

SECTION 32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Seeding.
 - 2. Hydroseeding.
 - 3. Turf renovation.
 - 4. Erosion-control material(s).
 - 5. Maintenance of turfs and grasses.
- B. Related Requirements:
 - 1. Division 31 Section "Earth Moving" for excavating, filling and rough grading.

1.3 STIPULATIONS

- A. The Landscape Installer is responsible for the success of the turf and grass installation and is required to be onsite daily to perform turf and grass maintenance including watering and reseeding as required to achieve Satisfactory Turf as defined in this Section. The Landscape Installer shall also remove all rocks in the turf and grasses.
- B. The General Contractor is responsible for all of the Architect's costs associated with the Landscape Installers failure to water and maintain the turf and grass installation daily and is responsible for all costs for the Owner to supplement the Landscape Installer's maintenance requirements.

1.4 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. Maintenance: Fostering and maintaining the health and growth of turfs and grasses by the Installer daily for a minimum of 45 days after installation and weekly after turfs and grasses are established during the maintenance period to achieve Satisfactory Turf.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- F. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. Refer to Division 31 Section "Earth Moving" for planting soils.
- G. Soil Amendments: Organic and inorganic materials added to planting soil to increase soil fertility prior to planting or seeding.
- H. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- J. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification stipulations.
 - 2. Review specification requirements.
 - 3. Review installation procedures.
 - 4. Review project Stipulations and maintenance requirements pre-and post occupancy.
 - 5. Inspect project conditions.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Planting and Maintenance Service Schedule: Provide anticipated planting dates for turfs and grasses and a matrix of tasks and procedures to be performed by the Installer during the warranty maintenance period indicated in Part 3. Include watering, fertilization, grub control, weed control, aeration, rolling, mowing, reseeding, testing, and other activities.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Stipulation Acceptance: On the General Contractor's and Landscape Installer's letterhead, provide document accepting Stipulations noted in this Section.
- C. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, 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.
- D. Product Certificates: For fertilizers, from manufacturer.

- E. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- F. Material Test Reports: For existing native surface topsoil, existing in-place surface soil, and imported or manufactured topsoil, as required and at no additional cost to the Owner. All costs shall be included in the base bid.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 - 2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Lawncare Technician.
 - c. Landscape Industry Certified Turfgrass Professional of Cool Season Lawns.
 - 5. Pesticide Applicator: State licensed, commercial.
 - 6. Proximity: Not more than one hour normal travel time from Installer's place of business to Project site.
 - 7. Maintenance: Performing maintenance as indicated in Part 3.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory 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.
- C. Soil Analysis: 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.
 - 2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three 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 turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. 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.

D. Topsoil Analysis

1. Furnish soil analysis 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 topsoil.
2. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorous, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 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, and other materials with appropriate certificates.

1.11 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods in accordance with the Project Schedule. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 1. Spring Planting: March 15 through June 1.
 2. Fall Planting: August 15 through October 15.
- B. Weather Limitations: 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.

1.12 WARRANTY MAINTENANCE SERVICE

- A. Warranty Maintenance Service: Installer shall provide full maintenance service by skilled employees of landscape installer as per the requirements and schedule indicated in Part 3. Begin maintenance immediately after each area is planted.

1. Where maintenance is not performed in accordance with this section and the result in unsatisfactory turfs and grasses, Installer will continue to provide maintenance service beyond the schedule in Part 3 until the Architect and Owner are satisfied with the quality of the turf and grass installation. Architect reserves the right to backcharge the Contractor for additional costs incurred for failure to perform specified maintenance to establish Satisfactory Turf in accordance with the Maintenance Schedule.

