7.10 PERMANENT EROSION CONTROL

The normal periods for permanent urban and rural seeding are from March 1 to May 31 and from August 10 to September 30. Native and wetland grass seeding dates are between April 1 and June 30 and between August 1 and August 31. Wildflower seeding dates are between April 15 and June 30 and between August 1 and August 31. Spring overseeding is typically performed after February 1 and before April 1. Refer to Construction Manual Section 7.16 for more information on overseeding.

These dates may be modified by the Office of Construction or the Office of Design (Roadside Development Section). Changes in the dates will be based on temperature and moisture conditions and possibly specific project considerations.

Seeding date extension notices will be posted on the Office of Construction website.

7.11 PREPARATION OF SEEDBED

Before seeding operations commence, care should be taken to properly prepare the area to be seeded. Areas around culvert headwalls and wingwalls, shoulders, flumes, sign posts, and other structures require special attention. The seedbed shall be worked to a depth of at least 75 mm (3 inches) deep with field machinery and at least 50 mm (2 inches) deep in locations prepared by hand. The specifications require certain areas such as raised medians, islands, and rest areas to be prepared with a Rototiller.

All debris, including stones 75 mm (3 inches) in diameter and larger, logs, stumps, wire, and other objectionable material shall be picked up and disposed of off the project.

If the project has been stabilized with temporary seeding, the plans will usually include mowing as a contract item. In this case, the mowing will be accomplished prior to seeding the permanent seed with a native grass seed drill.

7.12 PREPARATION OF SEED MIXTURE

Seed

When more than 25 kg (50 pounds) of seed per batch are to be prepared, a mechanical mixer is required and may be pre-mixed in accordance with Article 2601.04E.

Mechanically printed seed tags should be checked before seed is prepared for seeding to verify that it complies with minimum purity and germination requirements, current test data, and variety. The date of the germination test on the seed tags should be checked also. The specifications, based on the Iowa Department of Agriculture regulations, require that the test date be within 9 months of the seed purchase.

If the tag indicates noncompliance, the seed may be used on a pure live seed (PLS) basis providing:

- Seed meeting the requirements cannot be obtained, and
- The seed meets the approval of the project engineer.

For each seed variety, remove and retain at least one seed tag per day of seeding.

When seed is used on a pure live seed basis (PLS), the quantity required must be calculated from test results. If the project requires 4 kg (10 pounds) of Switchgrass PLS per acre, and the tag rated the furnished seed at 98% purity and 95% germination, the pure live seed is computed as follows:

Purity	= 98% = 0.98
Germination	= 95% = 0.95
PLS (Pure Live Seed)	= Purity X Germination
	= 0.98 X 0.95
	= 0.93 = 93% PLS

To calculate the number of kilograms (pounds) of seed required to provide 4 kilograms (10 pounds) PLS:

4 kg (10 pounds) / 0.93 = 4.3 kg (10.75 pounds) of seed per acre

Sticking Agent
Seed to be inoculated shall be treated with a sticking agent prior to the application of the inoculant. A sticking agent is not required with liquid inoculant.

Fungicide
A non-mercurial fungicide was previously required for all permanent seeding. However, the use of fungicides has been discontinued effective with the October 3, 2000 letting.

Inoculant
An inoculant is required for legume seed. An inoculant is a culture of bacteria specifically formulated to enhance the growth of the seed. The inoculant shall be a type recommended by the manufacturer and applied at the rate according to our specifications.

Red clover is an example of a legume that is used in stabilizing crop seeding.

Urban Seed Mixtures
Each bag shall have seed tags for each species of grass with all of the required information, seed test date, and specified seeding rate percentages.

For example:

Bluegrass, Ky	70%
Creeping, Red Fescue	20%
Ryegrass, Perennial	10%

A 50 pound bag of mixed seed would contain 35 pounds of Ky Bluegrass, 10 pounds of Creeping Red Fescue, and 5 pounds of Perennial Ryegrass.

Based on an application rate of 4 pounds per 1,000 square feet, there would be:

Bluegrass, Ky	122 lbs. per acre
Creeping, Red Fescue	35 lbs. per acre
Ryegrass, Perennial	17 lbs. per acre

The tag should also include the project number, type and rate of preinoculant, and date of mixing.

The Department is not obligated to purchase remaining amounts of premixed seed as “unincorporated material.”

