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USACE / NAVFAC / AFCEC / NASA **UFGS-32 92 19 (August 2017)**

Preparing Activity: NAVFAC **Superseding**
UFGS-32 92 19 (October 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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SECTION 32 92 19

SEEDING
08/17

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NOTE: This guide specification covers the requirements for seeding.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

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NOTE: The following information must be shown on the project drawings:

1. Clearly indicate all areas to be turfed and if more than one type of turf is specified, delineate areas for each type.

2. All draft turf specifications must be submitted to the cognizant Landscape Architect/Natural Resources Specialist for review to ensure that the specifications are in accordance with environmental conditions peculiar to the project areas.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C602	(2020) Agricultural Liming Materials
ASTM D4427	(2018) Standard Classification of Peat Samples by Laboratory Testing
ASTM D4972	(2018) Standard Test Methods for pH of Soils

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act
DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.2 DEFINITIONS

1.2.1 Stand of [Turf][_____]

95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

[Section 31 00 00 EARTHWORK,] [Section 32 84 24 IRRIGATION SPRINKLER SYSTEMS,] [Section 32 96 00 TRANSPLANTING EXTERIOR PLANTS,] [Section 32 92 23 SODDING,] [Section 32 92 26 SPRIGGING,] [Section 32 93 00 EXTERIOR PLANTS,] and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood Cellulose Fiber Mulch

Fertilizer

Include physical characteristics, and recommendations.

SD-06 Test Reports

****

NOTE: In states that require certification, adjust testing requirements to suit local conditions.

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Topsoil Composition Tests (reports and recommendations).

SD-07 Certificates

State Certification and Approval for Seed

[SD-08 Manufacturer's Instructions

Erosion Control Materials

]1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.1.2 [Fertilizer] [Gypsum] [Sulfur] [Iron] [and] [Lime] 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] [gypsum] [sulphur] [iron] [and] [lime] may be furnished in bulk with certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Seed, [Fertilizer] [Gypsum] [Sulfur] [Iron] [and] [Lime] Storage

Store in cool, dry locations away from contaminants.

1.5.2.2 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.

1.5.2.3 Handling

Do not drop or dump materials from vehicles.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

****

NOTE: Check with the local Agriculture County Extension Service to determine proper planting seasons for specie specified, for the optimum cover depth, and for the proper rate of application for sowing and drilling seed as this rate varies with the specie of seed used and local conditions. Allow for planting period in the construction completion time. Delete time restrictions for continuous growing conditions.

****

1.6.1 Restrictions

Do not plant when the ground is [frozen,] [snow covered,] muddy, or when air temperature exceeds [32] [_____] degrees Celsius [90] [_____] degrees Fahrenheit.

1.7 TIME LIMITATIONS

1.7.1 Seed

Apply seed within twenty four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

****
NOTE: The specific species and varieties used should be based on recommendations of the local Agriculture County Extension Service Office.
****

2.1.1 Classification

Provide [State-certified] [State-approved] [Endophyte-enhanced] seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mix is performed on site in the presence of the [Contracting Officer] [_____].

2.1.2 Planting Dates

Planting Season	Planting Dates
[Season 1]	[_____]
[Season 2]	[_____]
[Temporary Seeding]	[_____]

2.1.3 Seed Purity

Botanical Name	Common Name	Minimum Percent Pure Seed	Minimum Percent Germination and Hard Seed	Maximum Percent Weed Seed
[_____]	[_____]	[_____]	[_____]	[_____]
[_____]	[_____]	[_____]	[_____]	[_____]
[_____]	[_____]	[_____]	[_____]	[_____]

2.1.4 Seed Mixture by Weight

Planting Season	Variety	Percent (by Weight)
[Season 1]	[_____]	[_____]
[Season 2]	[_____]	[_____]
[Temporary Seeding]	[_____]	[_____]

Proportion seed mixtures by weight. Temporary seeding must later be replaced by [Season 1][Season 2] plantings for a permanent stand of grass. The same requirements of turf establishment for [Season 1][Season 2] apply for temporary seeding.

