

SECTION 02935

TURF
07/97

PART 1 GENERAL

1.1 QUALIFICATIONS

All work shall be done by an experienced crew familiar with horticulture and industry methods and standards for sodding and turf installation.

1.1 REFERENCES

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

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01 (Sep 1977; Amended Oct 29, 1986) Federal Seed Act Regulations (Part 20): Certified Seed Regulations

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 977 (1986) Emulsified Asphalt
 ASTM D 2028 (1976; R 1986) Cutback Asphalt (Rapid-Curing Type)
 ASTM D 2607 (1969) Peats, Mosses, Humus, and Related Products

FEDERAL SPECIFICATIONS (FS)

FS O-F-241 (Rev D) Fertilizers, Mixed, Commercial
 FS JJJ-S-181 (Rev B) Seeds, Agricultural

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL DESCRIPTIONS:

SD-01 Data

Manufacturer's Literature; FIO.

Manufacturer's literature discussing physical characteristics, application and installation instructions for erosion control material, and for

chemical treatment material.

SD-07 Schedules.

Equipment List; FIO

A list of proposed pesticide application, seeding and mulching equipment to be used in performance of turfing operation, including descriptive data and calibration tests.

SD-08 Statements

Delivery; FIO.

Delivery schedule, at least 10 days prior to the intended date of the first delivery.

Application of Pesticide; FIO.

Pesticide treatment plan with proposed sequence of pesticide treatment work. The pesticide trade name, chemical composition, formulation, concentration, application rate of active ingredients and method of application for all materials; and the name and state license number of the state certified applicator shall be included.

Maintenance Report; FIO.

Written record of maintenance work performed.

Turf Establishment Period; FIO.

Written calendar time period for the turf establishment period. When there is more than one turf establishment period, the boundaries of the turfed area covered for each period shall be described.

SD-13 Certificates

Certificates of compliance certifying that materials meet the requirements specified, prior to the delivery of materials. Certified copies of the reports for the following materials shall be included (FIO):

- a. Seed: (Not Applicable)
- b. Sod: For species, mixture percentage, percent purity, field location.
- c. Sprigs: (Not Applicable)
- d. Fertilizer: For chemical analysis, composition percent.
- e. Agricultural Limestone: (Not Applicable)
- f. Peat: (Not Applicable)
- g. Asphalt Adhesive: (Not Applicable)
- h. Pesticide Material: For EPA registration number and registered uses.

i. Topsoil: For Ph, particle size, chemical analysis and mechanical analysis.

1.4 SOURCE INSPECTIONS

Sod material will be subject to inspection by the Contracting Officer at the growing site.

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Protection

Sod shall be protected from drying out and contamination during delivery.

1.5.1.2 Topsoil

A soil test shall be provided for topsoil delivered to the site.

1.5.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.5.1.4 Pesticide

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration number and the manufacturer's registered uses.

1.5.2 Inspection

Sod shall be inspected upon arrival at the job site by the Contracting Officer for conformity to type and quality in accordance with paragraph MATERIALS. Other materials shall be inspected for meeting specified requirements and unacceptable materials shall be removed from the job site.

1.5.3 Storage

Materials shall be stored in areas designated by the Contracting Officer. Sod shall be installed immediately upon delivery. Temporary stored sod shall be lightly sprinkled with water, covered with moist burlap, straw, or other covering and protected from exposure to wind and direct sunlight until planted. Covering for sod shall allow air to circulate and prevent internal heat from building up. Fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment materials shall not be stored with other landscape materials.

1.5.4 Handling

1.5.4.1 Materials

Care shall be taken to avoid injury to sod or seed. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.5.4.2 Time Limitation

a. Sod: Limitation of the time between harvesting and placing of sod shall be 36 hours.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Seed (Not Applicable)

2.1.2 Sod

2.1.2.1 Sod Classification

State-certified Nursery-grown sod shall be provided as classified by applicable state laws. Each individual sod section shall be of a size to permit rolling and lifting without breaking.

