INDEX

SECTION 02700 –PERMANENT SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work under this SECTION covers requirements for materials, tools, equipment and services necessary to complete the herbaceous seeding of all areas disturbed during construction of this project. The work shall include, but is not necessarily limited to, completion of the following work:

1. Preparation of seedbed.
2. Testing surface materials for lime and fertilizer application rates.
3. Applying lime, fertilizer, and seed.
4. Applying mulch.
5. Applying erosion control mat, if specified.
6. Temporary fencing if required.
7. Field engineering.

1.2 REFERENCE SPECIFICATIONS

A. The following specifications or applicable standards are incorporated by reference into this SECTION:

1. SECTION 02400 – SUBGRADE PREPARATION.
2. U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and Iowa State laws.
3. Iowa Agricultural Liming Material Act.

B. Above-mentioned references, which do not appear printed with the Contract Documents, can be provided to Contractor upon request.

1.3 QUALITY ASSURANCE

A. Qualifications of Workers: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this SECTION.

B. All seed shall meet or exceed requirements contained in specifications of this SECTION and Federal, State and County laws requiring inspection for plant disease and insect control and shall be labeled and certified in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and Iowa State laws. All seed must be dated for test and be from the last season prior to date of delivery.

C. Lime Materials shall be a Standard Ground Agricultural Limestone which meets current requirements of the Iowa Agricultural Liming Material Act.

D. Fertilizer shall be a commercial grade fertilizer and shall meet standards for grade and quality as per the requirements of the Iowa Department of Agriculture and Land Stewardship.

E. Mulch shall meet the requirements of PART 2 PRODUCTS of this SECTION. Contractor shall identify to Engineer the locations from which the straw mulch was obtained and prove weight.

F. Engineer reserves the right, at any time, to sample all materials for testing to determine compliance with the requirements of this SECTION.

G. Contractor (or his designated subcontractor) shall notify Engineer when subgrade preparation, liming and fertilizer, seeding, and mulching is planned to occur. Any work completed without notifying Engineer will be subject to withheld payment until work can be verified.

1.4 JOB CONDITIONS

A. Areas to be seeded include all project areas disturbed by excavation, grading and other construction procedures required for the completion of this contract.

B. Seeding shall be performed only during the seasons specified. The planting operation shall not be performed during times of drought, excessive moisture, or other unfavorable climatic conditions.

C. Prior to the work of this SECTION, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

D. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

E. Prior to permanent seeding, the waiting period as determined by Division will be required after the lime and mulch has been applied to sites where no cover material is available. This waiting period is necessary to allow the lime-spoil reaction and mulch decomposition to occur, providing a suitable environment for vegetation. The waiting period typically requires ninety (90) days. This waiting period is not needed for areas where non-acidic cover material is placed over lime treated spoils.

1.5 SUBMITTALS

A. Certificates and Receipts

1. Certification shall be submitted to Engineer that all seed to be used is in compliance with the following:

   a. The Federal Seed Act.

   b. Iowa Department of Agriculture & Land Stewardship regulations.

   c. Species type and pounds of pure live seed (PLS) certification.

   d. Date and results at germination and purity tests.

   e. Test date to determine the percentages of germination and purity have been completed within a nine (9) month period, exclusive of the calendar month in which the test was completed.

f. The seed analysis on the label shall be mechanically printed.

2. Suppliers certification of Effective Calcium Carbonate Equivalent (ECCE) content per ton of material must be submitted to and approved by Engineer prior to initial applications and subsequently as requested by Engineer. Necessary information shall include:

a. Name and location of supplier.

b. Name and address of agency and/or laboratory making ECCE determination.

c. Clear identification of stockpile from which limestone is obtained.

d. Date of last ECCE test and those for the previous four (4) tests on which ECCE is based.

e. Receipts stating weight of material on each truck which arrives on site.

3. Fertilizer delivered in bulk shall be accompanied by the suppliers' certification of analysis and weight for each shipment made to the job site. Fertilizer delivered in individual containers shall be sealed and clearly marked for analysis and weight.

4. Contractor shall supply verification of the weight of mulch delivered to the job site in a method satisfactory to Engineer.

B. Testing

1. Contractor shall select a soil testing laboratory for use on the seeding work and submit the name, address and telephone number for approval by Engineer at least thirty (30) calendar days prior to sampling time.

2. Contractor shall submit to Engineer and Division the results of all tests for specified lime and fertilizer recommendations prior to application as specified in Item 3.2 in this SECTION. Payment for these tests will be made by Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle materials in accordance with the General Conditions and the Supplemental Specifications.

