

## SECTION 02920L

## GRASS SEEDING

02/02

## PART 1 GENERAL

## 1.1 DESCRIPTION

The goal of this work is to establish vigorous stands of [California native grass] [grass] that provide erosion control [and wildlife habitat]. [This section provides grass seeding to help meet permitted requirements of the Regional Water Quality Control Board and shall be coordinated with Section 01356L STORM WATER POLLUTION PREVENTION MEASURES.] The work shall consist of seeding grasses to all disturbed soil of the project and/or as designated on the plans. The Contractor shall provide all necessary labor, material, equipment, and services for grass seeding and mulching for all designated areas. See spec Section 02201L SITE PREPARATION FOR REVEGETATION for all site & soil preparation supporting this spec section.

## 1.2 DEFINITIONS

The terms referenced herein are defined as follows:

## 1.2.1 CO:

Contracting Officer

## 1.2.2 COR:

Contracting Officer's Representative

## 1.2.3 Contractor:

The company that is awarded this contract and its sub-contractors.

## 1.2.4 Seeding:

The act of installing or placing seed, and harrowing it into the soil.

## 1.2.5 Grass:

When used herein, this term shall refer to all grasses specified herein, including either California native and/or non-native grasses, also referred to as exotic grasses.

## 1.2.6 Native Grass:

Grasses endemic to California.

## 1.2.7 Exotic Grass:

Non-native grasses to California.

## 1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01 (Amended thru: Aug 1988) Federal Seed Act Regulations (Part 201-202)

## COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1909 (Basic) Fertilizer  
FEDERAL

## SPECIFICATIONS (FS)

FS O-F-241 (Rev D) Fertilizers, Mixed, Commercial

## 1.4 QUALIFICATIONS

All work shall be done by an experienced Contractor familiar with California [grass seeding] [native grasses] and its horticulture, and industry methods and standards for grass seeding. The Contractor shall employ modern equipment and state of the art methods and techniques. The Contractor shall have a minimum of 2 years of applicable on the job experience with [native grass seeding] [grass seeding] and weed control.

## 1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330L SUBMITTAL PROCEDURES:

## SD-03 Product Data

Equipment List;

Provide a list of equipment to be used for the seeding and mulching operations, including descriptive data and calibration tests. State equipment brand, model and supplier.

## SD-03 Product Data

Fertilizer;Mulch;Tackifier;Fiber;

Provide data for fertilizer, mulch, tackifier and fiber to be used.

## SD-05 Design Data

As-built Drawings; G

As-built drawings, which provide current factual information showing the point of connection and all equipment shall be submitted, locations of mains, circuits, heads, valves, and controllers including deviations from amendments to the drawings and changes in the work, shall be included.

## SD-07 Certificates

## Seed; G

Provide certificates of all seed used on the project. Show where seed was purchased from, date purchased, seed species, and purity and germination percentages.

## 1.6 INSPECTIONS

It is the Contractor's responsibility to notify the Contracting Officer at least 5 days prior to each anticipated inspection. The Contracting Officer may at anytime inspect work without notification. The following are key inspection events:

## 1.6.1 Inspection of Seed, Equipment &amp; Quantities

Seed suppliers are subject to inspection of methods, materials, and processing. Contractor shall provide supplier names and addresses upon award of contract. Seed shall be inspected upon arrival at the job site by the Contracting Officer for conformity to species and quality in accordance with paragraph MATERIALS.

## 1.6.1.1 Upon Arrival at the Site

The Contractor shall provide the Contracting Officer with receipts of the seed purchased and delivered to the site. Receipts shall provide name of company from which the seed was purchased, seed species, composition, quantity, germination rate, and pure-live-seed percentage. Other material shall be inspected for meeting specified requirements. Unacceptable materials shall be removed from the job site and replaced by the Contractor.

## 1.6.1.2 Calibration Test

Immediately prior to commencement of seeding operations, the Contractor shall adjust and calibrate equipment as per manufacturer's specifications and field test in the presence of the Contracting Officer.

## 1.6.2 Inspection of Seeding Operation

Seeding operation shall be inspected during equipment calibration, material loading and seed application.

## 1.6.3 Seeding Acceptance

A final inspection shall be held by the Contracting Officer to determine any deficiencies in work after completion of seeding operations. Upon receipt and approval of the punch list items, a letter of acceptance will be issued by the Contracting Officer.

## 1.6.3.1 Preliminary Seeding Inspection

Prior to the completion of the Seeding Period, a preliminary seeding inspection shall be held by the Contracting Officer. Time for the inspection shall be requested in writing by the Contractor at least 5 working days prior to desired date. The quantity and type of species seeded, clean up requirements and the acceptability of the seeding operation, in accordance with the requirements stated herein, shall be

determined and noted in writing.