2.1.2.2 Grass Species

Grass species shall be proportioned as follows:

Botanical Name	Common Name	Mixture Percent
<u>Cynodon dactylon Hybrid/</u>	Hybrid Bermuda	100%

2.1.2.3 Quality

The sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 2 inches in any dimension, woody plant roots and other material detrimental to a healthy stand of turf. Sod that has become dry, moldy, or yellow from heating, or has irregularly shaped pieces of sod and torn or uneven ends shall be rejected.

2.1.2.4 Thickness

Sod shall be machine cut to a uniform thickness of 1-1/4 inches within a tolerance of 1/4 inch, excluding top growth and thatch. Measurement for thickness shall exclude top growth and thatch.

2.1.2.5 Anchors

Sod anchors shall be as recommended by the sod supplier.

2.1.3 Sprigs (Not Applicable)

2.1.4 Soil Amendments

Soil amendments shall consist of lime, fertilizer, organic soil amendments and manufactured soil conditioners meeting the following requirements.

2.1.4.1 Lime

Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

2.1.4.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to FS O-F-241. Granular Fertilizer: As recommended by the soil test, estimated to consist of nitrogen-phosphorus-potassium ratio: 16 percent nitrogen, 20 percent phosphorus, and 0 percent potassium.

2.1.4.3 Organic Soil Amendments

a. Topsoil: The existing surface soil shall be stripped and stockpiled on the site in accordance with Section 02210 GRADING. When required beyond that available from stripping, the topsoil shall be delivered. Delivered topsoil shall conform to topsoil requirements specified in Section 02210 GRADING, and shall be amended as recommended by soil test.

b. Peat: Peat moss or humus derived from a bog, swampland or marsh shall conform to ASTM D 2607.

c. Sand: Clean, free of toxic materials; 95 percent by weight shall pass a 10-mesh sieve and 10 percent by weight shall pass a 16-mesh sieve.

d. Rotted Manure: Well rotted, horse or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials, free of stones, sticks, soil and containing no chemicals or ingredients harmful to plants.

e. Decomposed Wood Derivatives: Ground bark, sawdust, or other wood waste material free of stones, sticks, soil, and toxic substances harmful to plants, stabilized with nitrogen and having the following properties:

Particle Size: Minimum percent by weight passing:

Screen Size	Percent
No. 4 mesh Screen	95
No. 8 mesh screen	80

Nitrogen Content: Minimum percent based on dry weight:

Material	Percent
Redwood Sawdust	0.5
Fir Sawdust	0.7
Fir or Pine Bark	1.0

f. Calcined Clay: (Not Applicable)

2.1.4.4 Soil Conditioner/Fertilizer

Soil conditioner and fertilizer shall be derived from organic materials such as decomposed animal, vegetable, and mineral matter, which has been composted, is relatively dry, friable, and pass a one inch sieve. The conditioner shall not contain poultry, animal or human waste, pathogenic viruses, fly larvae, insecticides, fungicides, and poisonous chemicals that would inhibit plant growth. The conditioner shall be the following guaranteed chemical analysis:

<u>Ingredient</u>	<u>Percentage (Minimum)</u>
Nitrogen	5
Phosphoric Acid	3
Water Soluble Potash	1
Humus	50
Humic Acids	15
Soluble Metallic Iron	1

2.1.4.5 Gypsum

Gypsum shall be commercially packaged, free flowing, minimum 95 percent calcium sulfate by volume.

2.1.4.6 Porous Silica Aggregate

Porous silica aggregate shall be of commercial grade diatomaceous earth and be free flowing.

2.1.4.7 Iron Sulfate

Iron sulfate shall be commercially packaged, free flowing with an analysis of 19% Fe and 14% S.

2.1.5 Mulch (Not Applicable)

2.1.6 (Not Used)

2.1.7 Water

Water shall be from a designated reclaimed water source.

2.1.8 Pesticide

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide and miticide. For the purpose of this specification, soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved insecticide, herbicide, fungicide, nematocide, rodenticide, miticide, and soil fumigant.