B. Storage of all materials on the job site must be approved in writing in advance by Engineer.

C. Any materials approved for storage on site which, in the opinion of Engineer or Division, are being degraded due to storage must be removed and replaced at no additional cost to Division.

D. Use all means necessary to protect materials from the elements during delivery, handling and storage.

E. Deliver packaged materials (seed, etc.) to site in supplier's original unopened containers; each container to bear certification as specified. Pure live seed (PLS) certification shall be attached to all seed containers and shall not be removed except by Engineer.

F. Store packaged materials off ground and protect from moisture. Moisture damaged materials are unacceptable. Wet, moldy or otherwise damaged seed is unacceptable.

1.7 SITE DISTURBANCES

A. Take precautions to insure that equipment and vehicles do not unnecessarily disturb or damage existing grading, other site improvements, or adjacent areas to the work.

B. Repair any damage and return site and adjacent areas disturbed by Contractor's operations to original condition at no cost to Division.

PART 2 - PRODUCTS

2.1 AGRICULTURAL LIME

A. Agricultural lime shall be ground calcitic limestone conforming to the current requirements of the Iowa Agricultural Liming Material Act. The lime shall have a minimum fineness of fifty-five (55) percent and shall contain not less than one thousand (1,000) pounds ECCE per ton of lime to be applied.

B. If lime containing not less than one thousand (1,000) pounds ECCE per ton is not locally available, Contractor may submit a proposal for use of equivalent material based upon the minimum pounds required of ECCE per acre.

C. Lime sludge salvaged from water treatment plants or other industrial operations shall not be approved as a substitute for agricultural lime for permanent seeding.

2.2 FERTILIZER

A. Inorganic fertilizer shall be a standard commercial product which, when applied at the proper rate, shall supply the quantity of total nitrogen (N), available phosphoric acid (P), and soluble potassium (K) as specified herein.

B. Inorganic fertilizer shall be a commercial balanced fertilizer, uniform in composition, liquid or dry and free flowing. Fertilizer may be delivered bulk from the supplier or in its original unopened containers. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

2.3 MULCH

A. Mulch materials shall consist of wheat, oats, rye, hay, grass cut from native grasses or other plants approved in writing by Division. Corn stubble is not an acceptable type of mulch for this application.

B. Mulch shall be of air dry straw that has been properly cured and harvested. Mulch harvested after a killing frost or during dormant periods will not be acceptable. Mulch shall not be rotted, brittle, moldy, caked or otherwise degraded.

C. Mulch shall be free of noxious weeds as published by the local County Weed Commissioner and other weeds deemed undesirable by Engineer, such as foxtail, etc.

D. Each load of mulch shall be subject to inspection and acceptance by Engineer prior to unloading.

E. At least fifty (50) percent of the salvage weight of each mulch bale shall contain mulch with a length of ten (10) inches or greater. This requirement shall apply to all mulch intended for crimping into the sown seedbed.

2.4 SEED

A. All seed delivered to the job site shall be labeled according to the U.S. Department of Agriculture Federal Seed Act and shall be furnished in containers with tags showing seed mixture, purity, germination, weed content, name of seller, and date on which seed was tested.

B. Moldy seed or seed which has been damaged in storage shall not be used.

C. Seed that is more than one growing season in age shall not be used unless acceptable cold storage can be proven. If adequate cold storage is documented, seed may only be used if a twelve-month germination and viability test is performed.

D. Seed Mixture: Seed mixtures shall consist of the number of varieties and proportions of pure live seed (PLS) thereof as specified in the Supplemental Specifications. The percentage of pure live seed and the bulk application rate of seed mixture shall be determined using equations 1 and 2 as follows:

Equation 1:

$$Percent\ Pure\ Live\ Seed\ (\%PLS) = \left\{\frac{\%\ purity}{100} \times \left(\frac{\%\ germination\ (a)}{100} + \frac{\%\ hard\ seed}{100}\right)\right\} \times 100$$

Equation 2:

$$Actual\ Bulk\ Seed\ Applied\ per\ Acre\ \left(\frac{Bulk\ Lb.}{Acre}\right) = \frac{Req'd\ Lb.\ PLS\ per\ acre}{\left(\%\ PLS/_{100}\right)}$$

(a) TZ tests may be used instead of a germination test provided TZ tests report the percentage of viable seeds observed in a representative sample

E. Species Substitution

Substitutions of select plant species may be made subject to approval of the Division as discussed below.

