SECTION 32 91 19

TOPSOIL, SEEDING AND SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies providing and maintaining seeding and sodding, including grass, crownvetch and lespedeza.

B. Related Work Specified Elsewhere.
   1. Site grading: Section 31 23 00.
   2. Removal and restoration of existing landscaping: Section 02 43 17.

C. Definitions:
   1. UMPC: University of Maryland, College Park
   2. Numerical fertilizer analysis: Three-digit number indicates nitrogen, phosphoric acid and potash percentages by weight. Thus, 3-25-25 means three-percent nitrogen, 25-percent phosphoric acid and 25-percent potash by weight.

1.02 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications: Keep always available at the work site a copy of each of the cited references.
   1. Codes and regulations of the jurisdictional authorities.
   2. USDA-SCS.
   3. UMPC: Current publication of Agronomy Mimeo #77 (Turfgrass Cultivar Recommendations for Maryland).
   4. ASTM: C51.

B. Personnel Qualifications:
   1. Superintendent: Use a Superintendent with previous knowledge and verifiable experience in supervising seeding and sodding work of similar size and scope. Have the Superintendent present whenever work is being performed and have the Superintendent responsible for controlling the quality of work and inspecting completed work to ensure that Contract requirements are met. The Superintendent is the primary contact person with the Engineer regarding seeding and sodding work.
   2. Workers: Have the work performed only by experienced workers, who through related training and verifiable previous on-the-job experience, are familiar with the technical aspects of seeding and sodding, and with the materials and equipment used for each operation. Have each worker abide by the code of ethics or professional conduct established by the Landscape Contractors Association MD-DC-VA.

1.03 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

A. Samples and Certification:

1. Submit in accordance with Table 32 91 19-1 and as follows:
   a. Seed: Each seed bag bearing the following upon delivery:
      1) Analysis tag.
      2) Certification tag.
      3) Maryland or Virginia State tags where applicable.
   b. Inoculant: Sample packet of inoculant, viable bacteria, true to legume strain required and listing source.
   c. Sod: Maryland or Virginia State-Certified, each delivery bearing a Maryland or Virginia certification tag and label as required by law.
   d. Topsoil: Submit supplier's name and address and source of topsoil. Submit certified report of soil laboratory test results listing textures, pH, P and K nutrients, soluble salt, organic matter and mechanical analysis as to percentage of sand, silt and clay. Do not deliver topsoil to site until approved. Approval does not constitute final acceptance.
   e. Fertilizer: Labeled with manufacturer's name and address, guaranteed analysis, including nutrient and its derived source and listing of potential acidity.
   f. Limestone and acidifying agent: Labeled with manufacturer's name and address, chemical analysis, oxide content and size gradation of each used.
   g. Mulch and mulch binder: Labeled with manufacturer's name and address, material components, trademark, chemical analysis, species, size, age and source.
   h. Herbicide: Labeled with manufacturer's name and address and chemical analysis. Include in submittal the Material Safety Data Sheet, with copies to the Engineer and Contractor’s Safety Officer.
2. Usable samples will be returned.

B. Documentation:
1. Personnel qualifications: A list of the qualifications and experience of the workers, and qualifications and experience of the Superintendent, as attested by knowledge and experience in supervising contracts of similar size and scope in the past.
2. Soil tests for crownvetch and lespedeza areas: Submit certified report of soil tests made by a local state agricultural experiment station or agricultural laboratory recommended by U.S. Department of Agriculture. Test for pH, P and K nutrients, soluble salt, organic matter and mechanical analysis as to percentage of sand, silt and clay; and include recommended quantities of soil amendments to be added to produce the target pH value and to produce optimal growing conditions for the target crop.
3. Furnish one test for each 500 square feet of each crownvetch and lespedeza planting area, and not less than one test for each area.
4. Equipment list: A list of the equipment anticipated for use, including the make and model, year manufactured.

1.04 PRODUCT INSPECTION, DELIVERY, STORAGE AND HANDLING:

A. General: Materials and supplies are subject to inspection and sampling for testing. Allow no seed, sod, fertilizer, straw or other agronomic materials or supplies on site other than those for the project

B. Seed: Deliver with labels and tags.

C. Inoculants: Store inoculant containers below 70F until used. Keep containers sealed until contents are used in their entirety. Use inoculants before expiration date shown on packet. Using inoculants exposed to temperatures of 70F or greater is prohibited.

