

**SECTION 02900
SEEDING**

PART 1 GENERAL

1.01 - Section Includes

- A. Seeding Dates
- B. Finish Grading
- C. Seedbed Preparation
- D. Seed Preparation
- E. Application of Seed
- F. Soil Stabilization on Erosible Slopes
- G. Reseeding
- H. Cleanup
- I. Final Acceptance

1.02 - Description of Work

A. Seeding

This section includes preparation of seedbed, furnishing and placing seeding, fertilizing, mulching, maintenance, and providing a guarantee for completed seeded areas, as specified in the contract documents.

B. Imported Topsoil

This section also includes removal, loading, hauling, and disposal of any material required to make room for the topsoil, plus furnishing and spreading new topsoil. Topsoil shall be placed a minimum of 4" deep. This item shall only be provided at the direction of the ENGINEER.

C. Parkway Grading

This item includes the following work between the sidewalk and the back-of-curb: removal of existing turf, grading a smooth slope between the curb and sidewalk to promote positive drainage, removal of any excess material, and re-establishment of parkway (parking) grass by seeding.

1.03 - Protection of Property: Protect existing conditions at the site against damage including the following:

- A. Take precautions to insure that equipment, vehicles, and seeding operations do not disturb or damage existing grades, walls, drives, pavement, utilities, plants, lawns, irrigation systems, and other facilities.
- B. Verify locations and depths of all underground utilities prior to excavation and report conflicts with new seeding operations.
- C. Any damage to existing trees or shrubs, including branches and root systems, shall be repaired and/or pruned by an experienced tree surgeon or arborist.
- D. Repair, replace, and/or return to original condition any damaged item, without additional compensation.

1.04 - Submittals

- A. Submit from an established seed dealer or certified seed grower the certified blue tag from each container of seed of grass seed mixture dated within 12 months of delivery, indicating percentage by weight and percentage of purity, germination and weed seed for each grass, legume, and cereal crop stating botanical and common name of each species as specified in contract documents.
- B. Submit certificates of inspection as required by governmental authorities and manufacturer's or vendor's certified analysis for soil amendments.
 - 1. Fertilizer analysis with scale weight and statement of guaranteed analysis.
 - 2. Tackifier ingredients, recommended rates of application, and expiration date.
 - 3. Inoculant ingredient for legumes and the specific seed to be inoculated with the application rate and expiration date.
 - 4. Sticking agent ingredients with applicable use and rate by manufacturer.
 - 5. Degradable wood cellulose fiber mulch ingredients with applicable use and rate, and the water retention capacity by manufacturer or supplier.

- C. Submit written maintenance instructions recommending procedures for maintenance of seeded areas for one year, prior to final acceptance of the seeded areas.
- D. Upon request the Contractor will provide Material Certifications to the Engineer.

1.05 - Quality Assurance

- A. All seed shall have a certified blue tag from each container.
- B. All materials shall be in accordance with Iowa Seed Law and Iowa Department of Agriculture regulations and shall be labeled accordingly.
- C. Owner may have topsoil tested using Soil Organic Content Ignition (ASTM D 2974) at a commercial laboratory qualified to perform such test. Contractor shall pay cost for tests not passing; otherwise Owner will pay.

1.06 - Delivery, Storage and Handling

- A. Packaged materials shall be delivered in original, unopened, and undamaged containers.
- B. Store and protect materials off the ground to prevent wetting and deterioration.
- C. Deliver all seed in original containers. Seed shall not be mixed or blended except in the presence of the Engineer.

1.07 - Scheduling

- A. Notify Engineer two days minimum prior to start of seeding.
- B. Perform seeding after Engineer approves grading and planting.