1. The Contractor shall provide documentation that a particular species was sought from a variety of suppliers before concluding that a species is unavailable.

2. If after an exhaustive search was performed, and a particular species is determined to be unavailable, a substitution that exhibits a bloom period similar to the species it replaces shall be proposed. A legume should be substituted for a legume, a forb for a forb and a grass for a grass. Obligate (OBL) species should be substituted for obligate species, and facultative (FAC) for facultative. Preference shall be given to species native to Iowa and/or the upper Midwest of the United States.

3. The seed application rate of the proposed substitution(s) shall provide seed coverage at least equal to the seed coverage provided with the specified rate of the species it replaces.

4. The list of possible substitutions may be extensive, and availability may vary over time; therefore, any substitutions should be proposed, and approved no sooner than sixty (60) days prior to the anticipated seeding date.

PART 3 - EXECUTION

3.1 INITIAL PREPARATION

A. Except in the case of temporary seeding, the required lime/mulch treatment specified in Section 02400 - SUBGRADE PREPARATION shall have been performed and completed prior to initiating work of this SECTION in any area.

B. Areas of the site that do not have cover material shall also have had the neutralization period completed as determined by Division.

C. Any wetland or pond areas with pooled water levels above the specified seeding elevations for wetland seeding shall be lowered as needed at no additional cost to Division.

3.2 TESTING – SOIL FERTILITY

A. Contractor shall collect samples of finish grades as specified below for testing provided all of the initial preparations are completed. Engineer **must** be present when samples are collected to prepare a sampling location plan. The samples shall be submitted to laboratory to determine lime and fertilizer recommendations. Payment for these soil tests will be the responsibility of Contractor.

1. Engineer and Contractor shall collect composite samples of not less than ten (10) well-distributed individual soil cores from any contiguous area of ten (10) acres or less. Cores shall be three-quarter (3/4) inch to one (1) inch diameter to a depth of approximately six (6) to eight (8) inches. Areas having observable differences in material types or surface conditions (soil types) shall be handled as different composite samples, even if less than (10) ten acres.

2. Contractor shall combine soil cores to form composite samples for each (10) ten acres of contiguous area and/or observable different soil types by mixing well and placing in sample bag(s) to be sent to laboratory. (e.g. If total area is 30 acres and has two distinctly different soil types of 15 acres each, then there should be four (4) composite samples containing ten (10) soil cores each – two (2) composite samples from each soil type.)

B. Deliver each composite soil sample to the approved soil testing laboratory. Deliver samples for testing six (6) to eight (8) weeks prior to the beginning of the specified planting period. A shorter lead time may be possible depending on the laboratory. Test each composite sample for:

1. pH.

2. Buffer pH (Buffer Index).

3. CEC (Cation Exchange Capacity).

4. Phosphorus - Bray I (P_1 weak Bray) with recommendations.

5. Exchangeable Potassium with recommendations.

6. Nitrate Nitrogen with recommendations.

C. Recommendations from the lab shall include rates for applying lime, nitrogen, phosphorus, and potassium for the appropriate grass mix (pasture land) for each area.

D. Submit test results and laboratory recommendation to Engineer and Division for review at least one (1) week prior to scheduled date for application of lime and/or fertilizer.

E. Soil test results and laboratory recommendations shall be used by Engineer and Division to determine the amounts of lime and fertilizer to be applied for various areas. Engineer's and Division's final rates shall govern and these rates may be more or less than those recommended by the laboratory.

F. Cost of all services required from the testing laboratory for fertility shall be the responsibility of Contractor.

3.3 SEEDBED PREPARATION

A. Dispose of any growth, rocks, or other obstructions which might interfere with tilling, seeding, or later maintenance operations. Break up clods, and dispose of rocks, woody debris and other objects which are six (6) inches or greater in diameter. These obstructions may become exposed during any of the disking operations described below and shall be removed.

B. **FIRST DISKING:** Till all areas to be seeded by disking or other approved method to thoroughly loosen and pulverize the soil to a depth of six (6) inches. This may require multiple passes of the disk or other approved equipment. Lime and fertilizer shall not be incorporated during this first disking operation. If cover material has been placed over lime-treated spoil, care shall be taken to disk in manner and depth to prevent the acid material from mixing into the cover material.

C. **SECOND DISKING:** Following the first disking operation apply ag lime and fertilizer (see Item 3.4 *Liming and Fertilizing* below) then re-disk the site to a depth of three (3) inches. Multiple passes may be required to complete this second disking.