2.1.9 Erosion Control Material (Not Applicable)

PART 3 EXECUTION

3.1 SODDING TIMES AND CONDITIONS

3.1.1 Seeding Time (Not Applicable)

3.1.2 Sodding Time

Sod shall be placed from April to June for spring planting and from September to October for fall planting. Sod placement shall be timed to allow enough time for sod establishment before dormancy.

3.1.3 Sprigging Time (Not Applicable)

3.1.4 Turfing Conditions

Turf operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped when directed.

When special conditions warrant a variance to the turf operations, proposed times shall be submitted to and approved by the Contracting Officer.

3.2 SITE PREPARATION

3.2.1 Grading

The Contracting Officer shall verify that finished grades are as indicated on drawings, and the placing of topsoil and the smooth grading has been completed in accordance with Section 02210 GRADING.

3.2.1.1 Soil Test

A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local and site specific growing conditions for the type and variety of turf specified.

3.2.2 Application of Soil Amendments

The following soil amendments shall be incorporated into the soil if a manufactured soil conditioner/fertilizer is not utilized:

3.2.2.2 Soil Sulfur

Soil Sulfur shall be applied at the rate recommended by the soil test, estimated rate 32.8 pounds per 1000 square feet. Sulfur shall be incorporated into the soil to a minimum depth of 6 inches or may be incorporated as part of the tillage operation.

3.2.2.3 Fertilizer

Fertilizer shall be applied at the rate recommended by the soil test, estimated at 7 pounds per 1000 square feet. Fertilizer shall be incorporated into the soil to a minimum depth of 6 inches or may be incorporated as part of the tillage or hydroseeding operation.

3.2.2.4 Compost

A nitrogen stabilized compost shall be spread uniformly over the soil at the rate of 4.0 cu yds per 1000 sq. ft. and thoroughly incorporated by tillage into the soil to a minimum depth of 6 inches.

3.2.2.5 Porous Silica Aggregate

Porous silica aggregate shall be spread uniformly over the soil at the rate of 500 lbs per 1000 sq. ft

3.2.2.6 Iron Sulfate

Iron sulfate shall be applied and incorporated uniformly into the soil at

the rate of 5 lbs per 1000 sq. ft.

3.2.3 Application of Soil Amendments Using Soil Conditioner/Fertilizer

The following soil amendment ratios shall be incorporated into the soil if a manufactured soil conditioner/fertilizer is used:

3.2.3.1 Soil Sulfur

Soil sulfur shall be applied at the rate recommended by the soil test, estimated rate 32.8 pounds per 1000 square feet. Sulfur shall be incorporated into the soil to a minimum depth of 6 inches or may be incorporated as part of the tillage operation.

3.2.3.2 Soil Conditioner/Fertilizer

Soil conditioner/fertilizer shall be applied evenly at the rate of 200 lbs per 1000 sq. ft., and thoroughly incorporated as into the soil to a minimum depth of 6 inches or may be incorporated as part of the tillage operation.

3.2.3.3 Porous Silica Aggregate

Porous silica aggregate shall be spread uniformly over the soil at the rate of 500 lbs per 1000 sq. ft.

3.2.4 Tillage

3.2.4.1 Minimum Depth

Soil within turf areas shall be tilled minimum depth of 6 inches. Rototiller shall be used where soil conditions and size of area permit.

3.2.5 Finished Grading

3.2.5.1 Preparation

Turf areas shall be filled as needed or have surplus soil removed to attain the finished grade. Drainage patterns shall be maintained as indicated on drawings. Turf areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of erosion or grade deficiencies shall conform to topsoil requirements specified in Section 02210 GRADING. Finished grade shall be 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas.

3.2.5.2 Turf Area Debris

Turf areas shall have debris and stones larger than 1 inch in any dimension removed from the surface.

3.2.5.3 Protection

Finished graded areas shall be protected from damage by vehicular or pedestrian traffic and erosion.