D. Sod: Deliver sod with labels and tags.
   1. Deliver sod to job within 24 hours after being cut; place sod within 36 hours after being cut.
   2. Prior to and after delivery during wet weather, allow sod to dry to the extent that will prevent tearing during handling and laying. During dry weather, water sod to ensure its vitality and prevent dropping of the soil in handling.

E. Topsoil: During hauling operations, keep walkway and roadway surfaces clean. Promptly remove fallen material.

1.05 JOB CONDITIONS:

A. Conduct seeding and sodding only under favorable seasonal conditions throughout the period of the Contract as determined by the Engineer. Install no work during adverse weather or during periods when soil conditions are unfavorable as determined by the Engineer. Do not plant or lay sod during freezing weather, when planting area is muddy or frozen, nor when sod is frozen.

B. Protection: During progress of operations, protect walls, walks, curbs, benches, established lawn areas, plant material, and other site improvements by adequate means acceptable to the Engineer.
   1. Weight Restrictions: Do not overload entrance paving, sidewalks and curbs.
   2. Pollution: Take necessary and adequate measures to prevent soil erosion, air pollution and water pollution by the materials and equipment used during construction.
   3. Repairs: If damage by the Contractor should occur, it is the Contractor's responsibility to repair or replace per the Engineer's direction, as acceptable to concerned parties, and at no additional cost to the Authority. Perform work so that damaged areas make smooth, satisfactory, and imperceptible transitions to existing adjacent work. Use materials and methods conforming to current standards for the area damaged, matching adjacent materials in appearance, and meeting approval of jurisdictional authorities and the Engineer.

C. If, at any time, the Engineer determines that work is unsatisfactory or being conducted in an unsafe manner, immediately cease such work activities upon notification.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Seed: Free of quack grass, timothy, bentgrass, clover, dock, annual bluegrass, cheat, chess, chickweed, crabgrass, plantain, black medic and, except where specified in Table 32 91 19-2, Canada Bluegrass. Kentucky Bluegrass and red fescue free of tall fescue.
   1. Grass Seed: Dated material from last available crop, with date of test not more than nine months before date of sowing; listed as Proven Cultivars in the latest Agronomy Mimeo #77 (Turfgrass Cultivar Recommendations for Maryland), published by UMPC; and as specified in Table 32 91 19-2 below.

2. Crownvetch Seed: Dated material from last available crop, with date of test not more than nine months before date of sowing. Germination portion consisting of minimum 35-percent normal sprouts, maximum 35-percent hard seed and as specified in Table 32 91 19-4.
3. Appalow Sericea Lespedeza Seed: Germination portion consisting of minimum 35-percent normal sprouts, maximum 35-percent hard seed and as specified in Table 32 91 19-5.

B. Inoculant: Adaptable culture of live nitrogen-fixing bacteria true to legume strain used.

C. Sod:
1. Well-rooted Maryland or Virginia State-Certified sod, at least 18 months old. Varieties, identical to one of the following, or as approved:
   a. Seed mixture specified in Table 32 91 19-3.
   b. Proven Cultivars in the latest Agronomy Mimeo #77, published by UMPC, certified 90-percent Turf-type Tall Fescue and 10-percent Kentucky Bluegrass.
2. Sod and attached soil free from noxious weeds such as Bermuda grass, quack grass, garlic, Johnson grass, Canada thistle and other turf weeds.
3. Mowed in production field to height of not more than 2-1/2 inches within five days prior to lifting.
4. Machine cut in sections not less than 2-1/2 feet in length nor less than 12 inches in width and to a depth equal to growth of fibrous roots, uniform soil thickness of 3/4 inch, plus-or-minus 1/4 inch. Measurement for thickness to exclude top growth and thatch.
5. Cut in sections or strips strong enough to support its own weight and retain size and shape when suspended vertically from firm grasp on upper 10 percent of section. Small, irregular or broken pieces of sod are prohibited. Sod on Beck Roll is permitted.