D. **THIRD DISKING:** Following the second disking harrow the site with an approved field cultivator or other approved tillage equipment, until the condition of the seedbed is suitable for seeding. The harrow shall be set to achieve the desired result. This may require manually resetting the teeth to a greater depth, weighting the harrow, removing extension arms on either side of the main frame, a combination of the above, or other modifications. In lieu of harrowing, or if the harrow is not producing the desired result, re-disk the area until the condition of the seedbed is suitable for seeding.

E. After the third disking operation, and prior to seed application, firm the seedbed with an approved cultipacker or similar piece of equipment. Cultipacking shall continue until such time as a finely pulverized and firmly compacted seedbed is obtained and accepted by Engineer. The seedbed shall be cultipacked again following completion of seeding to ensure adequate seed-soil contact.

F. Maintain the seedbed until seeded and mulched to provide a smooth area with no rills or eroded areas. Repair and restore prepared seedbed if it becomes eroded or otherwise disturbed.

G. Throughout seedbed preparation activities, disking, harrowing and other operations may expose rocks, boulders, rubbish, debris, etc. During and/or upon completion of each disking and harrowing operation, and prior to continuing with the next operation, pick up all debris, rubbish, etc., remove or bury all boulders, and pick up all rocks that hinder seedbed preparation or will impede seeding the site or mechanical mowing of the reclaimed site. Dispose of rocks and

boulders in locations as approved by Engineer. Dispose of debris, rubbish, etc. by burying on site or hauling to an approved landfill.

H. Contractor shall not perform seedbed preparation when ground conditions are unsuitable due to excessive moisture, snow, frost, or frozen ground, as determined by Engineer or Division.

3.4 LIMING AND FERTILIZING

A. Agricultural lime, nitrogen (N), phosphorus (P), and potassium (K) shall be applied to all areas to be seeded, and shall be incorporated by disking into the top three (3) inches of the prepared seedbed.

B. Lime and fertilizer shall be incorporated separately or simultaneously, depending upon the timing of product delivery and application.

1. **Lime:** The lime shall be applied and incorporated no less than one (1) week prior to seeding. Once applied, it shall be incorporated within a period of time which will avoid losses due to wind or rain.

2. **Fertilizer:** The fertilizer must be applied and incorporated no more than one (1) week prior to seeding. Once applied, it too shall be incorporated within a period of time which will avoid losses due to wind or rain.

3. If lime and/or fertilizer is applied but not yet incorporated, and Engineer or Division believes significant loss of lime and/or fertilizer has occurred due to bad weather, Engineer or Division may then require Contractor to reapply lime, fertilizer, or both, as applicable, at the rates and in the areas of the site so directed by Engineer and Division, at no additional cost to Division.

4. Incorporation of lime and fertilizer, whether done separately or simultaneously, shall be considered the second disking operation (see Item 3.3 SEEDBED PREPARATION, D above). Once the lime and fertilizer have both been applied and incorporated, continue seedbed preparation as described in 3.3 SEEDBED PREPARATION.

C. The application rate of agricultural limestone shall be based upon results of soil tests conducted in Item 3.2 TESTING – SOIL FERTILITLY in this SECTION. For bidding purposes, it is estimated that the rate provided on the plans or in the Supplemental Specification shall be applied.

D. Nitrogen (N), Phosphorus (P) and Potassium (K) fertilizer shall be applied to permanent cover seeding at a rate determined by the results of the soil testing in Item 3.2 TESTING - FERTILITY, in this SECTION. For bidding purposes, the rates provided on the plans or in the Supplemental Specification shall be applied.

3.5 SEEDING

A. All seeding shall be completed within the seeding season dates shown below. Temporary seeding shall be completed at any time where weather and soil conditions will promote vegetation growth. Determine seeding season in consultation with Engineer and Division.

Spring	April 1 - May 30
Fall	August 15 - September 15 (1)*
Dormant	November 15 – hard frost (2)**

(1)* Native species shall NOT be seeded during the Fall season

(2)***Dormant seeding for the permanent seeding mix may begin once observed soil temperatures are below 50 degrees Fahrenheit (50°F) for at least five (5) consecutive days***

B. If Contractor foresees that seeding cannot be completed within the specified seeding seasons, he shall submit a written request for a seeding date extension to Division. All seeding completed outside of approved seeding dates is at Contractor's risk. Any repairs and reseeding that becomes necessary as a result of work completed outside the approved dates shall be completed by Contractor at no cost to Division.

C. General Requirements:

1. As weather and site conditions permit, within the specified seeding season, seed site areas as shown on the Plans and all other disturbed areas.

