

**SECTION 329219
SEEDING**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Seeding of disturbed areas
- B. Fertilizing and soil amendments, as necessary.
- C. Maintenance

1.2 REFERENCES

- A. U.S. Department of Agriculture (USDA)
 - 1. AMS Seed Act (1940; R 1988; R 1998) Federal Seed Act
 - 2. DOA SSIR 42 (1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

1.4 DEFINITIONS

- A. Acceptable Stand of Turf: An area is considered acceptable if it is represented by a minimum of 100 seedlings per square foot of the permanent species of grass representative of the seed mixture.

1.5 RELATED REQUIREMENTS

- A. Geotechnical Report
- B. Section 312000 – Earthwork

1.6 SUBMITTALS

- A. The following shall be submitted in accordance with Section 01 33 00 - Submittal Procedures:
 - 1. Product Data:
 - a. Wood cellulose fiber mulch.

- b. Fertilizer: Include physical characteristics, and recommendations.
- 2. Certificates:
 - a. Seed: Contractor shall furnish labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this section.
- 3. Test Results:
 - a. The Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Service or other certified testing laboratory.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery

- 1. Seed Protection: Seed shall be delivered in new, sealed bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act. Left over seed from pervious projects shall not be allowed for use if bag seal has been broken or if seed is out-dated. Protect seed from drying out and from contamination during delivery, on-site storage, and handling.
- 2. Fertilizer and Other Agricultural Chemicals Delivery: Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer may be furnished in bulk with certificate indicating the above information.

B. Storage

- 1. Seed Storage: Store in cool, dry locations away from contaminants.
- 2. Topsoil: Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

C. Handling: Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. All materials shall conform to the requirements and standards of this Section.
- B. Temporary and permanent seed shall be manufactured by Super Sod, a division of Patten Seed Company. Equal products may be used upon approval by the Engineer; however, equal products must be grown and manufactured in the state of Georgia. Equal products must be

specific to the identified seed types used in Drawings and Specifications.

- C. Organic humus compost, Soil³, shall be manufactured by Super Sod. Equal products may be used upon approval by the Engineer; however, equal products must meet the minimum requirements of Soil³ in regards to material, process, size, and organic nature.

2.2 TOPSOIL

- A. The Contractor is responsible for reviewing the geotechnical report, if available, to determine the consistency of soil types and the suitability of topsoil. If the geotechnical report infers suitable topsoil is not available on-site, the Contractor shall notify the Engineer in the Request for Information (RFI) period of the bid process. The Contractor may not be entitled to additional compensation if the geotechnical report suggests topsoil is not suitable and does not inform the Engineer during the bid process.
- B. Using designated stockpiles or borrow areas on site, the Contractor shall place a minimum of 4-inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance.
- C. On-Site Topsoil: Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph entitled "Composition." When available, topsoil shall be existing surface soil stripped and stockpiled on-site in accordance with Section 31 20 00 - Earthwork.
- D. Off-Site Topsoil: Topsoil shall conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the Contractor from offsite sources or Soil³ may be imported as a soil amendment to improve existing soils allowing them to meet the requirements for acceptable topsoil. Importing topsoil or Soil³ shall be justification for additional compensation to the Contractor. A change order properly authorized by the Owner shall be agreed upon prior to importing offsite topsoil or Soil³. No additional compensation will be allowed for spreading topsoil.
- E. Composition: Containing from 5 to 20 percent organic matter, by weight, as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. The pH shall be tested in accordance with ASTM D4972. Topsoil shall be free of sticks, stones, roots, and other debris and objectionable materials. Other components shall conform to the following limits:

Silt	25-50 percent
Clay	10-30 percent
Sand	20-35 percent
pH	5.5 to 7.0
Soluble Salts	600 ppm maximum

