

COCONINO COUNTY SEEDING SPECIFICATION

1.0 GENERAL CONDITIONS AND REQUIREMENTS

1.1 DESCRIPTION

The work shall include the supply and transport of all labor, material, and equipment required for soil preparation, furnishing, and placing seed as shown on the plans and to the requirements of this construction specification.

1.2 SCOPE OF WORK

1.2.1 Temporary Seed Mix

If required, prepare seedbed and seed all disturbed areas with Temporary seed mix once final grading is achieved.

1.2.2 Permanent Seed Mix

Prepare seedbed and seed all disturbed areas with Permanent seed mix once final grading is achieved. This task may consist of two applications of the Permanent seed mix. A second application may be required once success or failure of the first application has been determined by the County. The second application may occur over the previously prepared bed or require additional preparation at the discretion of the County.

1.3 SUBMITTALS

- Permanent seed mix utilized including composition percentages and application rates
- If required, Temporary seed mix utilized including composition percentages and application rates
- Seed labels and certified laboratory analysis results
- If Hydroseeding is utilized, the tacking agent swell volume test results

2.0 MATERIALS

2.1 SEED

2.1.1 Seed Certification Requirements

Seed shall be labeled in accordance with the state laws and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect. Supplier will provide seed label with certified laboratory results for seed lot mix. Analysis shall include seed purity and percent inert matter, percent other crop seeds, percent weed seeds and name of restricted and noxious weed species (see below), percent germination along with percent hard and dormant seed, and any information on the

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certification class of seed. No seed will be accepted with a test date of more than 9 months before the delivery date to the site. Seed that does not meet the standard identified below will not be accepted. Seed should not be ordered or arrive on site until certified laboratory results have been reviewed and approved by the County. Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted. Seed bag tags provide the information needed to verify the quality and amount of seed in the lot. Bag tags should remain on the bags for inspector's verification.

- Live seed material not specified in the seed mix (see tables below) shall not exceed one percent (1%) by weight of the total mixture.
- No weeds on the Arizona Department of Agriculture's Arizona Noxious Weed List (updated January 2020) are allowed in the seed mix.
- Coconino National Forest maintains a list of Invasive Plant species for the area, which is categorized by level of concern. No category 'A', 'B', or 'E' species will be allowed in the seed mix. Category 'C' species in the mix will have the percent composition of the mix documented and reported to the project sponsor. The most recent Coconino National Forest Invasive Plant Species List is available from the USFS or Coconino County.
- The percent of noxious weed seed allowable shall be as defined in the current State laws relating to agricultural seeds or by the Coconino National Forest regulations, whichever is more restrictive. Coconino National Forest sets a high standard for weed management that is applicable to all Coconino County lands.

2.1.2 Seed Substitution

Substitutions for seed species or changes to percent composition of mix may be suggested by Contractor based on market availability of specified seed. However, all substitutions shall be reviewed and approved by the County prior to arrival on site and shall pass the same certification process as the original seed mix. Any cost reduction created by substitutions or changes to the seed mix shall be passed back to County upon approval.

2.1.3 Seed Mixes

The Temporary seed mix shall be used for a short-term cover which germinates and establishes rapidly for effective erosion control, weed control and temporary cover. A Temporary seed mix shall be required and applied to all disturbed areas if disturbed areas are left untouched or open for more than six weeks during the growing season (March through September) or in disturbed areas that will require future weed management or grading and that are left open during the growing season. The Permanent seed mix shall be used as the final diverse native grass mix. The Permanent seed mix will be applied to all disturbed areas before the end of the project.

For wetlands, wet meadows, riparian areas, or other areas deemed a special concern for habitat, the seed mix will depend on site conditions and must be specially designed to meet those site conditions and habitat goals. For normal construction

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areas, right of way work and staging areas, the seed mix can be derived from the conditions set forth below.

The seeding rates given below are for broadcast seeding methods (both mechanical and hand) and hydroseeding. Seeding rates for drill seeding may be halved.

A. TEMPORARY SEED MIX

Species	Scientific Name	% Composition	Seeding Rate
Quickguard™ Sterile Triticale*	<i>Triticum aestivum</i> x <i>Secale cereale</i>	100%	20 PLS lbs/ac

*or similar

Note: Sterile triticale seed will provide one season of growth only and the area must be overplanted with a permanent cover. All materials shall meet the approval of the Engineer (and USFS biological specialists when on USFS lands) before purchase and application.

-or-

Alternatively, the Temporary seed mix shall consist of at least one cool season and one warm season grass that are native to the immediate area and appropriate for the soils, aspect and hydrologic regime of the site.