1.13 WARRANTY

- A. Warranty: The installer shall rebuild, repair, replace any turf and grass installations that have proven defective due to unsatisfactory material or workmanship for a period of one year from substantial completion.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 98 percent pure seed, and not more than 0.5 percent weed seed:
 1. Sun and Partial Shade: Proportioned by weight as follows:
 - a. 60 percent Kentucky bluegrass mixture
 - b. 20 percent Chewings fescue
 - c. 20 percent perennial ryegrass mixture
- C. Overseed Species: Seed of grass species as follows, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.5 percent weed seed:
 1. 60 percent Kentucky bluegrass mixture.
 2. 40 percent Pennlawn red fescue.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent with a minimum 95% passing through No. 8 sieve and a minimum 55% passing through No. 60 sieve, and as follows:
 1. Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 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. Perlite: Horticultural perlite, soil amendment grade.

TURF AND GRASSES

- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Soil Conditioner: A soil conditioner such as "gypsum" or equivalent material shall be applied and incorporated into the soil. Guaranteed Analysis:
 - 1. Minimum Calcium Sulfate as CaSO₄ 64.5%
 - 2. Minimum Calcium (Ca) from CaSO₄ 18.9%
 - 3. Minimum Sulfur (S) from CaSO₄ 15.1%
 - 4. Rate of Application: 50 lbs/1,000 Sq. Ft.
- J. Basic H Surfactant: Basic H Surfactant containing 28% active ingredients of Linear Alcohol Alhoxylates shall be applied at the rate of 2 oz. Per 1,000 sq. ft.
- K. Straw Mulch: Wheat or oat straw, free of viable seed, well cured to less than 20% moisture content by weight.

2.3 ORGANIC SOIL AMENDMENTS

- 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 1/2-inch 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. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources 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 laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

- A. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer 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.
 - a. Supplement surface soil with imported or manufactured topsoil from off-site sources to provide quantities required for lawn planting. 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. Obtain off-site topsoil from local sources or from areas having similar soil characteristics to that found at Project site.
2. Mix existing, native surface topsoil with soil amendments in quantities outlined in soil test reports to produce planting soil.

- B. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. 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.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1/2-inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes, grubs, and other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Mix imported topsoil or manufactured topsoil with soil amendments and fertilizers in quantities outlined in soil test reports to produce planting soil.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
- C. Compost Mulch: 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 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.
- D. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- E. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
- F. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.7 PESTICIDES AND HERBICIDES

- A. General: Pesticide, registered and approved by the 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 Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
1. Pre-emergent Herbicide: Shall be "Tupersan" (manufactured by Dupont Chemical Co.) – active ingredients: Siduron (1-(2 methylcyclohexyl), 3-(phenylurea).
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.
1. Broadleaf Herbicide: Shall be Brominal ME4 as manufactured by Union Carbide.
 - a. Active Ingredients
 - 1) Octanoic acid, 3,5-dibromo-4-hydroxybenzoxazole ester 31.5%
 - 2) Butyric acid, 3,5-dibromo-4-hydroxybenzoxazole ester 22.1%
 - 3) Inert Ingredients 46.4%

2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.
- C. Erosion-Control Mats: Cellular, nonbiodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Invisible Structures, Inc; "Slopetime 2."
 - b. Presto Products Company; "Geoweb."

- c. Tenax Corporation - USA; "Tenweb."
- d. North American Green.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 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 planting 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 or which is dusty.
- 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 Architect and replace with new planting soil.

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. 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 TURF AREA PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply fertilizer directly to subgrade before loosening.
 - 2. Thoroughly blend planting soil off-site before spreading.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

TURF AND GRASSES

- a. For planting soil more than 8 inches in depth, place soil mix in layers not more than 8 inches in loose depth and compact with a sheep's foot roller.
 - b. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
 4. Review subgrade with Architect.
- B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply fertilizer directly to surface soil before loosening.
 3. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
 5. Review subgrade with Architect.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future. Final stone pick the surface of stones larger than 1" in any dimension.
- D. Fertilization: Immediately before seeding, apply starter fertilizer at rate of 1/2 to 1 lb/1000 sq.ft. nitrogen. Repeat application at same rate two weeks after seeding.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

- A. Seeding will not be permitted until final precision grading is inspected and approved by the Architect.
 - 1. Where work commences without approval, Architect may require entire unapproved area to be re-prepared and re-seeded.
- B. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - 1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 2. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- C. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft. for new seeding and 1.25 lb/1000 sq.ft. for overseeding.
- D. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- E. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.
- F. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.
- G. Protect seeded areas with slopes not exceeding 1:6 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 thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 - 2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- H. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 1/4 inch, and roll surface smooth.