D. Topsoil: Weathered surface soils or natural friable loam obtained from approved sources, free of subsoil, hard fragments and stones larger than one-inch across greatest dimension, objectionable salts, noxious weeds and plants, debris and other materials inferior to surface soils or that would be toxic or harmful to growth; containing not less than 1.5-percent organic matter as determined by Walkley-Black Method; capable of sustaining normal, healthy growth and development of seed and sod scheduled and specified. Seed shall not be placed in topsoil which has been treated with soil sterilants until sufficient time has elapsed to allow for the dissipation of toxic materials.
1. Grading analysis:

	Sieve	Minimum Percent Passing
	2 inches	100
	1/2 inch	90
	1/4 inch	80
	No. 10	70

2. Test and analysis of proposed topsoil material: Performed by local state agricultural experiment station or agricultural laboratory recommended by the U.S. Department of Agriculture, including recommendations for fertilizer and pH adjustment for target crop, and meeting the following requirements.

a. Acidity range: pH 5.5 to pH 7.5, inclusive. When topsoil pH is not within pH 5.5 - pH 7.5, modifications to correct topsoil pH shall be made according to the recommendations of the soil test lab, or the applicable State Cooperative Agricultural Extension Service.

b. Salinity by electrical-conductivity measurement: 500-ppm soluble salt maximum.

c. Fertility: Rated high in natural nutrients in pounds per acre based on the standard soil test in laboratory.

d. Texture: Classification consisting of 5-percent to 25-percent clay, 20-percent to 60-percent sand and 15-percent to 45-percent silt as determined by hydrometer or pipette method. Sand, silt and clay as defined by USDA-SCS.

E. Fertilizer:

1. For grass seeded and sodded areas: Commercial fertilizer of standard quality, recommended by approved soil test report; 10-22-22.

2. For crownvetch seeded areas: Use both of the following:

a. Commercial fertilizer of standard quality; 0-20-20 or 3-25-25.

b. Blue Chip Nitroform, slow-release nitrogen, granular form, of standard quality; 38-0-0.

3. For appalow-sericea-lespedeza seeded areas: Commercial fertilizer of standard quality, recommended by approved soil test report; 10-22-22.

F. Limestone: ASTM C51, Dolomitic, Agricultural Grade.

1. Capable of neutralizing soil acidity and containing not less than 85 percent calcium and magnesium carbonates

2. Sieve analysis: 95-percent passing No. Eight sieve and 40-percent passing a No. 100 sieve. For hydroseeding, use pulverized limestone.

3. Containers labeled to show chemicals.

G. Acidifying Agent: As approved per soil analysis recommendations and seeding method.

H. Mulch:

1. Wood-cellulose fiber: Containing no growth or germination-inhibiting factors and dyed green.

a. Properties:

1) Fiber length: Approximately 3/8 inch.

2) Diameter: Approximately 1/32 inch.

3) Acidity range: pH 4.0 to 8.5, inclusive.

4) Ash content: 1.6-percent maximum.

5) Water-holding capacity: 90-percent minimum.

b. Packaging: Furnish fibers air-dry in packages not exceeding 50 pounds gross, with net weight shown on package.

c. Source: Conwed Hydro Mulch by Conwed Corp., St. Paul, MN 55101 or equal.

2. Straw: Wheat, barley, oat or rye straw, threshed, air-dried and free from Canada thistle, dock, Johnson grass and other foreign matter.

3. Mulch blanket: Knitted construction of biodegradable yarn with uniform openings, Gulf States Paper Corporation, Tuscaloosa, AL 35401 or equal.

a. 150-foot lengths or greater.

b. U-shaped staples: As standard with mulch-blanket manufacturer.

I. Mulch Binders: Non-asphaltic only.
   1. Synthetic binder for use with the following:
      a. Wood-cellulose fiber: Terra Tack 1 by Grass Growers, Plainfield, NJ 07061; Soil-Gard by Alco Chemical Company, Philadelphia, PA 1913, or equal.
      b. Straw: Terra Tack 1 by Grass Growers, Plainfield, NJ 07061 or equal.
   2. Biodegradable netting for use with straw: Conwed Erosion Control Netting by Conwed Corporation, St. Paul, MN 55101 or equal.

J. Herbicides:
   1. Broadleaf weed control: Trimec by P.B.I. Gordon Corporation, Kansas City, KS 66118 or equal.
   2. Pre-emergent crabgrass control: Balan by Elanco Products Company, Division of Eli Lilly Corporation, Indianapolis, IN 46206 or equal.
   3. Post-emergent crabgrass control: A.M.A., D.S.M.A., M.A.M.A. or Calcium Methyl Arsenate by W.A. Cleary Company, Somerset, NJ 08873 or equal.
   4. Perennial bunch-grass control: Round-up by Monsanto Agricultural Products Company, Wilmington, DE 19810 or equal.

K. Stakes (for pegging sod): Wood or other biodegradable stakes suitable for the purpose, measuring 1/2-inch by one-inch by 12 inches.