B. PERMANENT SEED MIX

- i. For volcanic or limestone soils above 6,800 feet in elevation use:

Species	Scientific Name	% Composition	Pure Stand Seeding Rate PLS lbs/ac	Final Mix Seeding Rate PLS lbs/ac
Blue Grama	<i>Bouteloua gracilis</i>	25	4	1
Little Bluestem	<i>Schizachyrium scoparium</i>	25	10	2.5
Arizona Fescue	<i>Festuca arizonica</i>	25	6	1.5
Western Wheatgrass	<i>Pascopyrum smithii</i>	25	24	6

Potential Alternatives: Mountain Muhly (*Muhlenbergia montana*), Purple Three-awn (*Aristida purpurea*), or Pine Dropseed (*Blepharoneuron tricholepsis*) may be acceptable substitutions for Little Bluestem. Muttongrass (*Poa fendleriana*), Slender Wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*), Bottlebrush Squirreltail (*Elymus elymoides*), Prairie Junegrass (*Koeleria macrantha*), or Needle and Thread (*Hesperostipa comata*) may be acceptable substitutions for Arizona Fescue or Western Wheatgrass.

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ii. For volcanic or limestone soils below 6,800 feet in elevation use:

Species	Scientific Name	% Composition	Pure Stand Seeding Rate PLS lbs/ac	Final Mix Seeding Rate PLS lbs/ac
Blue Grama	<i>Bouteloua gracilis</i>	12.5	4	0.5
Sideoats Grama	<i>Bouteloua curtipendula</i>	12.5	14	3.5
Purple Three-awn	<i>Aristida purpurea</i>	25	12	3
Muttongrass	<i>Poa fendleriana</i>	25	5	1.25
Western Wheatgrass	<i>Pascopyrum smithii</i>	25	24	6

Potential Alternatives: Little Bluestem (*Schizachyrium scoparium*), Vine Mesquite (*Panicum obtusum*), Fringed Brome (*Bromus ciliatus*), Bottlebrush Squirreltail (*Elymus elymoides*), Slender Wheatgrass (*Elymus trachycaulus ssp. trachycaulus*), Needle and Thread (*Hesperostipa comata*), Prairie Junegrass (*Koeleria macrantha*), or Indian Ricegrass (*Achnatherum hymenoides*)

iii. For sand or cinder soils use:

Species	Scientific Name	% Composition	Pure Stand Seeding Rate PLS lbs/ac	Final Mix Seeding Rate PLS lbs/ac
Purple Three-awn	<i>Aristida purpurea</i>	25	12	3
Galleta Grass	<i>Pleuraphis jamesii</i>	25	16	4
Indian Ricegrass	<i>Achnatherum hymenoides</i>	25	14	3.5
Needle and Thread	<i>Hesperostipa comata</i>	25	20	5

Potential Alternatives: Spike Dropseed (*Sporobolus contractus*), Sand Dropseed (*Sporobolus cryptandrus*), Sideoats Grama (*Bouteloua curtipendula*), Blue Grama (*Bouteloua gracilis*), Cane Bluestem (*Bothriochloa barbinodis*), Sand Bluestem (*Andropogon hallii*), Thickspike Wheatgrass (*Elymus lanceolatus ssp. lanceolatus*), Vine Mesquite (*Panicum obtusum*: lower elevation)

iv. For clay soils use:

Species	Scientific Name	% Composition	Pure Stand Seeding Rate PLS lbs/ac	Final Mix Seeding Rate PLS lbs/ac
Galleta Grass	<i>Pleuraphis jamesii</i>	35	16	5.6
Alkalai Sacaton	<i>Sporobolus airoides</i>	30	4	1.2
Western Wheatgrass	<i>Pascopyrum smithii</i>	35	24	8.4

Potential Alternatives: Blue Grama (*Bouteloua gracilis*), Buffalograss (*Bouteloua dactyloides*), Little Bluestem (*Schizachyrium scoparium*), Muttongrass (*Poa fendleriana*), Curly Mesquite (*Hilaria belangeri*)

-or-

The permanent cover seed mix shall consist of, at minimum, two cool season and two warm season native, perennial grass species appropriate to the site. Chosen species should be dominant species from adjacent sites with similar soils,

hydrology and aspect. Perennial forbs and annual grasses can be added as required per the goals of the revegetation plan. However, all materials shall meet the approval of the County (and USFS biological specialists when on USFS lands) before purchase and application.