1.08 - Warranty

- A. Provide a warranty for completed seeded areas, starting upon the date of initial acceptance (see 3.11 of this Section). The Engineer will provide written record of initial acceptance, upon request. The warranty is to guarantee completed seeded areas to provide a uniformly dense, live, and healthy stand of grass, free of weeds and undesirable grasses, debris, and free of eroded areas, bare spots, diseases, and insects at the end of the warranty period of one full year.
- B. During warranty period, any defects in the seeded area and grass stand such as weedy areas, eroded areas and bare spots shall be corrected and reseeded as originally specified until all affected areas are accepted by the Engineer; without additional compensation.
- C. Repair and replace to original condition all damages to property resultant from the seeding operation and all damages as a resultant from the remedying of these defects, without additional compensation.
- D. **Grass must be in good condition and determined to be acceptable by the Engineer prior to project closeout. No incentive payments shall be made prior to project closeout.**

PART 2 PRODUCTS

2.01 - Topsoil

- A. On-site topsoil material shall be that material excavated from the top 6-10 inches of the disturbed areas as verified by the Engineer, not including vegetation contained therein.
- B. Use of on-site topsoil material shall be subject to Engineer's approval.
- C. Imported topsoil material, as needed, shall meet the requirements of paragraph 2.01E.
- D. Topsoil shall be of uniform quality, free from hard clods, roots, sods, stiff clay, hard pan, stones larger than 1 inch (1/2 inch maximum stone size for turfgrass seeding), lime cement, ashes, slag, concrete, tar residue, tarred paper, boards, chips, sticks or any undesirable material.
- E. Topsoil shall contain at least 3% organic matter, have a high degree of fertility and be free of herbicides. Surface soils from ditch bottoms, drained ponds and eroded areas, or soils that are supporting growth of noxious weeds or other undesirable vegetation will not be accepted. The acidity range shall be pH 5.5 to pH 7.5 inclusive. The mechanical analysis of the soil shall be:

<u>Passing</u>	<u>Retained On</u>	<u>Percentage (%)</u>
1-inch Screen		100
1-inch Screen	½-inch Screen	3 – 5
¼-inch Screen	No. 100 Sieve	40 – 60
No. 100 Sieve		40 – 60
Silt	0.050 mm to .005 mm	10 – 30

Clay .005 mm and smaller 10 - 30

2.02 - Seed

- A. Provide fresh, clean, new crop, certified blue tag seed complying to tolerance for germination and purity and free of poa annua, bent grass, or noxious weed seed.
- B. Seed quality: Seed shall meet or exceed the following minimum requirements of purity and germination stated on the certified blue tag:

	Purity	Germination
DOMESTIC GRASSES		
Permitted Kentucky Bluegrass Cultivars:	95%	85%
Fescue, Creeping Red	85%	80%
Permitted Varieties of Fine-leafed Perennial Ryegrass:	95%	90%
Ryegrass, Annual	98%	90%
LEGUMES		
Alfalfa, Ranger/Vernal	99%	90%
White Dutch Clover	98%	90%
Red Clover, Medium	99%	90%
White Clover	98%	90%
NATIVE GRASSES		
		<u>Purity (PLS)*</u>
Big Bluestem (Kaw, Pawnee, Roundtree, or Champ)		30%
Little Bluestem (Blaze, Aldous, or Camper)		30%
Switchgrass (Blackwell, Pathfinder, Cave-in-Rock, or Nebraska 28)		63%
Indiangrass (Nebraska 54, Oto, or Holton Rumsey)		30%
Western Wheatgrass (Barton or Common)		56%
Canada Wildrye		50%
Oats		60%
Sideoats Grama		50%

*Pure Live Seed (PLS) percentage is the product of (pounds of seed) times (purity) times (germination percentage). Calculations will be based on test results of samples taken by Owner or from label information, as determined by the Engineer.

- C. Permitted Bluegrass cultivars include the following (Certified varieties):

Absolute	Blue Chip Plus	Glade	NuGlade
American	Blue Moon	Liberty	Nustar
Apex	Dellwood	Meret	Quantum
Award	Dragon	Midnight	Ram I
Barron	Eclipse	Nublu Plus	Rugby II

- D. Permitted Varieties of Fine-leafed Perennial Ryegrass include the following (Certified varieties):

Accent II	Calypso II	Elf	Prizm
APM	Cocomo	Exacta	SR 4200
Blazer III	Cutter	Omega III	SR 4400
Caddy Shack	Dandy	Pennfine	

2.03 - Seed Mixtures: Provide certified blue tag seed mixture type and application rate as defined in the Contract Documents.