2. When conditions are such that less than satisfactory results are likely to be obtained by reason of drought, excessive moisture, snow, or frozen soil, seeding work shall be halted and resumed only when conditions are favorable or when approved alternative or corrective measures and procedures have been affected.

3. Proceed with seeding work as rapidly as portions of the site become available within seasonal limitations. In any event, seeding shall be accomplished before the prepared seedbed becomes eroded, crusted over, or dried out and shall not be conducted when the ground is frozen or snow covered. Should seeding not be accomplished prior to the prepared seedbed becoming eroded, crusted over, or dried out, or the ground becomes snow covered or frozen, Engineer or Division shall require Contractor to rework the seedbed as necessary prior to seeding at no cost to Division.

4. Schedule permanent seeding such that mulching of seeded areas takes place no later than forty-eight (48) hours after seeding partial areas. The time period between seeding and mulching shall be shortened if it appears adverse weather conditions could either cause damage to the seeded area or delay the timely application of mulch. If, prior to mulching, the seeded area is damaged by adverse weather, or success of the seeding is in doubt due to Contractor's failure to apply mulch in a timely manner, the seedbed for the area so affected shall be re-prepared and re-seeded, all at no additional compensation. Re-application of ag lime, fertilizer, or both may also be required depending on Engineer's or Division's opinion of the severity of damage due to weather or, in the case of fertilizer, on the time lapse between the initial fertilizer application and reseeding. Reapplication of lime and/or fertilizer, if required by Engineer or Division, shall also be done at no cost to Division.

D. Seed Placement:

1. **Non-Native Seed Mixes** – *PRIOR to application of Seeding mulch:*

a. Seed all areas to be seeded with the appropriate seed mix as shown on the Supplemental Specifications. Seed species shall be applied at the rates provided in the Supplemental Specifications. Sow seed along the contour using a grassland or rangeland drill set for the specified seeding rates. The drill shall be equipped with double coulter furrow openers. The drill shall be subject to acceptance by Engineer. Drill seeding shall be accomplished with rows set no more than eight (8) inches apart. Overlap each successive seeding passes at least one (1) row width to ensure complete coverage. Upon a show of green, non-acidic bare areas will be reseeded at no additional cost to Division.

b. Embed the seed at a depth recommended for the species.

c. Broadcasting by centrifugal-type or hydroseeder broadcasters, or by hand shall also be allowed in areas not accessible to drills or other equipment, and may be allowed for correction or bare spots. Once broadcast, the seed must be covered with soil to a depth recommended for the species.

d. Upon completion of the seeding operation, cultipack the seedbed to provide a positive seed-soil contact. If the drill seeder is equipped with an approved cultipacker or press wheels, separate operations shall not be necessary. The type of cultipacker/seeder to be used shall be subject to acceptance by Engineer.

2. **Native Seed Mixes** – *AFTER placement of Seeding mulch*:

a. Seed all areas to be seeded with the appropriate seed mix as shown on the Supplemental Specifications. Seed species shall be applied at the rates provided in the Supplemental Specifications. Sow seed along the contour using a grassland or rangeland drill especially manufactured for planting native seed species. The machine shall be set to distribute seed at the specified seeding rates. The drill shall be equipped with a depth band which limits the maximum depth of seed placement. Native seeding drills with double disc openers are preferable, but other configurations may be acceptable. The native seeding drill should NOT include no-till coulters. The drill shall be subject to inspection and acceptance by Engineer or Division. Drill seeding shall be accomplished with rows set no more than eight (8) inches apart. Overlap each successive seeding pass at least one (1) row width to ensure complete coverage. Upon a show of green, non-acidic bare areas will be reseeded at no additional cost to Division.

b. Embed the seed at a depth recommended for the species. **Native seeding mixes shall be planted NO DEEPER than one-fourth (1/4) of one inch.**

c. Broadcasting by centrifugal-type or hydro-seeder broadcasters, or by hand shall also be allowed in areas not accessible to drills or other equipment and may be allowed for the correction of bare spots. Once broadcast, the seed must be covered with soil to a depth recommended for the species.

d. Upon completion of the seeding operation, cultipack the seedbed to provide a positive seed-soil contact. If the drill seeder is equipped with an approved cultipacker or press wheels, separate operations shall not be necessary. The type of cultipacker/seeder to be used shall be subject to acceptance by Engineer.