L. Water: Potable.

2.02 SEED MIXTURES:

A. Grass Seed: Tables 32 91 19-2 and 32 91 19-3.

B. Crownvetch Seed: Table 32 91 19-4.

C. Lespedeza Seed: Table 32 91 19-5.

D. Hydroseeding Crownvetch and Lespedeza Seed: Tables 32 91 19-6 and 32 91 19-7.

2.03 EQUIPMENT:

A. Dry-Type Seeder: Brillion seeder, drill seeder or other approved mechanical seeder.

B. Spraying Equipment for Hydroseeding: Use water tank equipped with liquid-level gauge calibrated in increments not larger than 50 gallons over entire range of tank capacity with gauge visible to nozzle operator. Use tank equipped with agitation system capable of maintaining solids in complete suspension until used.

PART 3 - EXECUTION

3.01 PLACING TOPSOIL:

A. After completion of construction work in the area, prepare surface of subsoil. Finish to lines shown and parallel to proposed finished grade, as approved. Remove rocks and other foreign materials 1-1/2 inches or greater in any dimension. Immediately prior to covering with topsoil, loosen prepared subsoil surface to a minimum depth of four inches. Leave no depressions.

B. Place and spread topsoil over areas to be seeded and sodded except areas to receive crownvetch or lespedeza (unless Contract Drawings require 2:1 or greater slopes to be sodded or seeded), to depth which will produce four-inch depth after natural settlement and will conform to finish lines, grades and elevations.

C. When placing topsoil on slopes, work topsoil into subsoil to minimum depth of four inches to eliminate slip-plane between the two materials. Leave topsoil at surface to ensure germination of seed.

D. After spreading topsoil, rake up and remove large stiff clods, hard lumps, large rocks, roots, stumps, litter and other foreign matter.

E. Maintain specified depth of topsoil from time placed until specified seed or sod is established.

F. If soil or weather conditions are unsuitable, cease topsoil operations. Resume topsoil operations when proper conditions prevail.

3.02 SEEDING GRASS:

A. Dry Seeding: After placing topsoil, proceed as follows:

1. Seed bed preparation:

a. pH adjustment: Adjust topsoil pH to raise it by applying limestone or approved acidifying agent or elemental sulfur to lower the topsoil pH at per-acre rate recommended by approved soil test report so as to obtain a 6.5 pH. Apply separately prior to fertilizing and seeding operations. Work into the top three inches of soil.

b. Fertilizing: After acidity adjustment and within 24 hours before seeding, apply fertilizer at per-acre rate recommended by approved soil test report. Use machine spreader and lightly drag or rake fertilizer into top 1/4 inch of soil.

2. Seeding: Clean seeders as approved prior to applying seed. Apply seed mixture directly after fertilizing.

a. Sow specified grass seed mixture from March 1 to April 30 and from August 15 to October 15. Extend or reduce specified periods as approved and as required by weather and soil conditions.

b. Sow at minimum rate as specified in Table 32 91 19-3.

c. Work seed in to depth of 1/4-inch maximum.

d. Finish as follows:

1) Lawn areas with slopes up to 3:1: Raked surface.

2) Roadside areas with slopes up to 3:1: Scarified surface.

3) Slopes over 3:1: Leave surface in irregular condition with ridges running parallel to contour of slope to prevent erosion.

3. Rolling: Directly after seeding, roll lawn areas with slopes up to 3:1 using approved lawn roller, weighing 40 to 60 pounds per foot of width, unless intervening precipitation would cause such rolling to be detrimental.

B. Hydroseeding: After placing topsoil, proceed as follows:

C. Seed bed preparation:

a. Clean hydroseeders as approved prior to coming on site.

b. pH adjustment: Adjust soil pH by either applying limestone or approved acidifying agent or elemental sulfur at per-acre rate recommended by approved soil test report so as to obtain a 6.5 pH. Apply separately prior to fertilizing and seeding operations.
   1) Use only pulverized limestone to raise soil pH.
   2) Apply not more than 300 pounds of limestone for each 100 gallons of water.
   3) After applied limestone mixture has dried, work into the top three inches of soil.
c. Apply elemental sulfur as recommended, and incorporate into top three inches of soil.
d. After pH adjustment, again grade and dress seed beds for lawn areas to raked surface.