A. Type 1A, Lawn Mixture, Sunny Conditions

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
Kentucky Bluegrass Cultivar	35
Kentucky Bluegrass Cultivar (not same variety as above)	35
Kentucky Bluegrass Cultivar (not same variety as above)	35
Certified Fine-leafed Perennial Ryegrass	40
Certified Fine-leafed Perennial Ryegrass (not same variety as above)	40
Certified Fine-leafed Perennial Ryegrass (not same variety as above)	40
TOTAL	225

B. Type 1B, Lawn Mixture, Shady Conditions

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
Creeping Red or Hard Fescue (mix of three cultivars)	105
Certified Fine-leafed Perennial Ryegrass	40
Certified Fine-leafed Perennial Ryegrass (not same variety as above)	40
Certified Fine-leafed Perennial Ryegrass (not same variety as above)	40
TOTAL	225

C. Type 2, Erosion Control Mixture

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
(same as SUDAS Type 2 Cool-Season Mixture for Slopes & Ditches)	
Fawn Fescue	65
Annual Ryegrass	40
Perennial Ryegrass	45
TOTAL	150

D. Type 3, Erosion Control Mixture

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
(same as SUDAS Type 3 Warm-Season Mixture for Slopes & Ditches)	
Little Bluestem	3 PLS
Sideoats Grama	5 PLS
Indiangrass	4 PLS
Switchgrass	1 PLS
Big Bluestem	3 PLS
Oats	16
Annual Ryegrass	40
TOTAL	72

E. Type 4, Perennial Ground Cover Mixture

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
Ryegrass, Perennial	50
Fawn Fescue	30
Red Clover, Medium	10
White Clover	5
Annual Ryegrass	20
TOTAL	115

Alternately, a mixture using brome grass may be submitted for approval.

F. Type 5, Stabilizing Crop

<u>Type of Seed</u>	<u>Application Rate (lb/acre)</u>
Spring – March 1-May 20:	
Winter rye	1 bushel
Spring wheat or oats	1 bushel
Fawn Fescue or similar	15
Alfalfa (Ranger or Vernal)	5
Summer – May 21-July 20:	
Oats or spring wheat (or combination)	2 bushels

	Fawn Fescue or similar	15
	Alfalfa (Ranger or Vernal)	5
Fall – July 21-September 30:	Winter rye	2 bushels
	Fawn Fescue	15
	Alfalfa (Ranger or Vernal)*	5

*After August 31, Hairy Vetch shall be substituted for alfalfa at a rate of 10 lb/acre.

Sticking agent will not be required for the stabilizing crop seed.

All legumes specified for stabilizing crop seed shall be treated with inoculant prior to mixing with the remainder of the seed mixture.

G. Type 6, Rural Areas	Application Rate
<u>Type of Seed</u>	<u>(lb/acre)</u>
Fawn Fescue	60
Ryegrass, Perennial	50
Sideoats Grama	10
TOTAL	120

H. Type 7, Native Grass and Wildflower Seeding (same as SUDAS)	Application Rate
<u>Native Grasses</u>	<u>(lb/acre)</u>
Oats	32 PLS
Canada Wildrye	6 PLS
Switchgrass	1 PLS
Big Bluestem	4 PLS
Indiangrass	4 PLS
Little Bluestem	2 PLS
Sideoats Grama	2 PLS
 <u>Forbs</u>	 <u>(lb/acre)</u>
Purple Prairie Clover	0.25
Blackeyed Susan	0.25
Prairie Blazing Star	0.25
Pale Purple Coneflower	0.25
Greyhead Prairie	0.25
New England Aster	0.125

*Native grass seeds shall be eco-type seeds, suitable for the Cedar Rapids Zone

2.04 - Fertilizer shall comply with the rules of the Iowa Department of Agriculture and as follows:

