

805 SEEDING

Certificates of Compliance conforming to Specification 106.05 are needed for all material used in seeding.

The materials are also to be inspected on the project, sampled, and tested.

Commercial materials are required to be labeled showing all the included ingredients. The Inspector must have a clear understanding with the (sub)Contractor as to the areas to be seeded and which method will be used in each area. Do not allow operations during windy weather. Raking, harrowing, disking, and loosening of the soil as specified are very important.

Read the Specification carefully and see that the procedures are followed faithfully. The procedures are the result of many years of experience and are known to give the best possible results.

A review of slope soil types is quite important. Erosion problems can lead to unsightly slopes and cause maintenance problems. In some cases, this creates a safety hazard and water pollution if not properly handled. If erodible soils are on or near the surface of slopes, consideration must be given to reducing erosion through seeding.

805-2 Materials

805-2.02 Seed

Seed is specified by using genus, species, and sometimes variety. When a variety is specified, no other variety is acceptable unless approved by the Landscape Architect (who would consider delivery times, complications, plant characteristics, cost, etc.). An example would be *Agropyron trichophorum* (Luna). If *Agrophyron trichophorum* were specified, any variety of *Agrophyron trichophorum* would be acceptable. If *Agrophyron trichophorum* (Luna) were specified, only the variety Luna would be acceptable.

The Specifications will designate the type of seed and the rate of application in terms of Pure Live Seed (PLS) pounds or ounces (grams or kilograms) per acre. Pure Live Seed is just that, all the seed that has a live germ in it. It is the total of germination rate and hard dormant seed. Purity is described as the amount of the weight (mass) that is actually seed and is given in percent: 95% purity indicates for each pound of weight (mass) you have only 95% seed, the rest being trash or dead seed.

To determine how much pure live seed you have in a given weight (mass), you multiply the purity by the total of the germination and the hard (dormant) seed. If you have ten pounds (4.5 kg) of seed with 50% germination, 5% hard seed, and a purity of 60%, you would have 3.3 pounds (1.5 kg) of pure live seed. This can be shown as follows:

$$\begin{array}{rcl} \text{purity} & (\text{germination} + \text{hard seed}) & (\text{PLS}) \\ .60 \times & (.50 + .05) & = .33 \end{array}$$

For each 10 pounds (4.5 kg) of seed from the sack, the PLS equals: $.33 \times 10 = 3.3$ pounds ($.33 \times 4.5 = 1.5$ kg) of PLS

Each seed container will be labeled as required by Arizona and Federal Laws.

The labels will indicate, among other things, percent purity or pure seed, percent hard or dormant seed (if there is no hard or dormant seed the term may not even be listed), and the percent germination.

Two examples of how this information may be listed are shown below:

A		B	
Pure Seed	98.00	Purity	98.25
Other Crop	0.30	Crop	0.67
Inert	1.65	Inert	1.06
Weeds	0.05	Weeds	0.02
Noxious Weeds	0	Noxious Weeds	0
Germination	88.00	Germination	85.00
Hard Seed	0	Dormant Seed	1.00

Note: The values in the above table are in percent. In order to make calculations, convert the percent values to decimal proportions by dividing each by 100. For example, 98.00 (%) = 0.98.

The adjusted rates of application are computed by the PLS formula as follows using the examples shown above:

$$A: PLS = (0.88 + 0) \times 0.98 = 0.86$$

$$B: PLS = (0.85 + .01) \times 0.9825 = 0.84$$

The adjusted rate of application of seed is then calculated by dividing the specified rate of application by the PLS percent.

If the specified application rate is 12 pounds (5.5 kg) per acre, then using the appropriate percent from the above calculations:

$$A: 12/0.86 = 13.95 \text{ lbs. per acre (5.5/0.86 = 6.4 kg per acre)}$$

$$B: 12/0.84 = 14.28 \text{ lbs. per acre (5.5/0.84 = 6.6 kg per acre)}$$

We now have an adjusted rate of application that will provide 12 pounds (5.5 kg) of pure live seed per acre.

805-2.03 Mulch

(A) Wood Cellulose Fibers

Wood fiber is usually used for Class I seeding and straw is usually specified for Class II seeding.

Wood cellulose fibers made from virgin wood is specified to prevent the use of shredded newspaper or other paper products. Ink, glues, and other impurities used in paper manufacturing can be detrimental to plant growth.