3.3 SEEDING (Not Applicable)

3.4 SODDING

3.4.1 General

Areas shall be sodded as indicated. Adequate soil moisture shall be ensured prior to sodding by spraying water on the area to be sodded and wetting the soil to a minimum depth of 1 inch.

3.4.2 Placing Sod

Rows of sod shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod strips shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. On long slopes, sod shall be laid at right angles to slopes. In ditches, sod shall be laid at right angles to the flow of water. When required, the sod shall be anchored by placing anchors a minimum distance of 2 feet on center with a minimum of 2 anchors per sod section.

3.4.3 Finishing

Air pockets shall be eliminated and a true and even surface shall be provided by tamping or rolling the sod in place. Displacement of the sod shall be assured by knitting of sod to the soil. Frayed edges shall be trimmed and holes or missing corners shall be patched in the sod.

3.4.4 Watering Sod

Watering shall be started immediately after completing each day of sodding. Water shall be applied at a rate sufficient to ensure moist soil conditions to a minimum depth of 1 inch. Run-off and puddling shall be prevented.

3.5 SPRIGGING (Not Applicable)

3.6 EROSION CONTROL (Not Applicable)

3.7 APPLICATION OF PESTICIDE

When pesticide becomes necessary to remove a pest or disease, a state-certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Hydraulic equipment shall be provided for the liquid application of pesticides with a leak-proof tank, positive agitation methods, controlled application pressure and metering gauges. A pesticide plan shall be provided to the Contracting Officer as stated in paragraph SUBMITTALS.

3.8 RESTORATION AND CLEAN UP

3.8.1 Restoration

Existing turf areas, pavements and facilities that have been damaged from the turfing operation shall be restored to original condition at Contractor's expense.

3.8.2 Clean Up

Excess and waste material shall be removed from the planting operation and shall be disposed of off the site. Adjacent paved areas shall be cleaned.

3.9 PROTECTION OF TURFED AREAS

Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed by the Contracting Officer.

3.10 TURF ESTABLISHMENT PERIOD

3.10.1 Commencement

The Turf Establishment Period for establishing a healthy stand of turf shall begin on the first day of work under this contract and shall end 60 days after the last day of turfing operations required by this contract. Written calendar time period shall be furnished to the Contracting Officer for the Turf Establishment Period. When there is more than one turf establishment period, describe the boundaries of the turfed area covered for each period.

3.10.2 Satisfactory Stand of Turf

3.10.2.1 Sodded Area

A satisfactory stand of turf from the sodding operation is defined as vigorous living sod uniform in rooting and top growth.

3.10.3 Maintenance During Establishment Period

3.10.3.1 General

Maintenance of the turfed areas shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turfed areas from traffic, mowing, watering, and post-fertilization.

3.10.3.2 Mowing

a. Lawn Areas: Lawn areas shall be mowed to a minimum height as recommended by the seed producer when the average height of the turf becomes 2 inches. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas.

b. Field Areas: Field areas shall be mowed once during the season to a minimum height of 3 inches.

3.10.3.3 Watering

Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 1 inch. Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the turf. Run-off, puddling and wilting shall be prevented.

3.10.3.4 Post-Fertilization

Nitrogen carrier fertilizer shall be applied at the rate of 7 pounds per

1000 square feet after the first month and again every three months to the final acceptance. The application shall be timed prior to the advent of winter dormancy and shall avoid excessively high nitrogen levels.

3.10.3.5 Pesticide

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.10.3.6 Repair

The Contractor shall re-establish as specified herein, eroded, damaged or barren areas. Mulch shall also be repaired or replaced as required.

3.10.3.7 Maintenance Report

A written record shall be furnished to the Contracting Officer of the maintenance work performed.

3.11 FINAL ACCEPTANCE

3.11.1 Preliminary Inspection

Prior to the completion of the Turf Establishment Period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be established in writing. The acceptability of the turf in accordance with the Turf Establishment Period shall be determined. A unacceptable stand of turf shall be repaired as soon as turfing conditions permit.

3.11.2 Final Inspection

A final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing.

-- End of Section --