

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work in this section consists of furnishing and installing sod and landscape materials required as specified in locations shown.

1.2 RELATED WORK

- A. Section 32 84 00, PLANTING IRRIGATION.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting 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. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, turf and grasses, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- F. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 ABBREVIATIONS

- A. TYP.: Typical.
- B. MIN.: Minimum
- C. MAX.: Maximum

1.5 DELIVERY, STORAGE AND HANDLING

- A. Notify the Contracting Officer's Representative (COR) of the delivery schedule in advance so the plant material may be inspected upon arrival at the job site. Remove unacceptable plant and landscape materials from the job site immediately.
- B. Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable. Keep seed and other packaged materials in dry storage away from contaminants.
- C. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants. Keep bulk materials in dry storage away from contaminants.
 - 2. Provide erosion control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- D. Harvest, deliver, store, and handle sod according to requirements in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage, seed contamination and drying.
- E. All pesticides and herbicides shall be properly labeled and registered with the U.S. Department of Agriculture. Deliver materials in original, unopened containers showing, certified analysis, name and address of manufacturer, product label, manufacturer's application instructions specific to the project and indication of conformance with state and federal laws, as applicable.

1.6 PROJECT CONDITIONS

- A. Verify actual grade elevations, service and utility locations, irrigation system components before proceeding with planting work.
- B. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion. Plant during one of the following periods:
 - 1. Spring Planting: April 1 to June 1.
 - 2. Fall Planting: September 1 to November 1.

- C. Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- D. Plant sod after finish grades and irrigation system components are established, but not before irrigation system components are installed, tested and approved.
 - 1. When planting sod protect irrigation system components and promptly repair damage caused by planting operations.

1.7 QUALITY ASSURANCE:

A. Products Criteria:

- 1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
- 2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

B. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

- 1. Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association with 5 years experience in landscape installation.
- 2. Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
- 3. Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network and submit one copy of certificate to the Contracting Officer's Representative:
 - a. Certified Landscape Technician (CLT) - Exterior, with installation, maintenance, irrigation, designated CLT-Exterior.
 - b. Certified Ornamental Landscape Professional, designated COLP.
- 4. Pesticide Applicator: Licensed in state of project, commercial.

C. Include an independent or university 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.

D. For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60, "Diagnosis and Improvement of Saline and Alkali Soils".

2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Contracting Officer's Representative. A minimum of 3 representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for plant growth.

- a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

- b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

E. Contracting Officer's Representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Contracting Officer's Representative retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Contracting Officer's Representative of plant material sources 14 days in advance of delivery to site.

F. Include product label and manufacturer's literature and data for pesticides and herbicides.

G. Conduct a pre-installation conference at Project site.

1.8 SUBMITTALS

- A. Submit product data for each type of product indicated, including soils:
 - 1. Include quantities, sizes, quality, and sources for plant materials.
 - 2. Include EPA approved product label, MSDS (Material Safety Data Sheet) and manufacturer's application instructions specific to the Project.
- B. Submit samples and manufacturer's literature for each of the following for approval before work is started.
 - 1. Organic and Compost Mulch: 1 quart (1-liter) volume of each organic and compost mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
- C. Qualification data for qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- D. Prior to delivery, provide notarized certificates attesting that each type of manufactured product, from the manufacturer, meet the requirements specified and shall be submitted to the Contracting Officer's Representative for approval:
 - 1. Plant Materials (Department of Agriculture certification by State Nursery Inspector declaring material to be free from insects and disease).
 - 2. Manufacturer's certified analysis of standard products.
 - 3. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Material Test Reports: For existing native surface topsoil.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

1.9 TURF ESTABLISHMENT PERIOD

- A. The establishment period for turf shall begin immediately after installation, with the approval of the Contracting Officer's Representative, and continue until the date that the Government accepts

the project for beneficial use. During the Establishment Period the Contractor shall maintain the plants and turf as required in Part 3.

1.10 TURF MAINTENANCE SERVICE

A. Provide initial maintenance service for turf by skilled employees of landscape Installer. Begin maintenance immediately after sod is installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 1 month from date of Substantial Completion.