#### 1.6.3.2 Final Seeding Inspection

A final inspection shall be requested in writing by the Contractor at least 5 working days prior to the desired date. At the final seeding inspection, the Contracting Officer will evaluate the deficiencies noted in the preliminary seeding inspection, to ensure they have been corrected. Time for the inspection shall be established in writing. A "Seeding Acceptance" will be given after all seeding requirements have been satisfactorily completed and approved by the Contracting Officer. PARTIAL ACCEPTANCE OF ANY ITEM OR COMBINATION OF ITEMS WILL NOT BE GIVEN. A written acceptance by the Contracting Officer of all project components, in addition to requirements specified in this section, shall constitute the beginning of the Establishment Period.

### 1.7 SHIPMENT, DELIVERY, STORAGE AND HANDLING

#### 1.7.1 Shipment

Preparation for shipment shall be done in a manner that will not cause damage to seeds, fertilizers, pesticides and all other material. Endomycorrhizal inoculum shall be transported, stored and handled in vehicles, containers and application equipment with a temperature less than 90 degrees Fahrenheit.

#### 1.7.2 Deliver

Seeds, fertilizers, pesticides and all other material shall be protected from weather and contamination during delivery.

#### 1.7.3 Storage

Material shall be stored in areas approved by the Contracting Officer. Seed, fertilizer and mycorrhizal inoculum shall be stored in cool, dry locations out of direct sunlight and away from contaminants. Chemical and pesticide material shall not be stored with other landscape materials and shall be stored in a spillage contained area. Mulch shall be kept covered from rain.

#### 1.7.4 Handling

Except for bulk deliveries, material shall not be dropped or dumped from vehicles.

### 1.8 TIMES AND CONDITIONS

#### 1.8.1 Seeding Times

All grasses shall be seeded at the earliest available time and be completed by [1 September 2001]. No variance to the start date will be allowed unless given in writing by the Contracting Officer.

#### 1.8.2 Seeding Period

The Seeding Period begins, when the Notice to Proceed is given and continues until all requirements indicated in this specification and accompanying drawings are completed and approved and a written acceptance is given by the Contracting Officer.

### 1.8.3 Seeding Conditions

Seeding and construction operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture, winds or other unsatisfactory conditions prevail, the work shall be stopped when directed by the Contracting Officer. The Contractor shall schedule planting in the mornings to avoid stressing plants during seeding, if the planting schedule calls for installation when the temperature is expected to be 90 degrees Fahrenheit/32 degrees Centigrade or greater. When special conditions warrant a variance to the planting operations, a proposed seeding time shall be submitted in writing to, and approved by, the Contracting Officer. The Contractor shall be prepared to seed at the earliest time when all conditions (weather, moisture, temperature, tides and river flows, etc...) are acceptable.

## 1.9 MEASUREMENT AND PAYMENT

Measurement and payment for each requirement stated herein shall be as indicated below:

### 1.9.1 Grass Seeding

[Grass] [Native grass] seeding shall be measured by the number of [acres] [square feet] seeded in accordance with plans and specifications and as directed by the Contracting Officer. Payment for "[Grass Seeding] [Native Grass Seeding]" shall be made at their respective unit price per acre [square feet], and shall be in full compensation for all labor, materials, and costs associated with [grass] [native grass] seeding. Payment shall include, but not be limited to: seed, storage, handling, delivery, equipment calibration, seeding, harrowing, and tackifying.

### 1.9.2 Straw Mulching

Straw mulching shall be measured by the number of [acres] [square feet] applied in accordance with plans and specifications and as directed by the Contracting Officer. Payment for "Straw Mulching" shall be made at their respective unit price per [acre] [square feet], and shall be in full compensation for all labor, materials, and costs associated with [grass] [native grass] seeding. Payment shall include, but not be limited to: mulch, storage, handling, delivery, equipment calibration, mulching, and tackifying.

### 1.9.3 Grass Seeding As-builts

Grass seeding as-builts shall not be measured. Payment for "Grass Seeding As-builts" shall be at a lump sum price in accordance with plans and specifications and as directed by the Contracting Officer. Payment shall be in full compensation for all labor, materials, and costs associated with Grass Seeding As-builts, but not limited to: monitoring, preparing base mapping, updating data on drawings and submitting required drawings and electronic files to the Government.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Clarification

State-certified seed of the latest season's [or previous seasons crop] shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS?01 and applicable state seed laws. AOSCA / CCIA certifications for seeds are encouraged.

2.1.2 Seed Quality

Weed seed shall not exceed 1 percent by weight of the [total of each species] [total mixture]. Wet, moldy, insect infested, or otherwise damaged seed shall be rejected and removed from project site. Open containers of seed or improperly tagged containers will be rejected and removed from project site.

2.1.2.1 Sampling

For all seeds or containers, it is the option of the government to take random samples for each species, and require the Contractor to provide analysis of samples at no extra cost to the government.

2.1.3 Seeding Mix

The mixing of seed [may be done by the supplier prior to delivery] [shall be performed by the Contractor, in the presence of the Contracting Officer, on site] as directed by the Contracting Officer.