- A. The grade of fertilizer will be identified according to the percent nitrogen (N), percent of available phosphoric acid (P₂O₅), and percent water soluble potassium (K₂O), in that order, and approval will be based on that identification. **Minimum grade of fertilizer is 6-24-24.**
- B. All fertilizer shall be furnished from an established fertilizer dealer and guaranteed percentage analysis shall be provided by the fertilizer supplier on each container with the proper scale weight records.
- C. Fertilizer shall be of a type that can be uniformly distributed by the application equipment. Fertilizer may be furnished in a dry or liquid form.
- D. When applied dry, the fertilizer shall be a granular, non-burning chemically combined product composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer. Granular or pellet form shall be uniform in composition, dry, and free flowing without caking or other damage not suitable for use.
- E. When applied in a liquid form, fertilizer may be chemically combined or may be furnished as separate ingredients.

- F. Upon request of the Owner, the Contractor shall provide a test of the fertilizer for conformance with the required analysis at no additional compensation; a tolerance of 1.0 percentage point plus or minus of that specified will be considered to be in substantial compliance.

2.05 - Water

- A. Water shall be free of any substance harmful to seed growth.
- B. The Contractor shall provide water, equipment, methods of transportation, water tanker, hoses, sprinklers, and labor necessary for the application of water.

2.06 - Mulch

- A. Hydroseeding (Hydraulic seeding):
 - 1. The material shall be a natural or cooked cellulose fiber processed from whole wood chips, or recycled paper mulch, or a blend. which will disperse readily in water to form a homogeneous slurry and remain in such state when agitated in the hydraulic mulching unit. Material shall be packaged in new labeled containers.
 - 2. The homogeneous slurry of material and water shall be capable of being applied with standard hydraulic mulching equipment.
 - 3. When applied, the wood cellulose fiber slurry shall be free from weeds or foreign mater toxic to seeds. At a minimum, 30 percent of fibers shall have a minimum length of 0.15 inches. Fibers shall form an absorptive mat, but not a plant-inhibiting membrane, which will allow moisture to percolate into the underlying soil.
 - 4. Mulch shall have a water-holding capacity of not less than 9 lb water per pound of fiber.
 - 5. All materials used for mulch shall be free from noxious weeds. Mulching material or slurry shall contain no growth or germination-inhibiting factors and shall not be toxic to plant or animal life.
 - 6. The slurry shall be dyed green to facilitate visual metering during application
- B. Tackifier (hydroseeding):
 - 1. The mulch shall include a colloidal polysaccharide tackifier which shall be adhered to the fiber to prevent separation during shipment and avoid chemical co-agglomeration during mixing within the hydraulic mulching equipment.
 - 2. The material shall be homogeneous within the slurry and shall have no growth or germination-inhibiting factors nor any toxic effect on plant or animal life when combined with seed or fertilizer.
 - 3. Tackifier shall be applied at a minimum rate of 50 pounds per acre and shall be packaged in new labeled containers.
- C. Conventional seeding:
 - 1. Material used as mulch may consist of straw (oats, wheat, barley, or rye).
 - 2. Hay (bromegrass, timothy, orchard grass, alfalfa, or clover) shall not be used to mulch areas where lawn mixtures are seeded, but may be used to mulch areas where erosion control and perennial ground covers are seeded.
 - 3. All material used as mulch will be free from all noxious weeds, seed-bearing stalks, or roots. Obtain approval from the Engineer prior to applying. Other material may be used with the Engineer's approval.

2.07 - Bonded Fiber Matrix Soil Stabilizer

- A. Bonded Fiber Matrix shall be manufactured to be hydraulically applied, and upon drying, adheres to the soil in the form of a continuous, 100% coverage, biodegradable, erosion control blanket.
- B. The Bonded Fiber Matrix shall be comprised of a long strand, thermally produced wood fibers passing a freeness test at a 760 cc (MLS) level or below (>88% of total volume by weight) held together by organic tackifiers (10%) and mineral bonding agents (<2%) which, upon drying, become insoluble and non-dispersible.
- C. The material, when mixed into a liquid slurry, shall pass a free liquid quality control test (liquids separate from fibrous solids no greater than one inch in one minute's time as measured on a standard test board).
- D. The binder shall not dissolve or disperse upon rewetting.