1.11 APPLICABLE PUBLICATIONS

A. The publications listed below, form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. Association of Official Seed Analysts (AOSA): Rules for Testing Seed.

C. American Society For Testing And Materials (ASTM):

C136-06.....Sieve Analysis of Fine and Coarse Aggregates

C602-07.....Agricultural Liming Materials

D5268-07.....Topsoil Used for Landscaping Purposes

D. Turfgrass Producers International (TPI): Guideline Specifications to Turfgrass Sodding.

E. United States Department of Agriculture (USDA): Handbook No. 60
Diagnosis and Improvement of Saline and Alkali Soils; Federal Seed Act
Regulations.

F. National Cemetery Administration (NCA):

Handbook 3420-08.....Turfgrass Maintenance

Appendix TL-08.....Cemetery Construction Requirements for
Turfgrass and Landscape Plant Material
Installation

1.12 WARRANTY

A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of one year from final acceptance, unless noted otherwise below. Further, the Contractor will provide all manufacturer's and supplier's written guarantees and warranties covering materials and equipment furnished under this Contract.

1. Turf Warranty Periods will begin from the date of Government acceptance of the project or phase for beneficial use and occupancy.
 - a. Turf: 12 months.
2. The Contractor shall have completed, located, and installed turf according to the plans and specifications. All turf is expected to be living and in a healthy condition at the time of final inspection.
3. The Contractor will replace any dead turf and any areas void of turf immediately, unless required to re-plant in the succeeding planting season. Provide extended warranty for period equal to original warranty period for replacement plant materials. Replacement turf warranty will begin on the day the work is completed.
4. The Government will reinspect turf at the end of the Warranty Period. The Contractor will replace any dead, missing, or defective turf immediately. The Warranty Period will end on the date of this inspection provided the Contractor has complied with the warranty work required by this specification. The Contractor shall also comply with the following requirements:
 - a. Replace turf that is more than 25 percent dead, prior to final inspection.
 - b. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
 - c. Mulch and weed plant beds and saucers. Just prior to final inspection, treat these areas to a second application of approved pre-emergent herbicide.
 - d. Complete remedial measures directed by the Contracting Officer's Representative to ensure turf survival.
 - e. Repair damage caused while making turf replacements.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. Turf materials: ANSI Z60.1; will conform to the varieties specified and be true to botanical name as listed in Hortus Third; nursery-grown turf material true to genus, species, variety, cultivar, healthy, normal and unbroken root systems developed by transplanting or root pruning; well-shaped, fully branched, healthy, vigorous stock, densely foliated when

in leaf; free of disease, pests, eggs, larvae, and defects such as knots, sun scald, windburn, injuries, abrasions, and disfigurement.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 90 percent calcium carbonate equivalent and as follows:
1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36 mm) sieve and a minimum of 75 percent passing through No. 60 (0.25 mm) sieve.
 2. Provide lime in a pelletized form of ground calcitic limestone.
 3. Available Product: 'Calpril' as manufactured by Pacific Calcium, Inc.; or equal.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 (3.35 mm) sieve and a maximum of 10 percent passing through No. 40 (0.425 mm) sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30 mm) sieve.
- F. Coarse Sand shall be concrete sand, ASTM C33 Fine Aggregate, clean, sharp free of limestone, shale and slate particles, and toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

- A. Organic matter: Commercially prepared compost. Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2 inch (13 mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. Organic Matter Content: 50 to 60 percent of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Wood derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

2.4 TURF FERTILIZERS

- A. Soil Test: Evaluate existing soil conditions and requirements prior to fertilizer selection and application to minimize the use of all fertilizers and chemical products. Obtain approval of Contracting Officer's Representative for allowable products, product alternatives, scheduling and application procedures. Evaluate existing weather and site conditions prior to application. Apply products during favorable weather and site conditions according to manufacturer's written instructions and warranty requirements. Fertilizers to be registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer applicable to specific areas as required for Project conditions and application. Provide commercial grade plant and turf fertilizers, free flowing, uniform in composition and conforms to applicable state and federal regulations.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
1. Composition shall be nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- C. Slow-Release Fertilizer: Granular or pellet fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition shall be nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