2.2 HYDROSEED ADDITIVES (IF UTILIZED)

Hydroseeding requires the use of a tacking agent, hydraulic mulch, and usually an indicator dye. Inoculum and fertilizer may be used if recommended by the supplier.

2.2.1 Tacking Agent

Tacking agent shall be a naturally occurring organic compound (often guar gum or plantago based) and shall be non-toxic. The tacking agent shall be a product typically used for binding soil and mulch in seeding or erosion control operations. The tacking agent shall be labeled indicating the type and purity. Tacking agents shall be applied at the rate recommended by the manufacturer or supplier.

2.2.2 Hydraulic Mulch

Hydraulic mulch shall be organic material (generally wood fiber or straw) that is designed to be used in hydroseeding. Hydraulic mulch should have low paper cellulose fiber content (high wood fiber or straw fiber content) and low ash content. Mulch shall be non-toxic, biodegradable, and have good absorbency or water holding content. Hydraulic mulch shall be applied at the rate recommended by the manufacturer or supplier.

2.2.3 Indicator Dye

An indicator dye should be used that is non-injurious to plant growth.

2.2.4 Inoculum and Fertilizer, if utilized

Inoculum and fertilizer can increase the success of seeding. Inoculum and fertilizer shall be used at the manufacturer recommended rate for hydroseeding.

3.0 EXECUTION

3.1 SEEDBED PREPARATION

Once the project area has been graded to appropriate elevations, ensure that the surface soil is in a roughened condition favorable for seed germination and growth. On sites where equipment can safely operate on slopes, the seedbed shall be adequately loosened (4 to 6 inches deep) and smoothed, with large clods being broken up. Areas that have been compacted by heavy equipment or other operations shall be ripped to a depth of at least 6 inches to ensure adequate permeability. All ripping should be conducted on contour to prevent rilling during runoff conditions. Disking, cultipacking, or both may be necessary to properly prepare a seedbed that is too rough to uniformly scatter seed. Where equipment

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cannot operate safely, the seedbed shall be prepared by hand methods by scarifying to provide a roughened soil surface so that broadcast seed will remain in place.

3.2 SEED APPLICATION

Application rate of seed, as specified, are for Pure Live Seed (PLS). PLS is a measure of seed that will germinate. PLS is determined by multiplying the percent purity by the sum of the percent of total viable seed (includes hard and dormant seed). Seed mix species, percent composition, and the PLS application rates per acre are shown in the seed mix tables above, Part 2.1.

All seeding operations shall be performed in such a manner that the seed is applied in the specified quantities uniformly in the designated areas. Seed shall be incorporated into the soil, but not more than 0.5 inch deep if using the dry method or hand application, as described below. Seeding should occur before installation of erosion control fabric, if required. To control erosion and weeds, apply seed to disturbed soil and slopes as soon as is practical after disturbance.

To increase likelihood of seeding success, seeding should be timed to precede seasonal monsoon moisture or winter snow cover. Avoid leaving seed on the soil for long periods of time without adequate moisture for germination and growth or winter cover, as this will promote seed predation by birds and insects. Seed should be worked into ground and/or protected by mulch. Seeding that occurs late in summer towards end of monsoon season rains may germinate but lack adequate growth during the shortened wet season to successfully over winter.

3.3 SEEDING METHODS

The following methods may be used to place material:

- *Hydroseeding Method.* Mix seed, hydraulic mulch, tacking agents, dye, inoculum and fertilizer (if utilized) with water in the amount and order specified by the manufacturer or supplier. Apply it under pressure at the rates specified. Hydroseeding mixing has the potential to mechanically damage native grass seeds. The mix should be utilized within 1/2 hour of adding seed to avoid over agitation and seed damage.
- *Dry Method.* Use mechanical, landscape, or cultipacker seeders, seed drills, or other approved mechanical seeding equipment to apply the seed. Dry method application must also utilize a weed-free mulch or erosion control fabric application over the seedbed as specified by the County and placed per manufacturer's specifications.
- *Hand Application.* Hand-operated seeding devices may be used to apply dry seed. Hand application method must also utilize a weed-free mulch or erosion control fabric application over the seedbed as specified by the County and placed per manufacturer's specifications.

4.0 MEASUREMENT AND PAYMENT

SUPPLY & PLACE GRASS SEED MIX shall be measured and paid on a per acre basis as determined from the plans and shall include all other areas disturbed by construction operations. Site preparation shall be incidental to those operations, and no separate payment will be made. No payment will be made for areas seeded with unapproved seed. No adjustment in payment will be made for the number of seeding mobilization activities.

Final payment will be made after determination of seeding establishment by the County.

***** END OF SECTION *****