- E. The matrix shall have minimum water holding capacity of 1000g/100g (1.2 gal/LB matrix).
- F. The matrix shall have no germination or growth inhibiting factors and shall not form a water insensitive crust. The matrix shall be comprised of materials which are 100% biodegradable and 100% beneficial to plant growth.
- G. The bonded fiber matrix shall be "Soil Guard" by Mat, Inc. or Engineer-approved equal.

2.08 - Wood excelsior mat and staples

- A. Where specified, wood excelsior mat shall be a mat of interlocking wood fibers with a plastic netting applied to both sides for holding the excelsior in place. The mat shall be nontoxic to growth of plants and germination of seeds. The netting applied to both sides shall have a mesh size of approximately 5/8 inch by 3/4 inch. The mat shall be furnished in rolls with a minimum length of 180 feet and a uniform minimum width of 48 inches, within a tolerance of minus 1 inch and plus 3 inches. As furnished, the mat shall have a minimum weight of 0.88 pound per square yard. The mat shall be furnished in plastic bags or otherwise protected to prevent damage from weather or handling.
- B. Wire staples for holding special ditch control wood excelsior mat and special ditch control jute mesh over sod shall meet the following requirements:
 - 1. Wire staples shall be U-shaped.
 - 2. Length of each leg shall be 6 inches minimum.
 - 3. Wire diameter shall be No. 11 wire.
 - 4. Staples shall be of sufficient hardness to facilitate installation without bending. In sandy soil (50 percent or more retained on the No. 200 sieve) conditions, wire staples shall be a minimum length of 12 inches long.

2.09 - Inoculant for Legumes

- A. An inoculant is a culture of bacteria specifically formulated for legume seeds (alfalfa, clovers, lespedesa, birdsfoot trefoil, hairy vetch, and crown vetch).
- B. The manufacturer's container shall indicate the specific legume seed to be inoculated, rate of application, and the expiration date.
- C. All inoculant shall meet the standards of the Iowa Seed Law.

2.10 - Sticking Agent

- A. A sticking agent shall be a commercial material recommended by the manufacturer to improve adhesion of inoculant to the seed.
- B. For small quantities (less than 50 lb) the sticking agent need not be a commercial agent, but it must be approved by the Engineer and must be applied separately prior to application of inoculant.

PART 3 EXECUTION

3.01 - General

- A. Area of Seeding: Areas to be seeded shall conform to the limits shown on the construction plans and contract documents. Areas disturbed outside the contract limits approved for seeding shall be seeded by the Contractor at no additional compensation.
- B. Watering: Water as necessary to achieve required results within the guarantee period specified.

3.02 - Seeding Dates

- A. Spring seeding dates for lawn mix shall be from March 15 to May 31. Commence only when ground temperatures are 55 degrees F. Fall seeding dates for lawn mix shall be from Aug. 10-Sept. 30.
- B. Erosion control mix seeding dates shall be from April 15 to May 31, or from Aug. 1 to Sept. 30.
- C. Prairie Grass and Wildflower seeding dates shall conform to the following:

Prairie Grass/Wild Flower Seeding Dates		
Type of Seeding	Introduced Species (Grasses & Legumes)	Native Species (Includes Prairie Restoration Mixtures)
Spring	March 1 – May 15	April 1 – June 1
Late Summer	August 1 – September 15	Not Permitted
Dormant	November 15 – Freeze-up	November 15 – Freeze-up
Frost	February 1 – March 15	February 1 – March 15

- D. Install stabilizing crop seed type specified in contract documents between June 1 and August 15.
- E. Fall seeding will include only the grass seed, not legumes.
- F. Legumes, including crown vetch, shall be seeded only during the spring season prior to May 15.
- G. For Work that is substantially complete, except for Seeding, by August 1, seeding shall be completed by September 10.
- H. At the option and at the full responsibility of the Contractor, seeding operations may be conducted under unseasonable conditions. The final results shall be as specified and guaranteed without additional compensation should the seeded areas require reseeding.