3.6 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with nonasphaltic tackifier.
 - 2. Spray-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 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.7 TURF RENOVATION

- A. Renovate all existing turf in areas disturbed by the work of the project.

TURF AND GRASSES

- B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 - 2. Install new planting soil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- E. Mow, dethatch, core aerate, and rake existing turf.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.8 TURF MAINTENANCE

- A. General: Installer shall 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 integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Installer shall install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf 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 turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

- C. Installer shall mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third 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 1-1/2"-2" grass height:
- D. Turf Postfertilization: Installer shall apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 WARRANTY MAINTENANCE SCHEDULE

- A. Warranty Maintenance: Immediately after installation, installer shall continuously water, mow and review conditions of the turfs and grasses as required to foster satisfactory growth. The installer shall perform maintenance in accordance with this Section. The dates are to be used as a guide and shall be confirmed prior to application, or modified due to climate conditions.
 - 1. End of Warranty Maintenance Period: 120 days from Substantial Completion.
 - a. Warranty Maintenance Period will be extended as required to achieve Satisfactory Turf at no cost to the Owner if the Turf Maintenance is not performed in accordance with this Section or Satisfactory Turf is not established at the end of the Warranty Maintenance Period.
- B. Maintenance Schedule
 - 1. March
 - a. Fertilizer: Apply 25-5-10, 60% WIN @ 4.4 lb./1,000 sq. ft.
 - b. Reseeding: Reseed thin areas showing wear, incorporate the seed with a spiker or drill seeder. Seed with match the original sod variety mix.
 - 2. April
 - a. Pre-Emergent Weed Control: Apply "Tupersan" in two applications at the rate specified for the project.
 - b. Post-Emergent Weed Control: as recommended by the manufacturer to control broad-leaf type weeds (because this weed control may severely damage young seedlings, use depending on field conditions, we may not apply this until fall-see Sept.-Oct.).
 - c. Basic H Surfactant: Apply as indicated.
 - 3. June
 - a. Pre-emergent Weed Control: "Tupersan" applied at a rate specified by the manufacturer.
 - b. Fertilizer: Apply 46-0-0 Nitrogen @ 2.5 lb/1,000 sq. ft.
 - c. Grub Control: Apply brand name chemical recommended by manufacturer to control identified insect at manufacturer's recommendations and procedures (may require more than one application).
 - d. Post-Emergent Weed Control: as recommended by manufacturer to control broad-leaf weeds (because this weed control may severely damage young seedlings, use depending on field conditions, we may not apply this until fall-see Sept-Oct).

4. July
 - a. Inspection: Turf is usually dormant at this time and inspections are made to assess summer's toll on the fields and fine tune the fall program.
5. August
 - a. Fertilizer: Apply 46-0-0 Nitrogen @ 2.5 lb/1,000 sq. ft.
6. Sept-Oct
 - a. Post-Emergent Weed Control: as recommended by the manufacturer to control broad-leaf type weeds (because this weed control may severely damage young seedlings we may choose to apply it in the fall only).
7. November
 - a. Aerification: Aerate utilizing a hollow line or spoon to remove soil cores to leave a hole or cavity in the sod. The core diameter shall be between $\frac{1}{2}$ and $\frac{3}{4}$ inches, penetration shall be 3 to 4 inches and core spacing shall be 4 to 6 inch centers. If needed after aeration, sweep or drag the field with a mat to remove or break up the core materials on the surface.
 - b. Fertilizer: 35-5-10 6% WIN @ 4.4 lb/1,000 sq. ft. and treat with fungicide or insecticide if needed.
 - c. Reseeding: Reseed areas showing wear. Incorporate the seed with a spiker or drill seeder. Seed will match the original sod varietal mix.

3.10 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- 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 according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

- A. 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.

- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- 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. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 32 92 00