- A. Planting Soil: ASTM D5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1/2 inch (13 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D5268 topsoil with the following soil amendments and fertilizers as recommended by the soils analysis.
- B. Existing Planting Soil: Existing, native surface topsoil formed under natural conditions retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with planting soil when quantities are insufficient.
 2. Mix existing, native surface topsoil with the following soil amendments and fertilizers as recommended by the soils analysis.
- C. Imported Topsoil: Imported topsoil or manufactured topsoil from off-site sources can be used if sufficient topsoil is not available on site to meet the depth as specified herein. The Contractor shall furnish imported topsoil. At least 10 days prior to topsoil delivery, notify the Contracting Officer's Representative of the source(s) from which topsoil is to be furnished. Obtain imported topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs, or marshes.

2.6 BIOSTIMULANTS

- A. Mycorrhizae: Endo mycorrhizal granules inoculum consisting of the following 4 species blend of propagules of arbuscular mycorrhizal fungi: *Glomus intraradices*, *Glomus mosseae*, *Glomus aggregatum*, and *Glomus etunicatum*. Minimum 100,000 spores/propagules per pound.
- B. Available Products: 'MycoApply Endo' by Mycorrhizal Applications, Inc.; 'Endo Granular' by Mycorrhizal Products.com; or equal.

2.7 SOIL MOISTURE RETENTION POLYMERS

- A. Soil Moisture Retention Polymers: A synthetic acrylic polyacrylamide with a potassium salt base; safe, non-toxic polymer for use in all horticultural applications. Particle Size: 1000 to 2000 microns.
- B. When used according to the application rates, can reduce irrigation frequency by 50 percent and last 3 to 5 years in the soil.

2.8 MULCH

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
1. Type: Shredded hardwood; Ground or shredded bark; or Wood and bark chips.
 2. Size Range shall be 1 inch (25 mm) maximum, 1/2 inch (13 mm) minimum.
 3. Color shall be natural and match existing bark mulch used on site.

2.9 COMPOST

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1 inch (25 mm) sieve; soluble salt content of 2 to 5

decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.10 EDGING

- A. Shovel Cut Edge Treatment.

2.11 WATER

- A. Water shall not contain elements toxic to plant life. Water to be obtained from Government at no cost to the Contractor.

2.12 TURF SELECTIONS

- A. Grasses for Cool Regions shall be:
1. Bluegrasses: Kentucky (*Poa pratensis*).
 2. Fescue: Tall (*Festuca arundinacea*)
 3. Ryegrasses: Perennial (*Lolium perenne*)
- B. All cemetery turf sod compositions shall conform to the species and cultivar requirements detailed in the "Appendix T/L for NCA Cemetery Construction Requirements". Any deviation from the turf species requirements must receive written approval by the NCA Chief Agronomist and appropriate MSN Agronomist in coordination with the Contracting Officer's Representative.

2.13 SOD

- A. Sod: Sod shall be produced from Blue Tag certified seed and State of Oregon certified, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding". Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Sod Species: The composition of the grass species in the sod shall be a mix of 100% Perennial Ryegrass Blend. The ryegrass shall be a blend of at least 3 regionally adapted cultivars.
1. Available Product: 'JB Signature Sod' as produced by JB Instant Lawn; or equal.

2.14 PESTICIDES

- A. Consider IPM (Integrated Pest Management) practices to minimize the use of all pesticides and chemical products. Obtain approval of COR for allowable products, product alternatives, scheduling and application

procedures. Evaluate existing weather and site conditions prior to application. Apply products during favorable weather and site conditions according to manufacturer's written instructions and warranty requirements. Pesticides to be registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
 - 5. Special conditions may exist that warrant a variance in the specified planting dates or conditions. Submit a written request to the Contracting Officer's Representative stating the special conditions and proposal variance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as

directed by Contracting Officer's Representative and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install 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 EDGING INSTALLATION

- A. Shovel cut a "V"-shaped ditch to separate sod planting from existing rough lawn areas as shown on the drawings. Firm and compact sides of ditch. Fill ditch with bark mulch and compact in place.