3.03 - Finish Grading

- A. Grading Tolerances: Prior to the seeding subcontractor beginning seeding operations, the Contractor shall grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface change, and as in conformance with the grading plan as follows:
 - 1. Lawn or unpaved areas near buildings, parking areas and sidewalks: $\pm 0.10'$.
 - 2. Lawn or unpaved areas away from buildings, parking areas and sidewalks: $\pm 0.25'$.
- B. Subgrade: When construction Work is finished, after rough grading has settled and been approved, but prior to finished grading, harrow or otherwise loosen subgrade to depth of 4-6 inches, to reduce compaction. Remove sticks, stones and foreign material one inch or greater in size from the subgrade.
- C. Topsoil.
 - 1. The topsoil shall be hauled to the location of application only after all grading and trenching activities in the area have been completed.
 - 2. Topsoil shall be spread over areas to be seeded and planted, and any other areas scheduled to receive additional topsoil. The depth of topsoil shall be 4 to 6 inches after natural settlement, and shall conform smoothly to the lines, grades and elevations shown.
 - 3. After spreading topsoil, rake up large stiff clods, hard lumps, roots, litter, other foreign matter and stones larger than $\frac{3}{4}$ inch in greatest dimension. Remove from the premises or dispose where directed, in a satisfactory manner. Fine grade and rake topsoiled areas to a smooth, uniform surface. Compact with an approved roller weighing approximately 500 pounds. Regrade and reroll until satisfactory grades as shown are obtained with the required depths of topsoil. Do not finish grade during unsuitable weather.
 - 4. The seeding or sodding operation shall follow the finish grading activities as closely as is practical in order to minimize the potential for soil erosion.
 - 5. The Contractor shall remove excess topsoil from the Site. Unless specified elsewhere in the Contract Documents, excess topsoil belongs to the Contractor.

3.04 - Seedbed Preparation

- A. Limit preparation of seedbed to areas which will be seeded immediately upon completion.
- B. Remove all weeds and weed debris where weed growth has developed, in the opinion of the Engineer. **In addition, fine rake topsoil to a minimum depth of three (3) inches to remove all rocks and soil clumps. The process for these activities shall be approved by the Engineer. No additional compensation shall be allowed for this work.**
- C. The Contractor shall shape and fine grade to remove washes or gullies, water pockets, and irregularities to provide a smooth, firm, and even surface true to grade and cross-section.

- D. Disk or rototill and cultivate seedbed to a minimum 3 inch depth to a fine texture and without soil lumps. Where the area is inaccessible to machinery, it shall be prepared by hand to a minimum depth of 1½ inches after the fertilizer has been applied.
- E. Application of Fertilizer:
1. Apply fertilizer after shaping and fine grading and prior to the combined tillage and rock-removal operations. On areas inaccessible to machinery, the fertilizer may be spread prior to tillage and cultivated seedbed preparation and uniformly mixed into the top 1½ inches of soil.
 2. Fertilizer shall be spread with a mechanical spreader or sprayer uniformly to all areas to be seeded at the minimum rate specified herein. The fertilizer shall be tilled into the soil to a minimum depth of 3 inches.
 3. The Contractor shall be permitted to substitute other fertilizer containing analysis percentages different from those specified, provided that the minimum amounts of actual nitrogen (N), phosphate (P), and potash (K) per acre are supplied and that in no case shall the total amount per acre of the three fertilizer elements (N), (P), or (K) be exceeded by 30 percent of the following minimum amounts.
 4. Conventional Seeding: Apply 6-24-24 commercial fertilizer or the equivalent units of nitrogen (N), phosphate (P), and potash (K) at the rate of 200 pounds per acre. A minimum of 40 percent of the total nitrogen (N) shall be water insoluble nitrogen.
 5. Hydroseeding:
 - a. Fertilizer if applied at time of hydroseeding shall be Plant Marvel Sprayable Spray and Seed Special 13-38-17 plus trace elements or approved equal.
 - b. For approval of alternate hydroseeding fertilizer, the fertilizer shall be a commercial combined fertilizer manufactured for hydroseeding that provides a blend of nitrogen, phosphorus, and potassium. Application rate shall provide between 0.5 and 0.75 pounds of phosphorous per 1,000 square feet.
 6. Tilling:
 - a. After fertilizer has been applied, use a mechanical rock picker or spring tooth cultivator on areas accessible to machinery to mix fertilizer in the soil to a depth of 3 inches and to remove all rocks, debris, and solid non-soil material larger than 1½ inches in diameter from the upper 3 inches of the soil. Remove rock by hand after each use of the cultivator. Repeat the process until the soil is relatively free of rock as determined by the Engineer. Remove all rock remnants from rock piles used on project smaller than 1½ inches.
 - b. Then smooth the seedbed to final grade, subject to Engineer's approval.
 - c. Till parallel to contours.
 - d. Ruts and wheel tracks in the seedbed from seedbed preparation are to be removed prior to seeding. This must be completed just prior to seeding and the work approved by the Engineer before the seeding application.