2.2 TOPSOIL

****
NOTE: If topsoil properties are included in another section of Division 2, delete this paragraph and include a cross-reference to the appropriate section. Otherwise, select appropriate paragraphs on topsoil. Check with the local Agriculture County Extension Service Office for soil properties appropriate for the plant materials to be planted. Where suitable topsoil is available within limits of the work area, stripping and stockpiling of topsoil should be included in the applicable section of Division 2 of the specification. If suitable topsoil is not available within the limits of the work area, it should generally be the Contractor's option to either treat the soil of the graded areas with fertilizer and supplements so as to be conducive to turf establishment and maintenance, or to transport topsoil to the project site. Modify pH range for specified turf and geographical requirements.
****

2.2.1 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph COMPOSITION. When available topsoil must be existing surface soil stripped and stockpiled on-site in accordance with Section [31 00 00 EARTHWORK][31 23 00.00 20 EXCAVATION AND FILL].

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph COMPOSITION. Additional topsoil must be [furnished by the Contractor] [obtained from topsoil borrow areas indicated].

2.2.3 Composition

Containing from 5 to 10 percent organic matter as determined by the

topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 19 mm 3/4 inch, with maximum 3 percent retained on 6 mm 1/4 inch screen. The pH must be tested in accordance with ASTM D4972. Topsoil must be free of sticks, stones, roots, and other debris and objectionable materials. Other components must conform to the following limits:

Silt	[25-50][7 to 17][_____] percent
Clay	[10-30][4 to 12][_____] percent
Sand	[20-35][70 to 82][_____] percent
pH	[5.5 to 7.0][_____]
Soluble Salts	[600] [_____] ppm maximum

2.3 SOIL CONDITIONERS

****
NOTE: Prior to including these provisions in project specifications, perform tests of on-site topsoil to determine its suitability and the possible need of pH adjusters or soil conditioners. Delete these requirements in developed areas and on small projects where planting is minimal.
****

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.3.1 Lime

****
NOTE: Use ASTM C602 calcium carbonate equivalent (C.C.E.) as specified in Table 1: for burnt lime, C.C.E. must not be less than 140 percent; for hydrated lime, C.C.E. must not be less than 110 percent; and for limestone, C.C.E. must not be less than 80 percent.
****

Commercial grade [hydrate] [or] [burnt] limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C602 of not less than [_____] percent.

2.3.2 Aluminum Sulfate

Commercial grade.

2.3.3 Sulfur

100 percent elemental

2.3.4 Iron

100 percent elemental

2.3.5 Peat

Natural product of [peat moss] derived from a freshwater site and conforming to [ASTM D4427] [as modified herein]. Shred and granulate peat to pass a 12.5 mm 1/2 inch mesh screen and condition in storage pile for minimum 6 months after excavation.

2.3.6 Sand

Clean and free of materials harmful to plants.

2.3.7 Perlite

Horticultural grade.

2.3.8 Composted Derivatives

Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:

2.3.8.1 Particle Size

Minimum percent by weight passing:

4.75 mmNo. 4 mesh screen	95
2.36 mmNo. 8 mesh screen	80

2.3.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.9 Gypsum

Coarsely ground gypsum comprised of calcium sulfate dihydrate 80 percent, calcium 18 percent, sulfur 14 percent; minimum 96 percent passing through 850 micrometers 20 mesh screen, 100 percent passing thru 970 micrometers 16 mesh screen.

2.3.10 Calcined Clay

Calcined clay must be granular particles produced from montmorillonite clay calcined to a minimum temperature of 650 degrees C 1200 degrees F. Gradation: A minimum 90 percent must pass a 2.36 mm No. 8 sieve; a minimum 99 percent must be retained on a 0.250 mm No. 60 sieve; and material passing a 0.150 mm No. 100 sieve must not exceed 2 percent. Bulk density: A maximum 640 kilogram per cubic meter 40 pounds per cubic foot.