(B) Straw

Straw shall be certified, free of restricted or noxious weed seed, and from the current season's crop to preclude the use of dry brittle mulch that does not crimp properly. The Resident Engineer will select a minimum of one bale of straw from each shipment, and open the bale to check for dry brittle straw and take samples of any uncommon seed in the straw. The object of the crimping is to provide vertical stubble to help hold the loose

stems from blowing away.

It is more desirable to have mulch crimped but if the soil is too rocky or the land is too steep for good crimping, the alternative is to tack the mulch.

805-3 Construction Requirements

Recommended inspection steps are as follows:

1. Check that all seed mix components have been approved and delivered to the jobsite.
2. Estimate the total acreage requiring seeding on the project. Start with plan areas, then field check for any adjustments required. Convert to slope areas, if applicable.
3. Check that seed delivered to the project is of sufficient weight to cover the total acreage.
4. Review the seed tags for all certification requirements. If the tag doesn't include the final pure live seed content, or application rate, request and check the calculations in accordance with subsection 805-2.02 in this manual.
5. Observe weighing and verify weights when batched.
6. The [Seeding Rate/Batch Mix](#) form provides a guideline for the mix design calculations and inspection information.

805-3.01 General

Many problems can be prevented in the initial stages of construction if the Contractor will protect the roadway as the work progresses. Elimination of low spots, grading of slopes, and direction of drainage water can all reduce damages. Poor construction practices can, in the long run, cost the Contractor additional money to correct the damage. Roadside Development is available to assist the ADOT construction personnel in changing erosion control or seeding requirements.

The permanent protection of earth fill and cut slopes should be accomplished as soon as possible. When provided in the contract, topsoil should be evenly placed on the slopes at the specified depth for areas to be seeded. The topsoil shall then be compacted per specifications, taking care to have the topsoil penetrate and bond with the soil it is covering. The purpose for this is to penetrate the topsoil layer, bonding it to the underlying material and to lessen the possibility of losing the topsoil by erosion.

Seed and fertilizer are to be uniformly applied on the slopes at the rate and mixture specified in the contract. Application shall be by an approved hydro-seeder, blowing equipment, properly equipped helicopters, or power drawn drills or seeders. Where areas are inaccessible for this equipment, approved hand seeding will be permitted.

All seed mixtures shall be mixed under the direction of the Resident Engineer. The Resident Engineer will take samples from each supplier of each type of seed before mixing the seed.

In order for the Contractor to order the proper amount of materials for the project and to provide the Inspector a method of checking the rate application of the seed and fertilizer to determine if the required rate of application is being met, the Resident Engineer shall measure the areas to be seeded and fertilized as soon as they can be determined and inform the Contractor of the anticipated acreage. During the seeding and fertilizing operation, the Inspector shall see that the material is placed at a uniform rate and compare the amount of seed and fertilizer applied with the area covered to verify that the proper rate of application is being placed.

A fillable [Seeding Rate/Batch Mix](#) form has been developed to assist the inspector in documenting the

Contractor's application and verifying the calculations of the seed mix and weight per load.

The seed shall be applied in a separate application after fertilizing. Straw mulch must be uniformly applied to the seeded areas within 48 hours after seeding. Checks are also necessary to determine that the mulch is applied uniformly and at the required rate. In areas that cannot be reached by a mulch spreader, hand methods resulting in uniform application may be used. The straw shall be crimped or tacked within 24 hours after being placed.

Crimping the mulch is the preferred method for anchoring mulch, and must be performed immediately behind the straw application. In some areas, it may be specified for the Contractor to anchor the mulch with a tacking agent. The Standard Specifications and Special Provisions are quite complete in the method of anchoring mulch.

In order to control the possible erosion resulting from fast run-off on steep slopes, excelsior matting may be used for temporary erosion control. It also has its use on flatter slopes (less than 3:1) where erodible soils are encountered. The purpose for using matting is to provide a quick temporary protection until the grass has grown enough to be permanent protection for the soil, but the matting cannot be expected to cope with water other than precipitation. Drainage from above or beyond the raw slope should be controlled by ditching or drains. The Inspector is charged with being alert to this potential problem and making every effort to ensure that drainage is diverted from the slope.

Bermuda does not germinate well when the day length shortens and the weather cools. Generally the middle of September is the latest it should be planted. During a warm Fall, sometimes the date may be extended. It is the Contractor's responsibility to provide the necessary cover to prevent erosion during the winter months or assume the responsibility of repairing damaged areas.

There is usually no seeding date specified in the Special Provisions for Class II and III. It is felt that it is better to plant as soon as possible--before the soil crusts. A variety of different seeds is used to further the chances of success. Both cool and warm season germinating grass varieties, as well as shrub and flower seed, is used.