

SECTION 32 91 15
SOIL PREPARATION (PERFORMANCE SPECIFICATION)

PART 1 GENERAL**1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
1. Placing topsoil
 2. Soil conditioning
 3. Finish grading
 4. Seeding
 5. Sodding
 6. Mulching
 7. Maintenance
- B. Related Work Specified Elsewhere:
1. Site Clearing (Clearing and grubbing): Section 31 10 00
 2. Earth Moving (Trenching, backfilling and compacting): Section 31 20 00 02
- C. Definitions: NONE
- D. Applicable Standard Details: NONE

1.2 QUALITY ASSURANCE

- A. Reference Standards:
1. Pennsylvania Department of Transportation (PennDOT), latest revision:
Publication 408, Specifications
 2. American Association of State Highway Transportation Officials (AASHTO):
T194 Determination of Organic Matter in Soils by Wet Combustion
 3. Pennsylvania Department of Agriculture
 4. Others:
Agricultural Liming Materials Act of 1978, P.L.15
Pennsylvania Seed Act of 1965, Act 187, as amended
Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258
No. 86 (3P.S. 68.2) as amended
Rules for Testing Seeds of the Association of Official Seed Analysts
Federal and State pesticide acts and registration requirements
- B. Sod Producer - Company specializing in sod production and harvesting with a minimum of 5 years experience.
- C. Sod Installer - Company specializing in performing this work with a minimum of 5 years experience.

1.3 SUBMITTALS

- A. Samples:
1. Unless otherwise directed, furnish three strips of sod, 4-1/2 feet long by 12" wide, laid on 3" of topsoil and tamped in place. The samples shall be representative of the sod and workmanship to be provided. Include sod source location.
 2. Advise the ENGINEER of the location of the field, and area within the field, from which the sod is to be taken for approval.
- B. Certificates:

1. Unless directed otherwise, prior to use or placement of material, submit certifications of material composition of the following for approval:
 - a. Topsoil analysis
 - b. Fertilizer
 - c. Lime
 - d. Seed mixtures
 - e. Inoculant
 - f. Sod

1.4 JOB CONDITIONS: Section not utilized

PART 2 PRODUCTS

2.1 TOPSOIL

- A. Having a pH of between 6.0 and 7.0; containing not less than 2% nor more than 10% organic matter as determined by AASHTO T194.
- B. Fertile friable loam, sand loam, or clay loam which will hold a ball when squeezed with the hand, but which will crumble shortly after being released.
- C. Free of clods, grass, roots, or other debris harmful to plant growth.
- D. Free of pests, pest larvae, and matter toxic to plants.

2.2 FERTILIZER

- A. Basic Dry Formulation Fertilizer:
 1. Analysis 10-20-20 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.Starter Fertilizer:
 2. Analysis 38-0-0 or 31-0-0 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

2.3 LIME

- A. Raw ground limestone conforming to Publication 408, Section 804.2(a).

2.4 SEED

- A. Deliver seed fully tagged and in separate packages according to species or seed mix. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.
- B. Fresh, clean, dated material from the last available crop and within the date period specified, with a date of test not more than 9 months prior to the date of sowing. Percentage of pure seed present shall represent freedom from inert matter and from other seeds distinguishable by their appearance. All seeds will be subject to analysis and testing.

2.5 SEED MIXTURES

- A. See "Seeding Restoration Table" on the Soil Erosion and Sedimentation Control Details plan sheet.

2.6 INOCULANT

- A. Inoculant leguminous seed before seeding with nitrogen fixing bacteria culture prepared specifically for the species.
- B. Do not use inoculant later than the date indicated by the manufacturer.

- C. Protect inoculated seed from prolonged exposure to sunlight prior to sowing.
- D. Reinoculate seed not sown within 24 hours following initial inoculation.

2.7 **MULCHING MATERIALS**

- A. Mulches for seeded areas shall be one, or a combination of, the following:
 - 1. Straw:
 - a. Cured to less than 20% moisture content by weight.
 - b. Contain no stems of tobacco, soybeans, or other coarse or woody material.
 - c. Wheat or oat straw.
 - 2. Wood Cellulose:
 - a. No growth or germination inhibiting substances.
 - b. Green, air dried. Packages not exceeding 100 pounds.
 - c. Requirements:

Moisture Content:	12% + 3%
Organic Matter:	98.6% + 0.2% on the oven dried basis.
Ash Content:	1.4% + 0.2%
Minimum Water-Holding Capacity:	100%
 - 3. Mushroom Manure:
 - a. Organic origin, free of foreign material larger than 2" and substances toxic to plant growth.
 - b. Organic Matter: 20% minimum
 - c. Water-Holding Capacity: 120% minimum
 - d. pH: 6.0
- B. Sewage sludge compost is not permitted.

2.8 **SOD**

- A. Well-rooted Kentucky Bluegrass (*Poa pratensis*) sod containing a growth of not more than 10% of other grasses and clovers.
- B. Free from noxious weeds such as Bermuda grass, wild mustard, crab grass, and kindred grasses.
- C. Mow sod in the field to a height of not more than 2-1/2" within 5 days prior to lifting.
- D. Cut sod to a depth equal to the growth of the fibrous roots, but in no case less than 1-1/2", exclusive of grass and thatch. Do not cut sod when the ground temperature is below 32°F.
- E. Deliver sod to the project site within 24 hours after being cut and place sod within 36 hours after being cut. Do not deliver small, irregular, or broken pieces of sod. Do not deliver more sod than can be laid within 24 hours.
- F. During wet weather, allow sod to dry sufficiently to prevent tearing during handling and placing. During dry weather, moisten sod to ensure its vitality and to prevent dropping of the soil during handling. Sod that dries out will be rejected.

