

SECTION 02485

GRADING AND SEEDING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work in this section includes, but is not limited to:
 - 1. Stripping and stockpiling topsoil.
 - 2. Placing existing and new topsoil.
 - 3. Seeding and fertilizing.
 - 4. Maintaining seeded areas until acceptance.
- B. Restore unpaved surfaces to a condition similar to or better than that prior to construction activities.
- C. Related Work
 - 1. Clearing and Grubbing - Section 02100
 - 2. Trenching, Backfilling and Compacting - Section 02221

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging. Damaged or open packages are not acceptable. Protect from weather.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged or open packages are not acceptable. Protect from weather.
- C. Deliver sod on pallets in right-of-ways and in areas avoiding obstruction of driveways, walkways and access to utilities. Keep sod moist and protect from drying.

1.03 EXISTING CONDITIONS

- A. Beginning work means acceptance of existing conditions.

PART 2 PRODUCTS

2.01 SOIL SUPPLEMENTS

- A. Pulverized Agricultural Limestone
 - 1. Pulverized Agricultural Limestone shall be supplied in accordance with PennDOT Specifications Publication No. 408, Latest Edition, Section 804.2(a).1.
- B. Fertilizer

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1. Fertilizer shall be supplied in accordance with PennDOT Specifications Publication No. 408, Latest Edition, Sections 804.2(a).2 and 804.2(a).3.

C. A shop drawing shall be submitted for each supplement used.

2.02 SEED

A. Seed shall be supplied in accordance with Section 804.2.(b) PennDOT Specifications Publication No. 408, Latest Edition.

B. A shop drawing shall be submitted for each seed used.

C. See attached Table 2.02-1 for seed formulas, rates, seeding dates and seeding locations.

2.03 HERBICIDES

A. Herbicides shall be in accordance with Section 804.2.(d) of PennDOT Specifications Publication No. 408, Latest Edition.

B. A shop drawing shall be submitted for each herbicide used.

2.04 EXISTING TOPSOIL

A. Existing topsoil shall be stripped and stockpiled in accordance with Section 801 of PennDOT Specifications Publication No. 408, Latest Edition and in conformance with all rules and regulations at the local conservation district having jurisdiction.

2.05 NEW 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. New topsoil shall comply with Section 802.2 of PennDOT Specifications, Publication No. 408, Latest Edition.

C. Topsoil shall be provided from an approved outside source and shall be accompanied by a grading analysis report showing the minimum percent passing through the specified sieve screens and the minimum and maximum percent of sand, silt and clay material passing the No. 10 sieve.

D. A shop drawing shall be submitted for the topsoil.

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2.06 MULCHING MATERIALS

- A. Mulches for seeded materials shall be in accordance with Section 805.2(a).1 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. Mulches for planting and other areas shall be in accordance with Section 805.2(a).2 of PennDOT Specifications, Publication No. 408, Latest Edition.
- C. Mulch binders shall be in accordance with Section 805 of PennDOT Specifications, Publication No. 408, Latest Edition.
- D. A shop drawing shall be submitted for each mulch used.

2.07 SOD

- A. Sod shall be in accordance with Section 809 of PennDOT Specifications, Publication No. 408, Latest Edition, and shall conform to all requirements of the most current edition of the American Sod Producers Association's Guideline Specifications to Sodding.
 - 1. Certified sod cultivated of two or more approved Kentucky bluegrass varieties.
 - 2. Containing not more than 10% of other fine turf grass species.
 - 3. Entirely free from weeds, as defined in the Pennsylvania Seed Act of 1965 and amendments.
 - 4. Free from harmful insects, disease, and nematodes.
 - 5. Cultured in mineral soil.
 - 6. Certified by the Pennsylvania Department of Agriculture or the Department of Agriculture of the state from which sod is obtained.
 - 7. Rectangular machine sections 12 to 24 inches wide, 2 to 6 feet long with a uniform soil thickness of approximately 3/4 inch excluding top growth and thatch. Broken sections or sections having torn or uneven ends will not be accepted.
 - 8. Grass height, maximum 1 1/2 inches.
 - 9. Relatively free of thatch (up to 1/2 inch uncompressed thickness acceptable).