E. Seed Mix Verification:

1. Each bag or package of seed mix shall include a tag or label affixed to it which or indicates the seed mix or species contained within it. Adhesive labels, where available, are preferable. If tags or labels are sewn onto the bags, the seam SHALL NOT obscure the printing. Information on the tag or label shall conform to the requirements of 1.4 A of this SECTION.

2. Neatly remove the tag or label from each bag. Care shall be taken to avoid mutilating the tag or label during removal. Tags or labels shall not be “ripped” or torn from the bag

or package. Tags or labels that become torn into shall be taped by contractor. Mutilated tags or labels shall not be acceptable.

3. Provide all tags or labels to the Engineer for verification that the specified seed mix with any approved substitutions was applied at the approved rates.

4. In the event Contractor cannot provide tags or labels in acceptable condition to the Engineer, Contractor shall provide a complete master mix tag from his supplier, which demonstrates the appropriate amount of pure live seed was shipped to the site. The master tag shall indicate the project name and show the information on it must conform to the requirement of 1.5 A of this SECTION.

5. Engineer shall perform the verification using the germination and purity information shown on the tags, labels or master tag provided by Contractor. After the applied seed mix is verified, Engineer shall provide all seed tags or labels to the Division.

3.6 MULCHING

A. Areas receiving erosion control mat do not require mulch after being seeded, but those areas may be mulched if it facilitates the Contractors operations

B. Timing

1. **Non-native seed mixes**: for areas sown with non-native seed mixes, mulch shall be applied, but it may be performed either before or after planting at Contractor's option.

2. **Native seed mixes**: areas to be sown with native seed mixes SHALL have the mulch applied and tucked BEFORE the native seed mix is planted.

3. Hydromulch, where specified, shall be applied at the specified rate after non-native or native seed mixes are planted.,.

C. Mulch shall be uniformly applied at the rate of two (2) tons per acre. The mulch may be spread either by hand or by mechanical spreader. When spread by hand, it shall be torn from the bale, "fluffed up" and spread uniformly over the area. When spread by mechanical spreader, the machine shall be adjusted to prevent cutting the mulch into pieces shorter than six (6) inches and to provide uniform distribution of the mulch over the area. The mulch, when applied, shall provide a uniform cover.

D. After application, the mulch shall be anchored into the soil by crimping into the soil with a mulch tiller to a minimum depth of two (2) inches. Anchoring shall be accomplished by using a mulch tiller with rolling coulter type disk which shall be sufficiently dull on the cutting edge to prevent cutting the mulch. The disk must be of sufficient diameter to prevent the frame of the mulch tiller from dragging the mulch. The number of passes over the mulch shall not exceed two (2).

E. The mulch shall not be covered with excessive amounts of soil. The rows or furrows made by the straw mulch crimping equipment (mulch tiller) shall be spaced not more than nine (9) inches apart.

F. All straw mulching operations shall be done on the contour. The spreading and anchoring will be so scheduled and performed progressively so that wind damage will be held to a minimum as approved by Engineer.

3.7 MAINTENANCE

A. Protection of Seeding:

1. Vehicular traffic on areas seeded with temporary or permanent seeding, shall be restricted to travel necessary to establish seeding and other travel approved by Engineer.

2. Protect seeded areas from damage due to operations of other contractors and trades, and trespassers. Maintenance shall commence immediately following seeding operations and shall continue until Division has issued final acceptance of the project. Repair or replace damaged areas.

B. Reconditioning Existing Areas:

1. Contractors equipment, project materials, and wastes such as oil drippings, stones, gravel, packaging containers, etc., shall be removed from the site or disposed of in a manner approved by Engineer and Division.

2. All disturbed areas including areas outside grading limits, such as entrance and haul roads, shall be reconditioned and planted to the satisfaction of the Division.

C. Repairs:

1. Repair all areas of rill erosion with a depth of greater than three (3) inches and width greater than four (4) inches.

2. Repair defects in vegetation having individual bare areas greater than one (1) square foot or total bare areas exceeding two (2) percent of the entire vegetated area.

3. The costs of materials and labor for repairs shall be performed at no additional cost to Division.

3.8 MINIMUM REQUIREMENTS FOR ACCEPTANCE

A. Ninety (90) days following evidence of plant growth or green-up, Division, Engineer, and Contractor shall inspect and evaluate the seeded areas for acceptance based on the criteria listed below.

B. The plant growth shall provide a minimum of seventy-five (75) percent cover over the seeded area. Areas failing to meet this cover density shall be interseeded or reseeded and mulched as required by Engineer and Division, at no cost to Division.