PART 3 EXECUTION

3.1 **TIME OF OPERATIONS**

- A. Spring Seeding:
 - 1. Preliminary operations for seed bed preparation may commence as soon after February 15 as ground conditions permit.
- B. Fall Seeding:
 - 1. Preliminary operations for seed bed preparation may commence after July 15.

3.2 FINISH GRADING

- A. Preparation of Subgrade:
 - 1. "Hard pan" or heavy shale:
 - a. Plow to a minimum depth of 6".
 - b. Loosen and grade by harrowing, discing, or dragging.
 - c. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.
 - 2. Loose loam, sandy loam, or light clay:
 - a. Loosen and grade by harrowing, discing, or dragging.
 - b. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.
- B. Placing Topsoil:
 - 1. Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Compact with a roller having not more than 65 pounds per roller foot width to a final compacted thickness of not less than 4".
 - 2. Hand rake topsoil and remove all materials unsuitable or harmful to plant growth.
 - 3. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry.
 - 4. Do not handle topsoil when frozen or muddy.
- C. Tillage:
 - 1. After seed bed areas have been brought to proper compacted elevation, thoroughly loosen to a minimum depth of 4" by discing, harrowing, or other approved methods. Do not work topsoiled areas when frozen or excessively wet.
 - 2. Liming:
 - a. Distribute lime uniformly at the specified rates.
 - b. Thoroughly incorporate into the topsoil to a depth of 4".
 - c. Incorporate as a part of the tillage operation.
 - 3. Basic Fertilizer:
 - a. Distribute basic fertilizer uniformly at the specified rate.
 - b. Thoroughly incorporate into the topsoil to a depth of 4".
 - c. Incorporate as a part of tillage operation.
- D. Finish Grading:
 - 1. Remove unsuitable material larger than ½ " in any dimension.
 - 2. Uniformly grade surface to the required contours without the formation of water pockets.
 - 3. Rework areas which puddle by the addition of topsoil and starter fertilizer and re-rake.

3.3 SEEDING

- A. Distribute starter fertilizer at the specified rates.
- B. Incorporate starter fertilizer into the upper 1" of soil.
- C. Uniformly sow specified seed mix by use of approved hydraulic seeder, power-drawn drill, power-operated seeder, or hand-operated seeder. Do not seed when winds are over 15 mph.
- D. Upon completion of sowing, cover seed to an average depth of 1/4" by hand re-raking or approved mechanical methods.
- E. Mulch immediately after seeding, using one of the following methods:
 - 1. Place straw mulch in a continuous blanket at a minimum rate of 1,200 pounds per 1,000 square yards.
 - a. Anchor straw mulch by use of twine, stakes, wire staples, paper, or plastic nets.

- b. Emulsified asphalt may be used for anchorage provided it is applied uniformly at a rate not less than 31 gallons per 1,000 square yards.
 - c. Chemical mulch binders may be used for anchorage if they are applied uniformly at the manufacturer's recommended rate.
 - d. Chemical mulch binders or a light covering of topsoil may be used for anchorage when the size of the area precludes the use of mechanical equipment.
2. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.
 3. Spread mushroom manure uniformly to a minimum depth of ½" or to the depth indicated on the Contract Drawings.
- F. When mulch is applied to grass areas by blowing equipment, the use of cutters in the equipment will be permitted to the extent that a minimum of 95% the mulch is 6" or more in length. For cut mulches applied by the blowing method, achieve a loose depth in place of not less than 2".
- G. When mulching by the asphalt mix method, apply the mulch by blowing. Spray the asphalt binder material into the mulch as it leaves the blower. Apply the binder to the mulch in the proportion of 1.5 to 2.0 gallons per 45 pounds of mulch.
1. Protect structures, pavements, curbs, and walls to prevent asphalt staining.
 2. Erect warning signs and barricades at intervals of 50 feet or less along the perimeter of the mulched area.
 3. Do not spray asphalt and chemical mulch binders onto any area within 100 feet of a stream or other body of water.

3.4 SODDING

- A. Prior to sod placement, complete finish grading and moisten prepared surface to received sod.
- B. Do not place sod when the temperature is lower than 32°F.
- C. Place sod by hand with tight joints and no overlap. Transverse joints shall be broken or staggered.
- D. Place sod so that the top of the sod is flush with the surrounding grade.
- E. Use of tools which damage the sod or dumping of sod from vehicles will not be permitted.
- F. Water sod to the saturation point immediately after placement.
- G. After watering, tamp with an approved tamper to close all joints and insure close contact between sod and sod bed. After tamping, the sod shall present a smooth, even surface free from bumps and depressions. If so directed, use a light roller, weighing not more than 65 pounds per foot of roller width to complete firming and smoothing the sod.
- H. When placing sod in ditches, place the strip with the long dimension at right angles to the flow of water. At any point where water will start flowing over a sodded area, the upper edge of the sod strips shall be turned into the soil below the adjacent area and a layer of compacted earth placed over this juncture to conduct the water over the edge of the sod.
- I. In ditches and on slope areas, stake each strip of sod securely with at least 1 wood stake for each 2 square feet of sod. Stakes shall be ½" by 1" with a length of 8" to 12". Drive stakes flush with the top of the sod, with the long face parallel to the slope contour.

3.5 MAINTENANCE

- A. Maintenance includes watering, weeding, cleanup, edging and repair of depressions, washouts or gullies.

- B. Those areas which do not show a prompt catch of grass within 14 days of seeding or sodding shall be reseeded or re-sodded until complete grass catch occurs.
- C. Maintain sodded areas for 3 months from date of substantial completion, mow to maintain maximum height of 2-1/2" or as specified on Contract Drawings.

END OF SECTION