2.3 GRASS SEED

- A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.
- C. Seed shall bear the growers analysis testing to 98% for purity and 90% for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower's analysis.
- D. Species, rate of seeding, fertilization, and other requirements are shown in Table 1 of this section.
- E. Seed species characteristics and uses are recommended as follows:
 - 1. Zenith Zoysia
 - a. Commonly used in residential lawns, roadsides and linear projects, commercial landscapes, golf courses, and sports fields.
 - b. Dense, slow growing, low maintenance turfgrass that can tolerate traffic and wear better than most warm season grasses.
 - c. Shade tolerant. Adaptable to full sun or light shade.
 - d. Tolerant of extreme heat and cold.
 - e. Drought tolerant
 - f. More heat and drought tolerant than Tall Fescue
 - g. Not suited for poorly drained soils where water may stand or pool.
 - 2. TifBlair Centipede
 - a. Commonly used in large landscapes, roadsides and linear projects, and public and private parks in the South U.S.
 - b. Best in full sun or partial shade.
 - c. Environmentally friendly, warm season grass
 - d. A non-attractant of Canadian geese and deer makes it a good choice for highway and airport projects.
 - e. A medium textured, slow growing grass that forms a relatively dense sod resistant to invasive grass and weed intrusion.
 - f. Not suited for poorly drained soils where water may stand or pool.
 - 3. Elite Tall Fescue
 - a. Commonly used in fine residential laws, roadsides and linear projects, large corporate and commercial landscapes including public and private parks.
 - b. A dark green, medium textured grass composed of two or more first quality fescue selections.
 - c. A superior blend of blue-tag and gold-tag certified fescue consisting of the latest best performing varieties with superior disease and pest resistance

- d. Adaptable to sun or shade.
- e. A cool season grass.
- f. Water Star Qualified grass seed.

TABLE 1						
SEEDING REQUIREMENTS						
Area	Planting Season	Species	Rates per 1,000 Square Feet			
			Seed	Fertilizer	Limestone	Maintenance
Temporary Flat to Rolling Terrain with Slopes Less than 3:1	Aug. 1 – May 31	Ryegrass	0.64 lbs	12 lbs (10-10-10)	45 lbs	7 lbs (10-10-10)
	April 1 – Sept. 1	Sudangrass	1.4 lbs	12 lbs (10-10-10)	45 lbs	7 lbs (10-10-10)
Temporary Embankments with Slopes Greater than 3:1	March 15 – June 15	Common Bermuda	0.23 lbs	12 lbs (10-10-10)	45 lbs	7 lbs (10-10-10)
Permanent Flat to Rolling Terrain with Slopes less than 3:1	March 1 – Sept. 1	Zenith Zoysia	1 lbs	10 lbs (5-10-15) Plus 3% iron	45 lbs	7 lbs (16-4-8) Plus 3% iron
Permanent Embankments with Slopes Greater than 3:1	April 1 – Sept. 1	TifBlair Centipede	0.5 lbs	5 lbs (5-10-15) Plus 3% iron	30 lbs	10 lbs (5-10-15) Plus 3% iron
Permanent Flat to Rolling Terrain with Slopes Less than 3:1	Sept. 1 – April 1	Elite Fescue	5 lbs	10 lbs (5-10-15) Plus 3% iron	45 lbs	10 lbs (16-4-8) Plus 3% iron

2.4 FERTILIZER MATERIALS

- A. Fertilizer materials shall comply with applicable state, local, and federal laws concerned with their production and use.
- B. Commercial fertilizer shall be a ready mixed material and shall be equivalent to the grade or grades in Section 2.3 – Table 1. Container bags shall have the name and address of the manufacturer, the brand name, net weight, and chemical composition.

2.5 AGRICULTURAL LIMESTONE

- A. Agricultural limestone shall be a pulverized dolomitic limestone having a calcium carbonate content of not less than 85 percent by weight.
- B. Agricultural limestone shall be crushed so that at least 85% of the material will pass a No. 10 mesh sieve, and 50 percent passing a No. 40 mesh sieve.

2.6 ORGANIC HUMUS COMPOST

- A. Organic humus compost shall be Soil³ or approved equal.
- B. Organic humus compost shall be comprised of grass clippings, wheat straw, and dairy cow waste and shall be certified by Organic Materials Review Institute (OMRI).
- C. Organic humus compost may be used as a soil amendment and/or seed bed. Compost shall have the consistency of coffee grounds.
- D. Organic humus compost shall not contain sludge (biosolids), peanut hulls, vermiculite, perlite, bark, and peat fillers, pesticides, fertilizers, or chunky debris.
- E. Apply organic humus compost at the following rates:
 - 1. New seed – 1 cubic yard (C.Y.) per 2,000 square feet (S.F.)
 - 2. Amending soil – 1 C.Y. per 1,000 S.F.