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- B. Sod shall be provided from an approved outside source and be accompanied by a certification that the sod provided meets or exceeds the American Sod Producers Association's Guideline Specifications.
- C. A sample shall be supplied to the Owner and no sod shall be placed until approval from the Owner is received in writing.

2.08 SLOPE EROSION PROTECTION AND SWALE PROTECTION

- A. Protection Materials shall be in accordance with Section 806 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. Type supplied, unless otherwise noted on the plans, shall be Geojute/Anti-wash as manufactured by Belton Industries of Atlanta, GA, or equal.
 - 1. Jut mat shall be cloth of a uniform plain weave of undyed and unbleached single jute yarn 48 inches in width plus or minus one (1") and weighing an average of 1.2 pounds per linear yard of cloth with a tolerance of plus or minus five percent (5%), with approximately 78 warp ends per width of cloth and 41 weft ends per linear yard of cloth. The yarn shall be of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one-half of its normal diameter.
 - 2. Paper fabric with synthetic netting shall be biodegradable paper. The netting shall be interconnected and the paper interwoven by strips. The rolls should be no less than 60 inches and weigh an average of 0.23 pounds per square yard.
 - 3. Staples for anchoring soil stabilization matting shall be made of 12 inch lengths of No. 8 gage steel wire, bent U-shaped with a throat width of 1 - 2 inches.
- C. Contractor shall submit a shop drawing for each type of Protection Material being used. Additionally, Contractor shall include all runoff calculations used to design the slope protection. No slope protection shall be installed until Contractor receives acceptance from the Owner in writing specifically identifying the area and material to be used.

2.08 PLANTS, PLANTING, AND TRANSPLANTING

- A. Plants and plantings shall be in accordance with Section 808 of PennDOT Specifications, Publication No. 408, Latest Edition, and the most current edition of the "American Standard for Nursery Stock".
- B. Species and size shall be the same as damaged or removed by the Contractor unless otherwise directed by the Owner in writing.

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- C. Contractor shall submit a shop drawing for each type of plant or planting supplied. Shop drawing should list age, size, species and nursery supplying planting, along with specific locations of planting. No planting shall be ordered until Contractor receives acceptance from the Owner in writing.
- D. Wetland plants shall be acclimated for growth in saturated soil conditions. Plantings shall be purchased from a registered wetland nursery.

2.10 SELECTIVE TREE REMOVAL AND TRIMMING

- A. Stump or basal treatment herbicide shall be in accordance with Section 810.2 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. Contractor shall not remove or trim any tree or bush unless directed by the Owner in writing.

2.11 TEMPORARY PROTECTIVE FENCING

- A. Fencing shall conform to Section 811 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. Fencing shall be placed as indicated or directed by the Owner or Owner's representative in the field.
- C. A shop drawing shall be submitted for all fencing used.

2.12 GEOTEXTILES

- A. Geotextile material shall conform to Section 212 and Section 735 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. A shop drawing shall be submitted for each geotextile fabric used.

2.13 ROCK LINING

- A. Rock material shall conform to Section 850 of PennDOT Specifications, Publication No. 408, Latest Edition.
- B. All rock supplied shall be accompanied by a certification, from the supply quarry, as to the gradation and class of the rock supplied. No rock shall be delivered to site until Contractor receives acceptance from the Owner in writing.

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PART 3 EXECUTION

3.01 PREPARATION

- A. Protect existing underground improvements from damage.
- B. Remove foreign materials, plants, roots, stones, and debris from site. Do not bury foreign material.
- C. Existing topsoil should be stripped and stockpiled.
- D. After installation of utility, backfilling shall be completed in accordance with Section 02221 - Trenching, Backfilling and Compacting.

3.02 TIME OF OPERATIONS

- A. Spring Seeding:
 - 1. Preliminary operations for seed bed preparation may commence as soon after March 1 as ground conditions permit, but shall end by May 30.
- B. Fall Seeding:
 - 1. Preliminary operations for seed bed preparation may commence after July 30, but shall end by October 1.
- C. All Other Period
 - 1. If construction is completed at times of the year other than noted above, temporary cover work shall be performed to provide interim soil coverage. The temporary cover work shall be followed by a second seeding in accordance with Table 2.02-1 during the above noted time periods.