2. Fertilizing and seeding: After seed bed preparation, apply fertilizer-seed mixture.
   a. Apply fertilizer at per-acre rate recommended by approved soil test report.
   b. Apply seed at same rates and times specified for dry seeding.Mix seed and fertilizer together in proportions to meet required application rates.
   c. If mulching with wood-cellulose fiber on areas with slopes up to 3:1, add mulch to seed and fertilizer mixture.
3. Application method:
   a. Apply mixtures by means of high-pressure spray directed upward into air so that mixtures fall to ground in uniform spray. Do not direct nozzle of hand-held hose toward ground in manner that would produce erosion or runoff.
   b. Make uniform applications at required rate, with two passes at 90 degrees to each other, to ensure uniformity and prevent misses.
   c. Agitate mixtures constantly from time mixed until application to seed bed.
   d. Use mixtures within eight hours after mixing.

3.03 SEEDING CROWNVETCH:

A. Seed Bed Preparation: After construction work in the area has been completed, proceed as follows:
   1. Grading: Rough grade to remove large stones and roots. Remove or break up clods greater than one-foot diameter. Chisel surface to depth of four to six inches. When preparing slopes, chisel parallel to contour of slope.
   2. pH adjustment: Adjust soil pH by applying limestone or approved acidifying agent or elemental sulfur at per-acre rate in Table 32 91 19-6, except as recommended by approved soil test report so as to obtain a 6.5 pH. Apply separately prior to fertilizing and seeding operations.
   3. Apply 2/3 of limestone when seed bed is prepared. Work this into the top six inches of soil.
   4. Apply remaining 1/3 of limestone with seed mixture.
   5. Fertilizing: After acidity adjustment, apply fertilizer at per-acre rate in Table 32 91 19-6, except as recommended by approved soil test report.
   6. Hydraulic overseeding: For overseeding existing vegetation, cut existing vegetation to height of three inches and remove resultant refuse prior to overseeding.

B. Seed Preparation:
   1. Inoculate crownvetch seed on day it is used.
   2. Reinoculate seeds not sown within 24 hours following inoculation.

C. Hydroseeding: Clean hydroseeders as approved prior to coming on site.

1. From March 1 to October 15, sow specified crownvetch seed mixture (Table 32 91 19-4) at a rate of 100 pounds per acre.
2. From June 1 to August 15 sow specified crownvetch seed mixture (Table 32 91 19-4) at a rate of 100 pounds per acre, except add an additional three-percent by weight of Loehmans Weeping Lovegrass.
3. Extend or reduce specified periods as approved and as required by weather and soil conditions.
4. Bare areas: Perform application-sequence Stages I and II, specified below.
5. Existing vegetation areas (hydraulic overseeding): Perform only application-sequence Stage I, specified below. Obtain the Engineer's on-site approval on whether to use nozzle or hose for hydraulic overseeding.
6. Application method:
   a. Apply mixtures by means of high-pressure spray directed upward into air so that mixtures fall to ground in uniform spray. Do not direct nozzle of hand-held hose toward ground in manner that would produce erosion or runoff.
   b. Make uniform applications at required rate, with two passes at 90 degrees to each other, to ensure uniformity and prevent misses.
   c. Agitate mixtures constantly from time mixed until application to seed bed. Use mixtures within eight hours after mixing.
   d. Use inoculated crownvetch in slurry with fertilizers within one hour after mixing. Use fresh crownvetch seed and reinoculate seed whenever this requirement cannot be met.
7. Application sequence:
   a. Stage I, Table 32 91 19-5: Load materials into water-filled tanks in proportion to tank size; agitate until smooth slurry is formed. Spray on seed bed at rates specified. Follow within two hours with Stage II.
   b. Stage II, Table 32 91 19-6: Mulch area within two hours after completing Stage I. Use straw mulch for slopes up to 2:1. Use mulch blanket for slopes greater than 2:1. Do not use wood-cellulose fiber.

3.04 SEEDING LESPEDEZA:

A. Seed Bed Preparation: After construction work in the area has been completed, proceed as follows:

1. Grading: Rough grade to remove large stones and roots. Remove or break up clods greater than one-foot diameter. Chisel surface to depth of four to six inches. When preparing slopes, chisel parallel to contour of slope.
2. ph adjustment: Adjust soil pH by applying limestone or approved acidifying agent, or elemental sulfur at per-acre rate in Table 32 91 19-6, except as recommended by approved soil test report so as to obtain a 6.5 pH. Apply separately prior to fertilizing and seeding operations.
   a. Apply 2/3 of limestone when seed bed is prepared. Work this into the top six inches of soil.
   b. Apply remaining 1/3 of limestone with seed mixture.
3. Fertilizing: After acidity adjustment, apply fertilizer at per-acre rate in Table 32 91 19-6, except as recommended by approved soil test report.
4. Hydraulic overseeding: For overseeding existing vegetation, cut existing vegetation to height of three inches and remove resultant refuse prior to overseeding.