3.05 - Seed Preparation

- A. Inoculate all legumes with a standard product humus culture before mixing with other seeds for sowing. Furnish inoculant or a type approved by the Engineer.
- B. Inoculated seed shall not be exposed to direct sunlight for more than ½ hour. Seed which is not sown within 8 hours after inoculation shall be reinoculated prior to use.
- C. All legumes, except crown vetch and birdsfoot trefoil, shall be inoculated at 2.0 times the rate specified by the manufacturer of the inoculant. Crown vetch and birdsfoot trefoil shall be inoculated at 5.0 times the rate specified by the manufacturer of the inoculant.
- D. Additional inoculation is required for preinoculated seed. Preinoculated seed will be considered as inoculated at not more than two times the rate specified by the inoculant manufacturer.

3.06 - Application Of Seed

- A. **For erosion control, ground cover, stabilizing crop and rural mixtures**, the Contractor has the option of using either hydraulic or conventional seeding methods; unless specified otherwise in the Contract Documents.
- B. **For lawn mixtures in sunny or shady conditions, seed shall be applied at a rate of 5.2 lbs per 1,000 SF (225 lbs/acre) in a split application with a minimum of two passes. Hydroseeding methods shall be used.**

- C. Prior to seeding, the seedbed shall be inspected and approved by the Engineer.
- D. Conventional Seeding:
 - 1. **Dormant seeding in early winter may be allowed, subject to Engineer approval.**
 - 2. Sowing:
 - a. On all areas accessible to machinery, all grasses shall be sown with a drop-type seeder attached to a landscape roller so the seed is applied, then covered by rolling to firm the soil.
 - b. On areas inaccessible to field machinery, the use of cyclone seeders will be permitted, but no other hand-seeding methods will be accepted.
 - c. The application of grass and legume seed with hand seeders on early spring work must be performed as separate operations. No mixing of the two types of seed will be permitted.
 - 3. Mulching:
 - a. All seeded areas shall be mulched within 24 hours after the seed is sown. The mulch shall be uniformly distributed over the required areas at a rate of 1½ tons of dry mulch per acre.
 - b. "Tuck" mulch with a mulch stabilizer.
- E. When planting swales subject to erosion, plant a nurse crop at the following seeding rates. Vary the amount within the range based on the severity of erosion potential:
 - Oats: 3/4 to 1 bu/acre
 - Barley: 1/2 to 1 bu/acre
 - Winter wheat: 1/2 to 1 bu/acre
 - Rye: 1/2 bu/acre
 - Annual ryegrass: 8 to 10 lbs/acre
- F. Hydroseeding:
 - 1. All material, seed, fertilizer, mulch, and tackifier shall be placed in hydraulic mulching equipment specifically manufactured for hydroseeding and mulching. The hydraulic equipment, pump, and application process shall not damage or crack seeds.
 - 2. Materials shall be mixed with fresh potable water using a combination of both recirculation through the equipment's pump and mechanical agitation to form a homogeneous slurry.
 - 3. Apply evenly over specified areas in a workmanlike manner at material rates specified.
 - 4. Slurry shall be applied at a minimum rate of 2,000 pounds per acre dry weight.
 - 5. Site cleanup shall be considered part of application and shall include the removal of hydraulic mulch slurry from buildings, landscaping, sidewalks, walls, and any other areas not specified for application. All debris resulting from this application shall be removed from the site.