3.03 PLACING of soil supplements

- A. Place soil supplements in accordance with Section 804 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 - 1. Uniformly apply supplements to the areas to be seeded, except areas to be seeded with Formula E, as identified in Table 2.02-1.
 - 2. On topsoiled areas, blend the initial soil supplements into the soil at least 2" by disking or harrowing or by another acceptable method approved by the Owner in writing. The blending of the supplements may be performed during tillage operations.

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3. Prior to project completion, apply slow-release, nitrogen fertilizer to the surface of Formula B, D, L and W seeded areas.
4. Apply soil supplements as follows:

Pulverized Agricultural Limestone	800 lbs/1,000 sy
10-20-20 Analysis Commercial Fertilizer	140 lbs/1,000 sy
38-0-0 Ureaform Fertilizer	50 lbs/1,000 sy
or	
32-0-0 to 38-0-0 Sulfa Coated	50 to 59lbs/1,000 sy
Urea Fertilizer	(as per Mfg.
or	recommended)
31-0-0 IBUDU Fertilizer	61 lbs/1,000 sy
5. In wetlands areas utilize Osmocote 17-6-10 fertilizer and distribute evenly throughout the area in accordance with Manufacturer's recommendations.

3.04 TILLAGE

- A. Perform tillage on topsoiled areas in accordance with Section 804 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 1. Correct surface irregularities by filling any depressions and leveling rough or uneven areas. Remove all metal objects, stones larger than 2 inches and any other debris detrimental to restoration operations.
 2. Topsoil areas 3:1 and flatter thoroughly loosen the surface to a depth of not less than 2 inches by utilizing a Tufline TW5 Series Tandem Disc Harrow, or equal and compact utilizing a P10 Series Single Gauge Pulverizer (Culti-Packer) as manufactured by Brillion Mfg., or equal.

3.05 SEED APPLICATION

- A. Apply seed in accordance with Section 804.3(a) of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 1. Spread seeds at the rates specified in Table 2.02-1. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

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- c. If there is a delay in seeding, during which weeds grow, the Contractor will remove the weeds. The soil will be lightly raked immediately before seeding is begun.
- d. One half the seed will be sown in one direction and the other half at right angles.
- e. In the event of drought or extremely dry conditions, the Contractor will supply a fine spray of water to the wetland area until uniform germination occurs over the entire area.

3.06 APPLICATION OF HERBICIDES

- A. Apply herbicides in accordance with Section 804.3(h) of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 - 1. Apply herbicides where weed growth is prominent. Application shall be by personnel certified by the Department of Agriculture and with equipment specifically designed for the spread of herbicides.
 - 2. No herbicides shall be utilized in wetland areas.

3.07 EXISTING TOPSOIL

- A. Stripping and Stockpiling
 - 1. Strip and stockpile existing topsoil in accordance with Section 801.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 - a. After clearing operations have been completed and prior to any other work activities, remove topsoil from area of construction operations and stockpile.
 - b. Provide soil erosion controls as indicated on the plans. And as required by Northampton County Conservation District requirements.
- B. Stripping of Wetland Soils
 - 1. In order to avoid impacting the existing wetland areas which are not within the project area, provide safety fencing around the entire perimeter of the area prior to construction.
 - 2. Unnecessary travel across the wetland portion of the project site should be avoided.

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3. Contractor shall not enter any wetland area outside the limits of the proposed project area.
4. Hydric soils will be excavated from the wetland using wide tracked low ground pressure equipment.
5. When excavating within the wetland area, the equipment operator will excavate soil beginning at the perimeter of the wetland area, working toward the interior of the wetland. This will avoid repeatedly driving over the hydric soil thereby compacting it, and destroying the seedbank present in the soil.
6. Wetland soils shall be stockpiled and covered with a tarp to prevent the soils from drying out. In the event of drought or extremely dry conditions, the Contractor will supply a fine spray of water to the stockpile at intervals directed by the Owner.

