

SECTION 02260

FINISH GRADING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- 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. Maintenance.

1.02 QUALITY ASSURANCE

- A. Testing Agency:
 - 1. The Contractor has the option to use soil testing to justify decreasing lime and fertilizer rates. When soil testing is selected by the Contractor, the soil and soil supplement testing shall be performed by a Soils Testing laboratory engaged and paid for by the Contractor and approved by the Owner's Representative.
 - a. Collect soil samples under the direction of the Owner's Representative.

1.03 REFERENCES

- A. Pennsylvania Department of Transportation Publication 408 Specifications (PDT):
 - 1. PDT Section 804 Seeding and Soil Supplements.
- B. Pennsylvania Seed Act of 1965, Act 187, as amended.
- C. Agricultural Liming Materials Act of 1978, P.L. 15, No. 9 (3 P.S. 132-1), as amended.
- D. Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3 P.S. 68.2), as amended.
- E. Rules for Testing Seeds of the Association of Official Seed Analysts.

1.04 SUBMITTALS

- A. Samples:
 - 1. When directed, furnish three strips of sod, 4½ 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.
 - 2. Advise the Owner's Representative of the location of the field, and area within the field, from which the sod is to be taken for approval.

B. Certificates:

1. 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 mixture(s).
2. If soil tests are performed to justify decreased liming and fertilizer rates, submit certified soil sample analyses, including laboratory's recommended soil supplement formulation.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Seed:

1. 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. Sod:

1. Mow sod in the field to a height of not more than 2½" within 5 days prior to lifting.
2. Cut sod to a depth equal to the growth of the fibrous roots, but in no case less than 1½", exclusive of grass and thatch. Do not cut sod when the ground temperature is below 32°F.
3. 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.
4. 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 which dries out will be rejected.

PART 2 – PRODUCTS

2.01 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.

2.02 FERTILIZER

A. Basic Dry Formulation Fertilizer:

1. Analysis 0-20-20 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

- B. Starter Fertilizer:
 - 1. Analysis 10-5-5 or 12-6-6 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

2.03 LIME

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

2.04 SEED

- A. 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.

Table 1 – Grass and Agricultural Seeds

Species	Minimum Guaranteed Purity (Percent)	Maximum Weed Seed (Percent)	Minimum Guaranteed Germination (Percent)
Kentucky Bluegrass (<i>Poa pratensis</i>) Domestic Origin; min. 21 lb. per bushel	90	0.02	80
Perennial Ryegrass (<i>Lolium perenne</i> , var. Pennfine)	95	0.15	90
Kentucky 31 Fescue (<i>Festuca elatior arundinacea</i>)	98	0.25	85
Crownvetch (<i>Coronilla varia</i> , var. Penngift)	99	0.10	70
Pennlawn Red Fescue (<i>Festuca rubra</i> , var. Pennlawn)	98	0.25	90
Annual Rye Grass (<i>Lolium multiflorum</i>)	95	0.25	95
Timothy (<i>Phleum pratense</i>)	98	0.25	95

2.05 SEED MIXTURES

- A. See "Seeding Restoration Table" in Part 3, Article 3.06.

2.06 INOCULANT

- A. Inoculate 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.

2.07 MULCHING MATERIALS

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

Moisture content:	12% \pm 3%
Organic Matter:	98.6% \pm 0.2% on the oven dry basis
Ash content:	1.4% \pm 0.2%
Minimum water-Holding Capacity:	1000%
 - 4. 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

2.08 SOD

- A. At least three year old, 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.

PART 3 – EXECUTION

3.01 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.

3.02 PREPARATION OF SUBGRADE

- A. "Hard pan" or heavy shale:
 - 1. Plow to a minimum depth of 6".
 - 2. Loosen and grade by harrowing, discing, or dragging.
 - 3. Hand rake subgrade. Remove stones over 2" in diameter and other debris.
- B. Loose loam, sandy loam, or light clay:
 - 1. Loosen and grade by harrowing, discing, or dragging.
 - 2. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.

3.03 PLACING TOPSOIL

- A. Replace topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Final compacted thickness of topsoil not less than 3-1/2".
- B. Hand rake topsoil and remove all materials unsuitable or harmful to plant growth.
- C. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry.
- D. Do not handle topsoil when frozen or muddy.