3.07 - Watering Requirements

- A. **After seeding and initial watering, provide water, equipment and labor to completely water all seeded areas every two (2) days unless 0.25-inch or greater rainfall occurs within that two-day period. A minimum of twenty (20) waterings is required.**
- B. **Each watering shall be sufficient to thoroughly saturate seeded and adjacent disturbed areas to a depth of approximately three (3) inches. Each watering requires an average of 50 gallons of water per 100 square feet, subject to local weather conditions and at the discretion of the Engineer.**
- C. **If contract documents do not note estimated water quantity required for each watering, verify required quantity with Engineer prior to seeding operations.**
- D. **Apply water uniformly and consistently on all seeded areas using a sprayer or other approved method to prevent seed bed damage, erosion or runoff.**

3.08 - Soil stabilization on erodible slopes

- A. Bonded Fiber Matrix Soil Stabilizer:
 - 1. Except where otherwise specified, on all surfaces to be seeded that have a slope greater than 9 percent, and at locations indicated in the Contract Documents (generally in swales or areas where flow from outside the seeded area will flow across the seeded area), use a bonded fiber matrix soil stabilizer at a rate of 300 pounds per acre.

2. The matrix as applied shall have no gaps between product and the soil or holes greater than 1/16 inch in size.
- B. Wood excelsior mat: Where specified, erodible slopes (slope greater than 9 percent, and surfaces where flow from outside the seeded area will flow across the seeded area) shall be stabilized by wood excelsior mat.

3.09 - Reseeding

- A. When seeding and related work is completed but is washed out or damaged before final acceptance, and that area involves seeding in combination with mulching or fertilizing or both, the area shall be reseeded and remulched at the contract unit price or prices when so ordered by the Engineer.
- B. Reseeding shall not be required if, in the Engineer's judgment in consultation with the Contractor, spring seeding will be grown in and acceptable by the beginning of the following spring, or fall seeding by the beginning of the following fall. In each case, the seeding will be reinspected at that time and the Contractor shall reseed unacceptable areas.
- C. Fertilized or seeded areas damaged by rain prior to required mulching or areas where the mulch is not tacked shall be refertilized or reseeded or both at a rate not to exceed the specified rate, as designated by the Engineer, without additional compensation.

3.10 - Cleanup

- A. Perform cleanup operations during installation of work and upon completion.
- B. Remove from site all excess materials, debris, and equipment. Hose down and/or broom clean all paved surfaces. Repair any damage resulting from seeding operations. Remove hydraulic slurry from buildings, landscaping, mulch, sidewalks, pavement, and any areas not specified for application.

3.11 - Miscellaneous Work

- A. **The Contractor shall maintain adequate erosion control during all construction.**
- B. **The Contractor shall re-seed the parkway at the request of the Engineer. The City of Cedar Rapids may require the parkway be re-seeded up to two (2) times, at the Contractor's expense, until it is deemed acceptable by the Engineer.**
- C. **The fall seeding window shall be open until the fourth Friday of September. No seeding will be permitted between said date and the third Monday of March of the succeeding year. The spring seeding window shall open the third Monday of March, at which time seeding may resume.**
- D. **The Engineer shall notify the Contractor on or before the third Friday of February as to any seeding location requiring reseeded. Any locations in need of reseeded shall be reseeded by the third Friday of April. Locations not reseeded by the third Friday of April shall be billed to the Contractor as liquidated damages in accordance with Contract Section 00500, Article 4. Liquidated damages shall be retained by the City of Cedar Rapids Public Works Department for future completion.**

3.12 - Final Acceptance

- A. The areas seeded shall be given an initial acceptance, prior to the warranty period, based upon the following criteria:
 1. All requirements for the completed installation and a minimum of 60 days maintenance have been provided.
 2. Seeded areas shall be in a live, healthy, growing, and well-established condition without eroded areas, bare spots, free of weeds, undesirable grasses, disease, or insects.
 3. Reseeding operations are completed.
- B. Final acceptance may be given by the Engineer upon fulfillment of all items completed as required under the warranty.

END OF SECTION 2900