C. Placing Stockpiled Topsoil

1. Place stockpiled topsoil in accordance with Section 803 of PennDOT Specifications Publication No. 408, Latest Edition and as follows:
 - a. Remove topsoil from stockpiles using an acceptable method which does not mix topsoil with foreign materials.
 - b. After placing topsoil, provide tillage and soil supplements prior to commencing any seeding operations.

3.08 PLACING NEW TOPSOIL

- A. Topsoil shall be placed in accordance with Section 802.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 1. Grade the areas to be covered with topsoil. Loosen soil to a depth of not less than 2" before placing the topsoil. Remove stones 2 inches or larger and dispose of unsuitable and surplus material.
 2. Place topsoil on the prepared areas to the required depth.
 3. Compact with a roller weighing not over 120 lbs. per foot of width or to other acceptable methods.
 4. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.

3.09 PLACEMENT OF MULCH

- A. Place mulch in accordance with Section 805.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:

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1. Mulching seeded areas.
 - a. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose over topsoiled areas.
 - b. Place straw or hay uniformly, in a continuous blanket, at a rate of 1,200 lbs per 1,000 square yards. Anchor straw or hay with acceptable materials at the following rates:
 - Emulsified Asphalt, not less than 31 gallons per 1,000 sy.
 - Wood Cellulose, 160 lbs per 1,000 sy.
 - 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.
 - c. 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.
 - d. When mulch is applied to grass 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.
2. Mulching Planted Areas
 - a. Place mulch in accordance with Section 805.3(b) of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:
 1. Uniformly mulch entire plant pit basins, and shrub beds to a depth of not less than 3 inches. Do not mulch areas planted with Crownvetch.
 2. Place mulch uniformly by hand or with mechanical spreading equipment manufactured for this purpose.
 3. Apply mulch within 48 hours after completion of each planting area.
 4. Maintain mulched area until the entire project has been completed. Reapply mulch that has become dislodged as directed by Owner.

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3.10 PLACEMENT OF SOD

A. Place sod in accordance with Section 809.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:

1. Sod shall be placed within 36 hours after having been cut.
2. Keep sod moist, during temporary storage protect from drying.
3. Provide sod bed grading such that, after placement, the top of sod is flush with the surrounding finished grade.
4. Apply soil supplements to areas to be sodded, till and moisten soil prior to placing sod.
5. Do not cut or place sod when the temperature is lower than 32° F.
6. Place sod by hand with tight joints, in straight lines with rows placed parallel to and tight against each other.
7. After placing, saturate sod with water to its full depth.
8. After initial watering tamp to obtain a smooth even surface then use a roller weighing not more than 65 pounds per foot of width to complete firming and smoothing the sod.
9. In ditches and on slope areas (3:1 or greater), staple each strip of sod securely. Drive staples flush with the top of the sod, with the width perpendicular to the slope contour.
10. Properly maintain sodded areas until the project has been accepted. This includes repeated watering, moving and repairs or replacement to any areas which fail to show a uniform growth of grass. Do not mow sodded areas until sod is firmly rooted and secure. Maintain grass at 1 1/2" in height.

3.11 PLACEMENT OF EROSION PROTECTION

A. Placement of erosion protection materials shall be in accordance with Section 806.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:

1. Place erosion control materials after the slope or swale has been dressed.
2. Place erosion control materials to conform to the shape of the soil surface.

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3. Spread out materials evenly and smoothly.
4. Unroll materials parallel to the flow direction.
5. Drive all staples flush with the soil surface.