2.4 FERTILIZER

****

NOTE: Check with the local Agriculture County Extension Service Office for recommended fertilizer mixture for local conditions.

****

2.4.1 Granular Fertilizer

[Organic][synthetic], granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

[_____] percent available nitrogen
[_____] percent available phosphorus
[_____] percent available potassium
[_____] percent sulfur
[[_____] percent iron

]2.4.2 Hydroseeding Fertilizer

Controlled release fertilizer, to use with hydroseeding and composed of pills coated with plastic resin to provide a continuous release of nutrients for at least 6 months and containing the following minimum percentages, by weight, of plant food nutrients.

[_____] percent available nitrogen
[_____] percent available phosphorus
[_____] percent available potassium
[[_____] percent sulfur
][[_____] percent iron

]2.5 MULCH

****
NOTE: Check with the local Agriculture County Extension Service Office to determine choice of mulch most suitable for the project area. Specify only one type of mulch.
****

Mulch must be free from noxious weeds, mold, and other deleterious materials.

2.5.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw must contain no fertile seed.

2.5.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay must be sterile, containing no fertile seed.

2.5.3 Wood Cellulose Fiber Mulch

****
NOTE: Wood cellulose fiber mulches have been successful on level areas or on slopes with slight grades where sufficient moisture is present to obtain a quick germination of grass seed. The material should be hydraulically applied at the following rates: Areas up to and including 3 to 1 slopes, at the rate of 1,120 kg per 10,000 sq. m 1,000 pounds per acre; areas steeper than 3 to 1 at the rate of 1,568 kg per 10,000 sq. m 1,400 pounds

per acre. It should not be specified for slopes 2 to 1 or greater in areas where drought may prevent germination of the seed or where runoff from heavy rains may cut gullies through the fiber mulch. In these areas use erosion control materials such as specified in paragraph EROSION CONTROL MATERIAL.
****

****
NOTE: Hydraulic mulch is an EPA designated product for recycled content. Recycled content percentages listed are recommended by EPA; additional information can be found on the EPA's "Comprehensive Procurement Guidelines (CPG)" page within EPA's website at http://www.epa.gov.
****

Use recovered materials of either paper-based (100 percent post-consumer content) or wood-based (100 percent total recovered content) hydraulic mulch. Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of materials application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 5.5 to 8.2 [_____]. Use with hydraulic application of grass seed and fertilizer.

2.6 WATER

****
NOTE: When water is Government furnished, locate the source. Recycled or reclaimed irrigation water may be available through a tertiary treatment plant on or off site. It is preferred that this type of water be used for irrigation whenever possible. Check project specific conditions.

Unless otherwise directed, water is the responsibility of the Contractor. Water source must be potable or non-potable. If non-potable edit specification accordingly. Source of water must be approved by the Contracting Officer and must be of suitable quality for irrigation, containing no elements toxic to plant life.

Coordinate information presented here with Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.
****

Source of water must be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

[2.7 EROSION CONTROL MATERIALS

****
NOTE: The Contractor may propose other types of erosion control material, based on site conditions.
****

Erosion control material must conform to the following:

[2.7.1 Erosion Control Blanket

[100 percent agricultural straw][70 percent agricultural straw/30 percent coconut fiber matrix] stitched with a degradable nettings, designed to degrade within [12 months][18 months].

][2.7.2 Erosion Control Fabric

Fabric must be knitted construction of polypropylene yarn with uniform mesh openings 19 to 25 mm 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips must have a minimum life of 6 months.

][2.7.3 Erosion Control Net

Net must be heavy, twisted jute mesh, weighing approximately 605 grams per meter 1.22 pounds per linear yard and 1200 mm 4 feet wide with mesh openings of approximately 25 mm one inch square.

][2.7.4 Hydrophilic Colloids

Hydrophilic colloids must be physiologically harmless to plant and animal life without phytotoxic agents. Colloids must be naturally occurring, silicate powder based, and must form a water insoluble membrane after curing. Colloids must resist mold growth.