B. Seed Preparation:
   1. Have lespedeza seed hulled, scarified and inoculated for spring sowing.
   2. Inoculate lespedeza seed on day it is used.
   3. Reinoculate seeds not sown within 24 hours following inoculation.

C. Hydroseeding: Clean hydroseeders as approved prior to coming on site.
   1. Sow specified lespedeza seed (Table 32 91 19-5) from March 1 to April 30 and August 15 to October 31 at the rate of 90 pounds per acre.
   2. Extend or reduce specified period as approved and as required by weather and soil conditions.
   3. Bare areas: Perform application-sequence Stages I and II, specified below.
   4. Existing vegetation areas (hydraulic overseeding): Perform only application-sequence Stage I, specified below. Obtain the Engineer's on-site approval on whether to use nozzle or hose for hydraulic overseeding.
   5. Application method:
      a. Apply mixtures by means of high-pressure spray directed upward into air so that mixtures fall to ground in uniform spray. Do not direct nozzle of hand-held hose toward ground in manner that would produce erosion or runoff.
      b. Make uniform applications at required rate, with two passes at 90 degrees to each other, to ensure uniformity and prevent misses.
      c. Agitate mixtures constantly from time mixed until application to seed bed. Use mixtures within eight hours after mixing.
      d. Use inoculated lespedeza in slurry with fertilizers within one hour after mixing. Use fresh crownvetch seed and reinoculate seed whenever this requirement cannot be met.
   6. Application sequence:
      a. Stage I, Table 32 91 19-5: Load materials into water-filled tanks in proportion to tank size; agitate until smooth slurry is formed. Spray on seed bed at rates specified. Follow within two hours with Stage II.
      b. Stage II, Table 32 91 19-6: Mulch area within two hours after completing Stage I. Use straw mulch for slopes up to 2:1. Use mulch blanket for slopes greater than 2:1. Do not use wood-cellulose fiber.

3.05 MULCHING:

A. General:
   1. Mulch according to the following slope limitations, except as limited for crownvetch and lespedeza.
   2. Mulch within two hours after seeding as follows:
   3. Immediately replace displaced mulching.

B. Slopes up to 3:1:
   1. Wood-cellulose fiber:
      a. Apply at a net dry weight 1,500 pounds per acre.
      b. Apply hydraulically with seed and fertilizer at rate of 50 pounds per 100 gallons of water.
   2. Straw:
      a. Methods of application:

1) Hand spreading: 4,000 pounds per acre (100 pounds per 1,000 square feet). Cover areas uniformly to depth of not less than two inches of loose material.
2) Blowing: Use of cutters is permitted in blowing equipment if at least 95-percent of mulch is six inches or more in length. For cut mulches applied by blowing method, achieve uniform distribution and loose in-place depth of not less than two inches.
3) Mulch-binder application:
   a) Synthetic binder: Apply according to manufacturer's instructions.
   b) Biodegradable netting: Apply according to manufacturer's instructions.

C. Slopes 2:1 to 3:1: Straw as specified above.

D. Slopes over 2:1: Mulch blanket, applied and stapled according to manufacturer's instructions.

3.06 SODDING:

A. Sod Bed Preparation: After placing topsoil, proceed as follows:
1. pH adjustment: Adjust soil pH by applying limestone or approved acidifying agent, or elemental sulfur at per-acre rate recommended by approved soil test report so as to obtain a 6.5 pH. Mix into soil to a depth of four inches minimum.
2. Fertilizing: After pH adjustment, apply fertilizer at per-acre rate recommended by approved soil test report. Mix into soil to a depth of four inches minimum.
3. Compact topsoil with lawn roller or tractor roller to three inches of final compacted thickness as approved.