3.04 TILLAGE

- A. After seed bed areas have been brought to proper compacted elevation, thoroughly loosen to a minimum depth of 5" by discing, harrowing, or other approved methods. Do not work topsoiled areas when frozen or excessively wet.
- B. Liming:
 - 1. Distribute limestone uniformly at a rate of 100 pounds per 1,000 square feet.
 - 2. Thoroughly incorporate into the topsoil to a minimum depth of 4".
- C. Basic Fertilizer:
 - 1. Distribute basic fertilizer uniformly at the rate shown in Seeding Restoration Table.
 - 2. Incorporate into soil to depth of 4" by approved methods.
 - 3. Incorporate as part of tillage operation.
- D. Liming and Fertilizer rates may be decreased if lesser rates are indicated by soil tests provided by the Contractor.

3.05 FINISH GRADING

- A. Remove unsuitable material larger than 2" in any dimension.
- B. Uniformly grade surface to the required contours without the formation of water pockets.

- C. Rework areas which puddle by the addition of topsoil and fertilizer. Re-rake.
- D. Distribute starter fertilizer as shown in Seeding Restoration Table.
- E. Incorporate starter fertilizer into the upper 1" of soil.

3.06 SEEDING

- A. Uniformly sow specified seed mix by use of approved hydraulic seeder, power-drawn drill, power-operated seeder, or hand-operated seeder or by hand. Do not seed when winds are over 15 mph.
- B. Upon completion of sowing, cover seed to an average depth of 1/4" by hand re-raking or approved mechanical methods.
- C. Seed and soil supplement materials application as follows:

Seed Restoration Table

Restoration Condition	Topsoil	Lime*	Basic Fertilizer	Starter Fertilizer	Seed Mix and Sowing Rate (% by Weight)
Temporary Cover (**)	N/A	N/A	N/A	N A	100% Annual Ryegrass Sow 9# per 1000 Sq. Yds. March through May/August through September
Bank Areas	Yes	100# per 1000 Sq. Ft.	No	10-5-5 @ 50# per 1000 Sq. Ft. or 12-6-6 @ 33# per 1000 Sq. Ft.	45% Crownvetch 55% Annual Ryegrass Sow 9# per 1000 Sq. Yds Anytime except September and October
Lawns and Park	Yes	100# per 1000 Sq. Ft.	0-20-20 @ 50# per 1000 Sq. Ft.	10-5-5 @ 50# per 1000 Sq. Ft. or 12-6-6 @ 33# per 1000 Sq. Ft.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Sow 21# per 1000 Sq. Yds. March through May/August through September
Open Fields and Woods	No	No	No	10-5-5 @ 50# per 1000 Sq. Ft. or 12-6-6 @ 33# per 1000 Sq. Ft.	100% Red Fescue Sow 36# per 1000 Sq. Yds. March through May/August through September

* Unless lesser rate indicated by soil test.

** Unless otherwise specified in the Section 01560.

- D. Seeding and soil supplement material application may be performed by the hydroseeding method. Rates of application, methods and equipment shall be approved by the Owner's Representative prior to commencing with work.

3.07 MULCHING

- A. Mulching within 48 hours of seeding.

- B. Place hay and straw mulch in a continuous blanket at a minimum rate of 1,200 pounds per 1,000 square yards.
 - 1. Anchor hay or straw mulch by use of twine, stakes, wire staples, paper, or plastic nets.
 - 2. 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.
 - 3. Apply approved chemical mulch binders at the manufacturer's recommended rate.
- C. 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.
- D. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards.
 - 1. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.
- E. Spread mushroom manure uniformly to a minimum depth of 1/2".
- 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% of 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 street or other body of water.

3.08 SODDING

- A. Prior to sod placement, complete soil preparation or topsoiling. Place sod within 7 days of trench backfill.
- B. Apply lime and fertilizer as specified. Work into the soil a minimum of 2".
- C. Do not place sod when the temperature is lower than 32°F.
- D. Place sod by hand with tight joints and no overlap. Transverse joints shall be broken or staggered.
- E. Place sod so that the top of the sod is flush with the surrounding grade.
- F. Use of tools which damage the sod or dumping of sod from vehicles will not be permitted.
- G. Water sod to the saturation point immediately after placement.
- H. 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.

- I. 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.
- J. 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 1/2" 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.

3.09 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 resodded until complete grass catch occurs.

END OF SECTION