3.4 MULCH INSTALLATION

- A. Mulch backfilled surfaces of planting areas and other areas indicated. Keep mulch out of plant crowns and off buildings, pavements, utility standards, pedestals, and other structures.
 - 1. Trees in Turf Areas: Apply organic mulch ring of 3 inch (75 mm) average thickness, with 36 inch (900 mm) radius around trunks or stems. Do not place mulch within 6 inches (150 mm) of trunks or stems.

3.5 TURF RENOVATION WITH SOD

- A. General: Existing turf and weeds shall be killed, removed and replaced with new sod. The area shall be expertly graded and re-sodded resulting in a uniform stand of turf, high quality in appearance.
- B. Vegetation Removal: Apply non-selective herbicide in a minimum of two applications to completely kill all existing vegetation in areas to receive new sod.
 - 1. First application: Irrigate the areas to be renovated with sod until just before the application of the herbicide to promote growth of existing weeds and turfgrasses. This will allow the vegetation to absorb the maximum amount of herbicide. While the vegetation is still actively growing, the entire area shall be sprayed with a non-selective herbicide ('Round Up' or approved equal).
 - a. Apply herbicide at the maximum rate as recommended on the label for the complete elimination of the existing turfgrass and weeds.

- b. Follow the product label instructions for elapsed time (7 to 10 days minimum) before moving to the next procedure to allow the herbicide to fully affect the plant material.
2. Remove dead plant debris to a depth of no less than 8 inches.
3. The area shall then be irrigated to encourage growth of any remaining plant material.
4. When there is sufficient re-growth of plant materials as determined by the COR, the area will be retreated with the non-selective herbicide, for a second time following the product label directions for time to elapse for the herbicide to fully affect the plants, before the start of tillage.
5. Once again, dead plant debris shall be removed to a depth of no less than 8 inches.
6. The Contractor shall repeat this operation until the existing weeds and turf have been eliminated, as determined by the COR.

3.6 TURF AREA PREPARATION AND GRADING

- A. Loosen subgrade to a minimum depth of 8 inches (200 mm). Remove stones larger than 1/2 inch (13 mm) in any dimension, dead turf, sticks, roots, rubbish, and other extraneous matter and legally dispose off of the Government's property.
- B. General: Apply biostimulants, lime, compost fertilizer and other soil amendments, directly to existing grades at rates recommended by the soils analysis.
 1. Broadcast mycorrhizal inoculum with calibrated spreading equipment at rate indicated on manufacturer's printed instructions.
 2. For Bidding Purposes: Broadcast pelletized calcitic lime ('Calpril' or Calcium Carbonate equivalent) at a rate of 80 lbs. per 1000 sq-ft; apply 1 cubic yard of compost per 1000 square-feet, and 20 lbs. of pre-plant fertilizer (16:16:16 plus micronutrients) per 1000 square feet and till into the soil to a depth of 8 inches to uniformly mix soil amendments and topsoil.
- C. Over Bridge Structure: Spread imported topsoil, biostimulants, soil moisture retention polymers, soil amendments, and fertilizer on surface, and thoroughly blend planting soil.
 1. Broadcast mycorrhizal inoculum with calibrated spreading equipment at rate indicated on manufacturer's printed instructions.
 2. Broadcast soil moisture retention polymers with calibrated spreading equipment at rate indicated on manufacturer's printed instructions.