]2.7.5 Erosion Control Material Anchors

Erosion control anchors must be as recommended by the manufacturer.

]PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation prior to planting (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.

3.1.1.1 Topsoil

Provide 102 mm 4 inches of [off-site topsoil][on-site topsoil][existing soil] to meet indicated finish grade. After areas have been brought to indicated finish grade, incorporate [fertilizer] [pH adjusters] [soil conditioners] into soil a minimum depth of [100] [_____] mm [4] [_____] inches by disking, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 19 mm 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.

[3.1.1.2 Soil Conditioner Application Rates

****

NOTE: Check with the local Agriculture County

Extension Service and specify amounts applicable for the project area.

****

Apply soil conditioners at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

[Lime [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Sulfur [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Iron [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Aluminum Sulfate [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Peat [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

][Sand [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

][Perlite [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

][Compost Derivatives [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

][Calcined Clay [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

][Gypsum [[_____] cubic meters per square meter [_____] cubic yard per acre] [[_____] cubic meters per 100 square meters [_____] cubic yards per 1000 square feet.]

]][3.1.1.3 Fertilizer Application Rates

****

NOTE: Check with the local Agriculture County Extension Service and specify amounts applicable for the project area. Two fertilizer applications may be required when hydroseeding with wood fiber mulch.

****

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

[Organic Granular Fertilizer [[_____] kg per square meter [_____]

pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Synthetic Fertilizer [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

][Hydroseeding Fertilizer [[_____] kg per square meter [_____] pounds per acre] [[_____] kg per 100 square meters [_____] pounds per 1000 square feet.]

]]3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

****
NOTE: Check with the local Agriculture County Extension Service to determine proper planting seasons for specie specified, for the optimum cover depth, and for the proper rate of application for sowing and drilling seed as this rate varies with the specie of seed used and local conditions. Allow for planting period in the construction completion time. Delete time restrictions for continuous growing conditions.
****

****
NOTE: Delete the last two lines of this paragraph when hydroseeding is selected as the only seed application method.
****

Immediately before seeding, restore soil to proper grade. Do not seed when ground is muddy [frozen] [snow covered] or in an unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.

3.2.2 Seed Application Method

Seeding method must be [broadcasted and drop seeding][drill seeding][hydroseeding].

[3.2.2.1 Broadcast and Drop Seeding

Seed must be uniformly broadcast at the rate of [_____] kilograms per hectare pounds per 1000 square feet. Use broadcast or drop seeders. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed uniformly to a maximum depth of [6] [_____] mm 1/4 inch in clay soils and [13] [_____] mm [1/2] [_____] inch in sandy soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

][3.2.2.2 Drill Seeding

****
NOTE: Check with the local Agriculture County Extension Service to determine proper planting seasons for specie specified, for the optimum cover depth, and for the proper rate of application for sowing and drilling seed as this rate varies with the specie of seed used and local conditions. Allow for planting period in the construction completion time. Delete time restrictions for continuous growing conditions.
****

Seed must be drilled at the rate of [_____] kilograms per hectare pounds per 1000 square feet. Use [cultipacker seeders] [grass seed drills] [_____]. Drill seed uniformly to average depth of [13] [_____] mm [1/2] [_____] inch.

][3.2.2.3 Hydroseeding

****
NOTE: Check with the local Agriculture County Extension Service to determine rate of application. This rate will vary due to site requirements for fertilizer, mulch material, and rates of seeding.
****

First, mix water and fiber. Wood cellulose fiber, paper fiber, or recycled paper must be applied as part of the hydroseeding operation. Fiber must be added at 11.2 kg per 100 square meter 1,000 pounds, dry weight, per acre. Then add and mix seed and fertilizer to produce a homogeneous slurry. Seed must be mixed to ensure broadcasting at the rate of [_____] kilograms per hectare pounds per 1000 square feet. When hydraulically sprayed on the ground, material must form a blotter like cover impregnated uniformly with grass seed. Spread with one application with no second application of mulch.

