Repair or replace as required.

- G. Cultivating:
 1. In the spring, before beginning watering, cultivate the soil surface shallowly as necessary to ensure penetration of water and air into the soil. Repeat as necessary for weed control and soil permeability.
 2. Avoid cultivating into the root zone of plants, particularly shallow-rooted groundcovers.

END OF SECTION 32 9500