C. A majority of native plants species included in the seed mixture should be present in the vegetation stand growing on site. Division acknowledges that some native species will not be observed for two (2) to three (3) growing seasons.

D. Areas of suspected hot spots shall be soil tested by Engineer or Division to determine if the failure of the seeding to meet acceptance criteria is due to low pH conditions. Engineer and/or Division may require Contractor to lime, fertilize, seed, and mulch these areas. Any additional work required in confirmed hot spot areas shall be paid for by Division at the appropriate bid item cost for each work item.

E. Following repair of defects, unaccepted areas, and reseeding of hot spot areas, the repaired areas will again be inspected ninety (90) days after evidence of plant growth or greenup. These areas shall be evaluated using the criteria listed in this Section.

F. In the event that in either the original seeding, repair seeding, or reseeding of hot spots it is found that the work, materials, or seedbed preparation failed to meet the quality or application rates specified, additional work shall be required at no cost to Division.

3.9 CONTRACT CLOSE OUT PROCEDURES

A. Closeout procedures and Final Acceptance Requirements are outlined in paragraph 7-13 of the General Conditions (Document N).

B. Refer to General Conditions Paragraph 5-10 related to Seeding and Seedling Plantings and the start of the Guarantee Period.

C. The Final Pay Application and Retainage Payment Application shall be prepared by Division and signed by all parties after completion of the punch list and final inspection.

D. Final Project Acceptance may be provided in writing by Division on or after the date of publication of the Notice of Completion in the newspaper.

E. The Contractor and Division shall jointly perform a site greenup inspection as outlined in Paragraph 3.8 above. If additional work is required based on this greenup inspection, Contractor shall complete this work as soon as possible. A follow up greenup inspection shall occur as jointly agreed up by Division and Contractor after all additional required work is completed. If Contractor refuses to complete any requested work at any time prior to Division's acceptance of established vegetation, Division will seek resolution with Contractor's Bonding Company.

F. Contractor shall re-seed areas where established vegetation is absent or limited and it is evident there has been a mechanical failure, inadequate overlap, missed areas, incorrect seed mix, missing species, or other items noted by Engineer and/or Division. Contractor shall not be held responsible for poor performance of the seed when acidic soils or adverse climate conditions are determined to be responsible for the poor performance.

PART 4 --MEASUREMENT AND PAYMENT

4.1 UNIT PRICES AND PAYMENT CALCULATION

A. Construction cost of all work included in this SECTION of the Construction Specifications shall be included in Contractor's unit prices set forth in the Proposal and Schedule of Prices (*Document C*) for the work items described below. Unit price for each of these several items shall include its pro rata share of overhead so that the sum of the products obtained by multiplying the unit prices so set forth by the amount of the work actually constructed, measured as described herein, shall constitute full payment to Contractor for performance of the work included in this SECTION.

B. Measurement and payment for each work item in this SECTION shall be in accordance with the following:

1. *Seedbed preparation*: Contractor's unit prices for Seedbed preparation shall represent full payment for the preparation of areas for seeding in accordance with requirements of this SECTION. Said unit price shall include all costs for multiple passes of tillage required including the pickup and disposal of rocks.

Measurement for payment purposes shall be the area properly prepared in acres, rounded to the nearest one-tenth (1/10) acre. Contractor shall provide field measurements as required to show the limits of the seeding. Engineer will determine in acres, to the nearest one-tenth (1/10) acre, the actual area that seeding has been performed, based on Contractor's field measurements. In lieu of field measurements, Contractor may request acceptance of plan (bid) quantity in accordance with 7-01 MEASUREMENT (Document N). Measurement and payment for seedbed preparation shall be made once without regard to the number of tillage passes required.

2. *Agricultural Limestone:* Contractor's unit price for agricultural limestone used for permanent seeding work shall represent full payment for the furnishing, delivery and application per these specifications.

The unit price for agricultural limestone applied to satisfy requirements of this SECTION shall be identical to the unit price for agricultural limestone used to satisfy requirements of SECTION 02400. The estimated quantity of agricultural limestone required for work in this SECTION shall be included with the estimated quantity of agricultural limestone required for work in SECTION 02400

The actual application rate shall be determined by the Engineer based upon the results of soil tests conducted in Item 3.1 TESTING--SOIL FERTILITY in this SECTION. Costs for incorporation agricultural limestone in this SECTION shall be included in *Seedbed Preparation*.

Measurement for payment purposes shall be the actual number of tons of effective calcium carbonate equivalence (ECCE) applied by Contractor in complying with requirements of this SECTION. Weight tickets must accompany each shipment of agricultural lime and shall form the basis for measurement and payment.