B. Laying Sod:
1. Lay sod between September 15 and June 1, grown from seed varieties identical to grass seed mixture in Table 32 91 19-3, or sod which is Blue-Tag certified.
2. Extend or reduce specified period as approved and as required by weather and soil conditions.
3. When soil surface is hot or dry, wet soil to a depth of two inches, six to eight hours before sodding. Do not accept or lay dried sod.
4. Place sod by hand with butted joints and no overlapping. When Beck Roll of sod is used, lay also in accordance with the supplier's instructions.
5. Lay first row of sod in straight line. Place subsequent rows parallel to and tightly against each other. Stagger perpendicular joints to promote more uniform growth and strength. Do not stretch sod. On slopes, lay sod parallel to contour of slope.
6. Peg sod placed on slopes 2:1 or greater. Peg each strip or section of sod with at least two stakes not more than two feet apart. Drive stakes flush with top of sod so that roots are in contact with topsoil.
7. Water sod immediately to prevent excessive drying during progress of work. Sod which dries out will be rejected.
8. Roll entire area as sodding is completed in each section so that sod is without surface irregularities, such as depressions and high spots.
9. Irrigate immediately after rolling, enough to wet underside of sod and one inch of soil immediately below.

3.07 MAINTENANCE AND REPLACEMENT:

A. Maintenance: Maintain seeding, sodding and incidental work during seeding and sodding and thereafter for a period of 120 days for work performed in the spring and for 90 days of subsequent growing weather for work performed in the fall. Perform the following and other operations of care appropriate for promotion of healthy growth, so that work is in an approved condition throughout maintenance period; uniform in color, quality and coverage; and free of weeds, insects, diseases, surface damage and other imperfections:

1. Watering:
   a. First week: Perform watering daily to keep soil and sod pads continuously moist, maintaining moist topsoil to a depth of at least four inches. Water prior to heat of the day as necessary to prevent wilting or as approved.
   b. Subsequent weeks: Water seeded and sodded areas to maintain moisture in upper four inches of soil for promotion of deep root growth.
2. Mowing: Mow only when seed or sod has firmly rooted, is securely in place and has grown to height of six inches. Mow to height of three inches at first cutting. Thereafter, do not remove more than 1/3 of grass leaf at any cutting. Maintain Kentucky Bluegrass between height of two and 2-1/2 inches and tall fescue at height of three inches, unless otherwise directed.
3. Edging: Edge walks during alternate mowings.
4. Rolling: Roll to maintain uniform surface.
5. Applying herbicides: Apply in spray form. Do not apply when temperature exceeds 80F or during periods of drought. Have workers wear personal protective equipment appropriate for the submitted MSDS.
6. Clean-up: Remove rubbish and debris caused by this work. Keep site clean during maintenance period.

B. Replacing Seeding and Sodding: During maintenance period and until Final Acceptance, replace seeded and sodded areas that are dead, unhealthy, unsightly or badly impaired. Replace as soon as possible during the specified planting seasons. Make such replacements in the same manner as required for original seeding and sodding.

3.08 SUBSTANTIAL COMPLETION INSPECTION (SCI):

A. Substantial Completion Inspection will be held by the Engineer after completion of seeding and sodding to verify that the work was performed as defined in the Contract Documents.

B. The Contractor will not be held responsible or liable for damage by animals, by malicious or careless human agencies over which the Contractor has no control, by fire or storm, or by vehicular accidents by others that occur after the Substantial Completion Inspection.

3.09 FINAL ACCEPTANCE:

A. Request inspection for final acceptance at least 10 days before end of maintenance period.

B. Replace rejected seeded and sodded areas as specified so that repair or replacement plantings are rooted and established prior to final acceptance.

C. Final acceptance of crownvetch or lespedeza areas requires a minimum of nine vigorous, healthy seedlings evenly distributed per each square yard after 12 weeks of growing weather following germination.

TABLE 32 91 19-1: MATERIALS SUBMITTAL CHART This chart indicates minimum length of time required for the approval process before intended use and by which submittals must be made, as well as the minimum quantity for each sample. Useable samples will be returned.			
ITEM	TIME	QUANTITY	COMMENT
SEED	40 days	10 pounds or 5 kilograms	If seed is purchased as a mixture.
		5 pounds or 3 kilograms	Per component prior to blending if Contractor blends mixture.
INOCULANT	7 days	1 packet	Keep temperature of inoculant below 70F (21C).
SOD	7 days	- -	Notification of source.
FERTILIZER	14 days	50 pounds (25 kilograms)	Provide sample of each type of fertilizer used. Unopened container.
LIMESTONE	14 days	50 pounds (25 kilograms)	As specified. Unopened container.
MULCH	7 days	10 pounds (5 kilograms)	Wood-cellulose fiber mulch.
		1 unbroken bale	Straw mulch.
		1 square yard (1 square meter)	Mulch blanket including staples.
MULCH BINDER	14 days	1 quart (1 liter)	Synthetic binder.
		1 square yard (1 square meter)	Biodegradable netting including staples.
TOPSOIL	28 days	25 pounds (15 kilograms)	- -
HERBICIDE	7 days	1 quart (1 liter)	Unopened container. Include MSDS
OTHER MATERIAL	7 days	As directed and as approved	- -