2.7 MULCH

- A. Mulch material shall be used in context to provide soil stabilization of temporary and permanent seeding operations.
- B. Mulch shall be air dried and reasonably free from noxious weeds, mold, and other deleterious materials that are detrimental to plant growth.
- C. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
- D. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops.
- E. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops.

2.8 MULCH TACKIFIER AND BINDER

- A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch tackifier or binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.
- B. Tackifiers and binders shall meet the requirements of Georgia Department of Transportation (GDOT). Approved manufacturers and types shall be listed on GDOT's Qualified Products List (QPL).

2.9 INOCULANTS FOR LEGUMES

- A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.10 WATER

- A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

PART 3 - EXECUTION

3.1 PREPARATION

A. EXTENT OF WORK

1. Furnish all labor, equipment, and materials required to place topsoil, seed, commercial fertilizer, agricultural limestone, and organic mulch materials, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or as shown on the Drawings.
2. In general, seeding operations shall be conducted on all newly graded earthen area not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these specifications.
3. Work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the Engineer and as required by the Plans and these Specifications.
4. Provide soil preparation (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.2 SECURING AND PLACING TOPSOIL

- A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by Engineer.
- B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage, and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these specifications.

- C. All areas from which topsoil is to be secured shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue, and any other refuse which will hinder or prevent growth.
- D. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil, or if required by the Engineer, the pit shall be abandoned.
- E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Engineer.
- F. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.
- G. Provide 4 inches of topsoil to meet indicated finish grade. Over rock, provide minimum of 12 inches of topsoil. After areas have been brought to indicated finish grade, incorporate fertilizer, pH adjusters, and soil conditioners into soil a minimum depth of 4 inches by disking, harrowing, tilling or other method approved by the Engineer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.
- H. Before beginning seeding operations in any area, complete the placing of topsoil and final grading, and have the work approved by the Owner's Representative.

3.3 SEEDING, FERTILIZATION AND LIMING

A. Seedbed Preparation

- 1. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots, and stones larger than 3-inches in any diameter shall be removed from the soil.
- 2. Not earlier than 24 hours before seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 4-inches with a weighted disc, tiller, pulvimixer or other equipment until the surface is smooth and in a condition acceptable to the Engineer.
- 3. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.
- 4. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

B. Fertilization and Liming

- 1. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in Section 2.3 – Table 1.

2. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1-inch.
3. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall remain not in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.
4. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown in Section 2.3 – Table 1. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.
5. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the requirements in Section 2.3- Table 1.

C. Seeding

1. Seed Application and Conditions
 - a. Immediately before seeding, restore soil to proper grade.
 - b. Do not seed when ground is muddy frozen or in an unsatisfactory condition for seeding.
 - c. Apply seed within twenty four hours after seedbed preparation.
 - d. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.
2. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in the Section 2.3 – Table 1 unless otherwise approved by the Engineer. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.
3. Seeds shall be uniformly sown by any approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seeding at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
4. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8 inch by a cultipacker or suitable roller.
5. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculated in accordance with the manufacturer's mixing instructions.

3.4 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion, and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.
- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:
 - 1. Wood Cellulose Fiber 1,400 lbs./acre
 - 2. Stalks 4,000 lbs./acre
 - 3. Straw 4,000 lbs./acre

These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

- C. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of 5 gallons per 1,000 square feet as required to hold the mulch in place.
- D. The Contractor shall cover structures, poles, fence, and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates.

3.5 WATERING

- A. Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank trucks, or sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.

3.6 MAINTENANCE AND BOND

- A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris, and excess material and the premises shall be left in a neat and orderly condition.
- B. No equipment, material storage, construction traffic, etc., will be permitted on newly seeded ground.
- C. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gullies, washouts, or other causes

shall be repaired by filling with topsoil, compacting, and repeating the seeding work at contractor's expense.

- D. A grassing bond will be required to cover all grassed area, solid sod areas, and erosion control for one year after the time of planting seed or placing sod.

3.7 FIELD QUALITY CONTROL

- A. The Owner's Representative shall inspect the seeding within 60 days after planting and determine if an acceptable stand of grass has been produced.
- B. If an acceptable growth is not obtained on the first planting, reseeding and remulching will be required.
- C. If the planting is less than 50 percent successful, rework the ground, refertilize, reseed, and remulch.

END OF SECTION 329219