3. For Bidding Purposes: Broadcast pelletized calcitic lime ('Calpril' or Calcium Carbonate equivalent) at a rate of 80 lbs. per 1000 sq-ft; apply 1/2 cubic yard of compost per 1000 square-feet; and 20 lbs. of pre-plant fertilizer (16:16:16 plus micronutrients) per 1000 square feet and till into the soil to a depth of 4 inches to uniformly mix soil amendments and topsoil.
- D. Spread imported topsoil as required depths required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or existing grades are muddy, or excessively wet.
1. Reduce elevation of planting soil to allow for soil thickness of sod.
- E. Finish grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grades shall conform to elevations to provide a smooth transition at curbs, trees, planters, adjacent turf areas; to provide uninterrupted drainage flow into existing drains; and to prevent any "scalping" of the new turf grass when mowed.
1. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be sodded immediately.
 2. Contractor shall request COR approval of lines and grades.
Contractor will be responsible for any additional cut and/or fill required to ensure that the site is graded to conform to elevations as determined by the COR.
- F. Contractor shall protect all trees, shrubs and plants. The areas within the drip lines of existing trees shall not be tilled at a depth greater than three inches or backfilled not to exceed two inches from existing grades, or as approved by the COR. Any damage to tree roots must be avoided.
1. If the Contractor is obstructed by tree roots within the drip-line of a standing tree that are 2 inches in diameter or greater, the Contractor shall request an inspection by the COR. The COR will inspect and determine if any roots will be pruned.
 2. Plant material damaged, weakened or killed during the renovation shall be replaced with its equivalent. Exceptions shall be approved by the COR.

3.7 SODDING

- A. Prior to delivery of sod, the COR(s) shall inspect the work area. Any discrepancies in the ground preparation shall be corrected prior to the laying of sod in the work area.
- B. Prior to installation of the sod, the COR shall have the right to inspect and to assess the acceptability and quality of the proposed sod. The COR shall have the right to reject poor quality sod before installation. The contractor shall warranty the sod for one (1) year from the date of Final Acceptance.
- C. The sod shall be cut as thinly as possible (1.25 to 1.5 inch) to allow for faster rooting and shall be cut and delivered to the work site the same day of installation. Contractor shall make all necessary arrangements to protect delivered sod from excessive drying and wind damage.
- D. Moisten prepared sod beds before planting if soil is dry. Water thoroughly and allow surface moisture to dry before sodding. Do not create a muddy soil condition.
- E. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- F. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation.
- G. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across angle of slopes exceeding 3:1.
- H. Sod shall be cut and fitted around sprinkler heads, valve boxes, edges of pavement/curb lines, edging, and other objects.
- I. Sod shall be kept moist until it is well rooted and able to survive with standard watering. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently until sod is established.
- J. Irrigation Systems: After installation of sod, Contractor shall ensure that all irrigation heads, valve boxes, and related components are at finished grade, aligned correctly and in proper working order. Any damage to the irrigation system caused by the Contractor shall be

repaired by the Contractor in a timely manner to prevent loss of sod at no additional cost to the Government.

3.8 TURF ESTABLISHMENT PERIOD

- A. The Establishment Period for turf shall begin immediately after complete sodding with the approval of the COR or designee, and continue for 30 days, at which time the Government will perform the final "turf inspection" and acceptance for that particular area.
- B. During the 30 days Turf Establishment Period, the Contractor shall:
1. Eradicate all weeds. Fertilize, re-sod, and perform any other operation necessary to promote the growth of uniform, healthy, high quality turf. The Contractor shall irrigate to keep the sod moist and healthy to promote rooting but is also responsible to carefully conserve water.
 2. Replant areas void of turf 1/2 ft² (one -half square foot) and larger in area.
 3. Begin mowing with newly sharpened mower blades when grass is 100 mm (4 inches) high to a height of 65 mm (2 1/2 inch to 3 inches) and maintain the turf at that height. Never remove more than 1/3 the leaf surface in a single mowing. Turf is also to be trimmed around the headstones and markers to the same height of the surrounding turf without scalping.

3.9 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use IPM (Integrated Pest Management) practices whenever possible to minimize the use of pesticides and reduce hazards.

4. 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.
 5. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- B. Mow turf 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. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow to a height of 2-1/2 to 3 inches (62 to 75 mm).

3.10 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Contracting Officer's Representative:
1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Contracting Officer's Representative before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Applied to tree mulch rings and mulched beds in accordance with manufacturer's written recommendations.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Applied only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

- B. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- C. Erect temporary fencing or barricades and warning signs, as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. After installation and before Substantial Completion, remove debris from planting areas, and Project site.
- E. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Government's property.

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