TABLE 32 91 19-2: GRASS SEED FOR SEED MIXTURES			
SPECIES	MINIMUM GUARANTEED PURITY	MAXIMUM WEED SEED AND OTHER CROP	MINIMUM GUARANTEED GERMINATION
Certified Turf-Type Tall Fescue Festuca elatior arundinacea (Cultivars from current Agronomy Mimeo #77)	98 percent	0.2 percent	85 percent
Certified Kentucky Bluegrass Poa pratensis	95 percent	0.2 percent	85 percent

TABLE 32 91 19-3: GRASS SEED MIXTURES
For areas with slopes up to 2:1, unless otherwise shown.
Seed Mixture: 90-percent Tall Fescue (Maryland Green-label certified cultivars from current Agronomy Mimeo #77) 10-percent Kentucky Bluegrass (Maryland Yellow-label certified cultivars from current Agronomy Mimeo #77)

TABLE 32 91 19-4: CROWNVETCH SEED MIXTURE.				
For areas with slopes 2:1 or greater, unless otherwise shown.				
SPECIES	PROPORTION BY WEIGHT	MINIMUM GUARANTEED PURITY	MAXIMUM WEED SEED & OTHER CROP	MINIMUM GUARANTEED GERMINATION
Certified Penngift Crownvetch Coronilla varia	40 percent	99 percent	0.25 percent	70 percent
Certified Pennfine or Manhattan or Citation Perennial Ryegrass Lolium perenne	60 percent	98 percent	0.25 percent	90 percent
Loehmans Weeping Lovegrass (June 1 to August 15)	3 percent	95 percent	0.20 percent	85 percent

TABLE 32 91 19-5: LESPEDEZA SEED MIXTURE				
For areas with slopes 2:1 or greater, unless otherwise shown.				
SPECIES	**PROPORTION BY WEIGHT**	**MINIMUM GUARANTEED PURITY**	**MAXIMUM WEED SEED & OTHER CROP**	**MINIMUM GUARANTEED GERMINATION**
Certified Lespedeza Certified Appalow	44 percent	99 percent	0.25 percent	70 percent
Nurse Grass: *Certified Tall Fescue per Maryland Green-label certified cultivars from current Agronomy Mimeo #77	56 percent	98 percent	0.20 percent	85 percent

TABLE 32 91 19-6: MATERIALS FOR HYDROSEEDING CROWNVETCH AND LESPEDEZA STAGE I		
MATERIAL	PER ACRE	PER 1,000 SQUARE FEET
Limestone	**2 ton minimum	**100 pounds
3-25-25 fertilizer or 0-20-20 fertilizer or *10-22-22 fertilizer	600 pounds 800 pounds *1,075 pounds	15 pounds 20 pounds *25 pounds
Blue Chip Nitroform, granular, 38-0-0	200 pounds	4.5 pounds
Nurse Grass: Certified Pennfine, Citation, or Manhattan Perennial Ryegrass Seed or *Certified Tall Fescue per Table 32 91 19-5	 60 pounds *50 pounds	 1.5 pounds *1.25 pounds
Target Crop: Blue Tag Certified Penngift Crownvetch Seed or *Certified Appalow Sericea Lespedeza	 40 pounds *40 pounds	 1 pound *1 pound
Bacterial crownvetch or lespedeza inoculant in 5-pound-size packets	Five times manufacturer's recommended rate	Five times manufacturer's recommended rate
Wood-Cellulose Fiber	435 pounds (dry weight)	10 pounds
Mulch Binder (synthetic type)	20 pounds	0.5 pounds
* Lespedeza requirements only. **Superseded recommendation of approved soil test report		

TABLE 32 91 19-7: MATERIALS FOR HYDROSEEDING CROWNVETCH AND LESPEDEZA STAGE II		
MATERIAL	PER ACRE	PER 1,000 SQUARE FEET
Straw	4,000 pounds	100 pounds
Mulch Blanket and Staples	Use according to manufacturer's instructions	Use according to manufacturer's instructions

END OF SECTION