7.13 CONVENTIONAL SEEDING

The following suggested sequence of operations is for permanent seeding with a gravity or cyclone seeder when a prepared seedbed is required:

1. Prepare seedbed and ditches
2. Spread fertilizer
3. Disc in fertilizer approximately 75 mm (3 inches)
4. Roll with cultipacker
5. Apply seed for special ditch control
6. Apply special ditch control material
7. Apply grass and legume seed
8. Roll with cultipacker
9. Apply mulch
10. Till (tuck) mulch with a mulch stabilizer

Note: Items 5 & 6 may be placed after Item 8

7.14 HYDRO-SEEDING (HYDRAULIC SEEDING)

The suggested sequence of operations using a hydro-seeder is:

1. Prepare seedbed and ditches
2. Apply seed for special ditch control
3. Apply special ditch control material
4. Roll with cultipacker
5. Apply fertilizer, seed, inoculant, and water with hydro-seeder
6. Roll with cultipacker
7. Place mulch where specified
8. Till mulch with mulch stabilizer (step not required if hydro-mulch is used)

Note: Items 2 & 3 may be placed following Item 6

The following items should be noted when inspecting hydro-seeding:

A fanning motion or horizontal motion of the seeding nozzle insures uniform application of the seed. Do not use an "up and down" motion; it results in seed application too heavy near the seeder and too thin at the far reach of the spray.

The seeder tank must be cleaned when changing seed mixtures.

The agitator in the seeder tank must be in operation for a period of time prior to starting the seeding to insure mixing of the material in the tank. After mixing and during application of material, a continuous operation with a constant pressure must be maintained during the seeding.

The contractor should apply the mixture of water, seed, and fertilizer with the wind, if possible. The contractor should try to prevent mist from blowing across the roadway if open to traffic.

The seed may be in the fertilizer solution for no more than one hour.

7.15 URBAN SEEDING

The suggested sequence for seeding in urban areas is:

1. Apply fertilizer. Unless otherwise impractical, fertilizer should be applied with hand-operated, gravity or cyclone type equipment.
2. Prepare seedbed using a rototiller
3. Roll with grid-type roller. The roller must be the open-grid type or a cultipacker covered with expanded metal mesh. Brillion seeding equipment provides a roller in front and behind the seed hopper.
4. Apply seed
5. Roll with grid-type roller
6. Apply hydro-mulch (Note: Straw is typically not used in urban situations)

7.16 OVERSEEDING

Spring overseeding or "frost overseeding" is the application of permanent seed without preparing a seedbed. Spring overseeding is performed normally in February or March, but may be modified depending on the weather conditions.

The following guidelines should be used to determine when spring overseeding is allowed:

- Ground is relatively free of packed snow and ice.
- Light snow cover of not more than 100 mm (4 inches).
- The project may be free of snow and ice with the exception of a few ditches or slope areas. It would be permissible to allow the overseeding with the stipulation that the contractor would reapply the seed on those designated ditches or slopes as soon as the snow and ice have melted.

The application of seed when the ground is loose and friable from frost action provides a favorable condition for the earliest possible seed establishment. The application of seed prior to this ideal condition is more favored than after the ground is free of frost and dry. Seed applied when the ground is frozen is not generally detrimental. The loss of seed due to runoff, in the event of heavy spring rains or snow melt, should be minor.

7.17 OVERSEEDING AND FERTILIZING

The following is a recommended schedule of payment for the item of "Overseeding and Fertilizing:"

- 50% at the completion of the overseeding
- 30% after the completion of the first application of fertilizer
- 20% after the final application of fertilizer

7.18 AERIAL SEEDING

Aerial seeding is only allowed when specified in the contract documents. The distribution of seed on the ground should be checked during the aerial seeding operation. If a significant amount of seed falls onto the roadway shoulders or off of the right-of-way, the seeding operation should be halted and corrective action taken. For aerial application, the wind velocity should be less than 16 kph (10 mph).

As a guide, the following is a part of the Beaufort Scale for wind velocity:

		Speed	
Type	**Observations**	**km/h**	**(mph)**
Calm	Calm. Smoke rises vertically.	0-2	(0-1)
Light air	Direction of wind shown by smoke drift but not by wind vanes.	2-5	(1-3)
Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.	6-11	(4-7)
Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flags.	13-19	(8-12)
Moderate breeze	Raises dust and loose paper. Small branches are moved.	21-29	(13-18)
Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.	29-39	(18-24)

A subcontract request form is not required for the aerial applicator (airplane or helicopter), which is usually owner-operated.

Guidelines to allow/disallow use of local roads for takeoff and landing of planes which seed areas on primary projects are:

- Primary roads or local roads designated as detours shall not be used for takeoff/landing
- Takeoff/landing should be with written permission of the county engineer or local agency and with traffic control and signing as required by the owner of the road
- The owner of the road may, at their discretion, ask the applicator for:
  -- A “waive and hold harmless” agreement to reduce liability
  -- Proof of insurance
- Federal Aviation Regulations (FAR) are listed in Title 14 of the U.S. Code of Federal Regulations. They are available to view at Web address: http://www.faa.gov/avr/AFS/FARS/far_idx.htm

Applicable regulations are “FAR Part 91 – General Operating and Flight Rules” and “FAR Part 137 – Agricultural Aircraft Operations”.