3. *Nitrogen (N), Phosphorous (P), and Potassium (K):* Payment for all fertilizer furnished, delivered, and applied into seedbeds, per requirements of this SECTION, shall be made in accordance with Contractor's unit prices. The actual application rates for Phosphorous (P) and Potassium (K) will vary from the bid quantity depending upon results of soil tests conducted in Item 3.2 *TESTING – SOIL FERTILITY* in this SECTION. The cost of soil testing for Nitrogen, Phosphorus and Potassium application rates shall be incidental to the work of this SECTION. At Engineer's option, the cost of nitrogen for temporary seeding may be measured and paid as part of the cost of implementing the Storm Water Pollution Prevention Plan in SECTION 02120. Also at Engineer's option, the cost of nitrogen for wetland fertilizer may be measured and paid for in SECTION 02400.

Measurement for payment purposes shall be the actual weight of active ingredient, to the nearest pound, for each of the fertilizer nutrients specified. Fertilizer suppliers may refer to active ingredients as "units" of nutrient.

4. *Seeding:* Contractor's unit prices for Seeding shall represent full payment for the planting of all seeded areas in accordance with requirements of this SECTION. Said unit price shall include the furnishing of all seed materials for the specified seed mix, planting of seeds, and culti-packing including all required equipment, labor and any required reseeding to complete all permanent seeding as specified herein.

Measurement for payment purposes shall be the area seeded in acres, rounded to the nearest one-tenth (1/10) acre. Contractor shall provide field measurements as required to show the limits of the seeding. Engineer will determine in acres, to the nearest one-

tenth (1/10) acre, the actual area that seeding has been performed, based on Contractor's field measurements. In lieu of field measurements, Contractor may request acceptance of plan (bid) quantity in accordance with 7-01 MEASUREMENT (Document N). Payment for seeding shall be made only after all submittals have been approved as required under this SECTION. Seeding for areas outside the specified seeding area will not be measured for payment. No separate measurement and payment apply to over-seeding; the cost of over-seeding shall be subsidiary to seeding.

In the event that the Contractor's cost of seed material increases ten percent (10%) or more from the time Contractor submitted the bid to the time the seed is purchased, the Division agrees to reimburse Contractor for the additional cost of the seed material provided Contractor requests the cost adjustment and demonstrates the cost difference. Differences in the seed cost shall be demonstrated as follows:

a. Contractor shall submit a request for a seed cost adjustment in writing on his company letterhead summarizing the cost difference, and

b. Contractor shall furnish a price quote from his seed supplier that is dated on or prior to the date Contractor's bid was received and opened by Division, and

c. Contractor shall furnish a current price quote from his seed supplier that is dated no more than seven days prior to Contractor's written request for a seed price adjustment, and

d. Both price quotes shall be mechanically printed and provided on seed supplier's letterhead, and

e. No text on either price quote shall show evidence of mutilation, smearing, overwriting, or other forms of tampering. In no event shall quotes with handwritten markings that affect price information be considered acceptable or valid.

If seeding is performed by Contractor's subcontractor, price quotes shall be provided by the subcontractor's seed supplier.

If Contractor requests a seed cost adjustment but is unable to provide the appropriate documentation as specified above, Division shall deny the seed cost adjustment request, and the Contractor's original unit price for seeding shall apply.

5. *Mulch, Seeding:* Contractor's unit price for mulch shall represent full payment for mulching in accordance with requirements of this SECTION 02700 – SEEDING. Said unit price shall include the furnishing and application of all straw mulch, including all required equipment and labor to complete the work as specified herein. Payment for mulch shall be made only after all submittals have been approved as required under this SECTION 02700 - SEEDING. Payment will not be made on total site acreage if not substantiated by adequate weight tickets.

Measurement for payment purposes shall be by the acre which shall be identical to the area as measured and approved for upland seeding and wetland fringe seeding.

4.2 SUMMARY—UNITS OF MEASURMENT

Units of measurement for bid items applicable to work covered by this SECTION are as follows:

Description	**Unit**
Seedbed Preparation	Acre
Agricultural Lime, Seeding	Ton (ECCE)
Nitrogen (N)	Pound (active ingredient)
Phosphorus (P)	Pound (active ingredient)
Potassium (K)	Pound (active ingredient)
Upland Seeding	Acre
Mulch, Seeding	Acre
Wetland Fringe Seeding	Acre

END OF SECTION 02700