B. Site Preparation and Installation

1. In general, jute and paper matting shall be used on the critical slopes or as required, to prevent seed washout and soil erosion.
2. Shape and grade the waterway, channel or area to be protected as required by the Plans and Specifications.
3. Remove rocks, clods over 1 ½ inches in diameter, sticks and other material that will prevent contact of the matting with the soil surface.
4. Start laying matting from the top of the channel or slope and unroll downgrade so that one edge of the strip coincides with the channel and allow at least a two inch (2") overlap for jute matting. If one roll of matting does not extend the length of the channel, continue downhill with additional rolls.
5. Secure the matting by burying the top end of jute strips in a trench four inches (4") or more deep. Tamp the trench full of soil. Reinforce with a row of staples driven through the jute about four inches (4") downhill from the trench. These staples should be about ten inches (10") apart. Then staple the overlap in the channel center. These staples should be 3 to 4 feet apart. The outside edges may be stapled similarly at any time after the center has been stapled. Closer stapling along the sides is required where concentrated water may flow into the channel.
6. Succeeding strips of matting, farther down the channel or slope, are secured in a similar manner. Strips of matting on the swale slopes should be laid and secured as above to a height of three feet (3') above base of swale.
7. Where one roll of jute matting ends and another roll begins, the end of the top strip overlaps the trench where the upper end of the lower strip is buried. Make the overlap at least four inches (4") and staple securely.

3.12 PLANTS, PLANTING & TRANSPLANTING

- A. Plants, planting and transplanting shall be performed in accordance with Section 808.3 of PennDOT Specifications, Publication No. 408, Latest Edition and as follows:

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1. Planting shall occur according to the following:
 - a. Deciduous Trees and Shrubs: October 15 to May 15
 - b. Evergreen Trees and Crownvetch Plants: March 1 to May 15 and August 1 to September 15
 - c. Seedlings and Seeding Transplants: March 1 to May 15
 - d. Rhizomes, Bulbs and Tubers: March 1 to May 15
 - e. Plugs and Peat Pots: March 1 to September 15

3.13 INSTALLATION OF PROTECTIVE FENCING

- A. Protective fencing shall be installed in accordance with Section 811 of PennDOT Specifications, Publication No. 408, Latest Edition.

3.14 INSTALLATION OF GEOTEXTILES

- A. Geotextile shall be installed in accordance with Section 212 of PennDOT Specifications, Publication No. 408, Latest Edition and as per the manufacturers recommendations.

3.15 SPECIFIC AREAS OF RESTORATION

- A. Final Restoration of Lawn Areas
 1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.
 2. Removal all debris and rock in excess of 2" in any direction.
 3. Place Topsoil on prepared area, spread and compact to a 4" uniform depth.
 4. Compact with a roller weighing not over 120 lbs. per foot of width.
 5. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.
 6. Apply seed (Formula "B") or sod at the recommended rates within the recommended seeding dates.
 7. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.
 8. Water as needed.
 9. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.

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10. Maintain restored areas within grading limits until the entire project is accepted.

B. Final Restoration of Open Field Areas

1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.
2. Removal all debris and rock in excess of 2" in any direction.
3. Place topsoil on prepared area, spread and compact to a 4" uniform depth.
4. Compact with a roller weighing not over 120 lbs. per foot of width.
5. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.
6. Apply seed (Formula "W") at the recommended rates within the recommended seeding dates.
7. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.
8. Water as needed.
9. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.
10. Maintain restored areas within grading limits until the entire project is accepted.

C. Final Restoration of Wooded Areas

1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.
2. Remove all debris and rock in excess of 2" in any direction.
3. Place topsoil, spread and compact to a 4" uniform depth.
4. Apply seed (Formula "W") at the recommended rates within the recommended seeding dates.
5. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.

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6. Water as needed.
7. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.
8. Maintain restored areas within grading limits until the entire project is accepted.

D. Final Restoration of Wetland Areas

1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.
2. Remove all debris and rock in excess of 2" in any direction.
3. Place wetland topsoil which was previously removed and stockpiled, on prepared area, spread and compact to a 4" uniform depth.
4. Apply seed (Formula "W") at the recommended rates within the recommended seeding dates.
5. Water as needed.
6. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.
7. Maintain restored areas within grading limits until the entire project is accepted.

E. Final Restoration of Stream Banks otherwise not described in the Contract Drawings.

1. After installation of proposed improvements stream bank shall be graded back at a 2:1 slope.
2. Provide Class 2, Type A Filter Fabric and tie into existing side slope and into existing bottom.
3. Provide dumped rip-rap Class R4 (min., or as directed in the Contract Drawings) having a minimum top width of 2'-0" and a slope of 1.5:1 maximum.
4. Maintain restored areas within grading limits until the entire project is accepted.

*** END OF SECTION ***