]3.2.3 Mulching

[3.2.3.1 Hay or Straw Mulch

Hay or straw mulch must be spread uniformly at the rate of 0.75 metric tons per hectare 2 tons per acre. Mulch must be spread by hand, blower-type mulch spreader, or other approved method. Mulching must be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch must not be bunched or clumped. Sunlight must not be completely excluded from penetrating to the ground surface. All areas installed with seed must be mulched on the same day as the seeding. Mulch must be anchored immediately following spreading.

][3.2.3.2 Mechanical Anchor

Mechanical anchor must be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

][3.2.3.3 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier must be sprayed at a rate between 666 to 866 liters per hectare 10 to 13 gallons per 1000 square feet. Sunlight must not be completely excluded from penetrating to the ground surface.

][3.2.3.4 Non-Asphaltic Tackifier

Hydrophilic colloid must be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture must be applied over the area.

][3.2.3.5 Asphalt Adhesive Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 666 to 866 liters per hectare 10 to 13 gallons per 1000 square feet, using power mulch equipment which must be equipped with suitable asphalt pump and nozzle. The adhesive-coated mulch must be applied evenly over the surface. Sunlight must not be completely excluded from penetrating to the ground surface.

][3.2.4 Rolling

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NOTE: Normally the roller weight should not exceed 134 kg per m 90 pounds per foot of roller width. Light rolling is needed on newly seeded and sprigged areas to firm the seed or sprigs into contact with the soil for optimum germination and growth. However, excessive soil compaction beyond this firming action will reduce the desirable percentages of air and water spaces in good growing topsoil.

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Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding [134] [_____] kg per m [90] [_____] pounds for each foot of roller width.[If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be eliminated.]

]3.2.5 Erosion Control Material

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NOTE: Specify erosion control where water concentrates and flows across areas at velocities which create an erosion hazard. Allow Contractor option for type of erosion control material, unless project specific requirements dictate otherwise.

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Install in accordance with manufacturer's instructions, where indicated or as directed by the Contracting Officer.

3.2.6 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to insure thorough wetting of soil to a depth of [50] [_____] mm [2] [_____] inches without run off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

[3.4 RENOVATION OF EXISTING TURF AREA

[3.4.1 Aeration

Upon completion of weed eradication operations and Contracting Officer's approval to proceed, aerate turf areas indicated , by approved device. Core, by pulling soil plugs, to a minimum depth of [_____] mm [_____] inches.[Leave all soil plugs, that are produced, in the turf area.][Remove all debris generated during this operation off site.][After aeration operations are complete, topdress entire area [6.35 mm1/4 inch] [12.70 mm1/2 inch] depth with the following mixture:

[[_____] percent sand

][[_____] percent humus

][[_____] percent gypsum

][[_____] percent organic fertilizer

][[_____] percent synthetic fertilizer

] Blend all parts of topdressing mixture to a uniform consistency throughout.] Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean all soil plugs off of other paving when work is complete.

][3.4.2 Vertical Mowing

Upon completion of aerating operation and Contracting Officer's approval to proceed, vertical mow turf areas indicated, by approved device, to a depth of [6 mm1/4 inch] [13 mm1/2 inch] above existing soil level, to reduce thatch build-up, grain, and surface compaction. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work is complete. Remove all debris generated during this operation off site.

][3.4.3 Dethatching

Upon completion of aerating operation and Contracting Officer's approval to proceed, dethatch turf areas indicated, by approved device, to a depth of [6 mm1/4 inch] [13 mm1/2 inch] below existing soil level, to reduce thatch build-up, grain, and surface compaction. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work is complete. Remove all debris generated during this operation off site.

][3.4.4 Overseeding

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NOTE: Drill seeding is the most viable method of overseeding when significant vegetation remains. Existing vegetative cover (live or dead) may prevent desired soil contact when seeded by other methods.

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Apply seed in accordance with and at rates indicated in applicable portions of paragraph SEED APPLICATION METHOD.

]]3.5 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations at the Contractor's expense. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work in adjacent areas is complete.

-- End of Section --