2.1.4 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 SEED SPECIES AND SEEDING RATES

2.2.1 Native Grass, Dry Mix

Native grass seed species and seeding rates for drier sites shall be as follows:

Botanical Name	Native Grass		Pounds Pure Live Seed per Acre		
	Dry Mixture	Common Name	Drill Seeding	Broadcast Seeding	Hydro-seeding
Elymus glaucus	Blue Wildrye		4	8	8
Leymus triticoides	Creeping Wildrye		4	8	8
Nassella pulchra	Purple Needlegrass		7	15	15
Nassella cernua	Nodding Needlegrass				
Hordeum californicum	California Barley		5	10	10
Elymus trachycaulus	Slender Wheatgrass				
Triticum x elymus	Sterile Wheatgrass				
TOTAL			20	41	41

2.2.2 Native Grass, Wet Mix

Native grass seed species and seeding rates for moist sites shall be as follows:

Native Grass Wet Mixture				
Botanical Name	Common Name	Pounds Drill Seeding	Pure Live Seed Broadcast Seeding	per Acre Hydro-seeding
Elymus trachycaulus majusVar. "Magus"	Yolo Slender Wheatgrass	5	10	10
Hordeum brachyantherum	Meadow Barley	8	15	15
Leymus triticoides	Creeping Wildrye	6	10	10
TOTAL		19	35	35

2.2.3 Exotic Grass

Exotic grass seed species and seeding rates shall be as follows:

Exotic Grass Mixture				
Botanical Name	Common Name	Pounds Drill Seeding	Pure Live Seed Broadcast Seeding	per Acre Hydro-Seeding
Vulpia myuros	Zorro Fescue	6	10	10
Bromus hordeaceus	Blando Brome	12	20	20
Trifolium Hirtum	Rose Clover	8*	17*	17*
Eschscholzia californica	California Poppy	3	5	5
Lupinus bicolor	Lupine	6	10	10
TOTAL		35	62	62

\*Rose clover shall be inoculated. The seeding rate shown reflects the weight of seed without the inoculum.

2.3 FERTILIZER

Fertilizer shall be [controlled release] commercial grade, free flowing, uniform in composition and conforming to FS O?F?241. Granular ammonium-phosphate-sulfate fertilizer consisting of : 16 percent nitrogen, 20 percent phosphorus, and 0 percent potassium. [For native grass seeding, no fertilizer is required.] [For exotic grass seeding, apply fertilizer at 300 lbs per acre.] [Apply fertilizer as per manufacturer's recommendations.] [Apply fertilizer as recommended by soils tests.]

2.4 PESTICIDES

All pesticides shall be as referenced in Section 02201L SITE PREPARATION FOR REVEGETATION.

2.5 MULCH

Mulch shall be free from noxious weeds and seeds, mold, and other deleterious materials.

### 2.5.1 Straw

Straw shall be stalks from, in order of preference: native grasses, wheat, barley, or rice furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment. Wheat or barley straw if used shall not be derived from dry farmed cereal crops. Apply straw mulch at [2,000 lbs] per acre.

### 2.5.2 Wood Cellulose Fiber

Wood cellulose fiber be commercially available and produced from virgin wood fiber. Fiber shall be of such character that fiber will disperse into a uniform slurry when mixed with water. The water content of the fiber before mixing into the slurry shall not exceed 15 percent of the dry weight of the fiber. The moisture content of the fiber shall be clearly marked on the package.

Fiber shall not contain more than 7 percent ash as determined by the Technical Association of the Pulp and Paper Industry (TAPPI) Standard T 413, and shall be nontoxic to plant or animal life.

Fiber shall have a water-holding capacity by weight of not less than 1,200 percent. Water-holding capacity of the fiber shall be marked on the package.

Fiber shall be colored to contrast the area on which the fiber is to be applied. The material used for color shall be nontoxic to plant and animal life and shall not stain concrete or painted surfaces.

### 2.5.3 Paper Fiber

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed. It shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color of green to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

### 2.6 TACKIFIER

Tackifier shall be a concentrated, biodegradable and organic derivative of the Plantago plant (*Plantago insularis*). Tackifier shall be non-toxic to plant and animal life, non-corrosive, and non-crystalline and be non-staining to concrete or painted surfaces. Tackifier shall conform to Sections 20-2.11 and Special Provisions Section 10-1.19 of the State of California Department of Transportation Standard Specifications for "Stabilizing Emulsion".

### 2.7 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

### 2.8 ENDOMYCORRHIZAL

Endomycorrhizal (arbuscular) inoculum shall consist of spores, mycelium, and mycorrhizal root fragments in a solid carrier suitable for handling by

hydro-seeding or dry seeding equipment. The carrier shall be the material in which the inoculum was originally produced, and may include organic materials, vermiculite, perlite, calcined clay, or other approved materials consistent with mechanical application and with good plant growth. Each endomycorrhizal inoculum shall carry a supplier's guarantee of number of propagules per unit weight or volume of bulk material. If more than one fungal species is claimed by the supplier, the label shall include a guarantee for each species of mycorrhizal fungus claimed.

### PART 3 EXECUTION

#### 3.1 SEEDING

[The Contractor shall seed using the [broadcast] [drill] [hydroseed] method.] [The Contractor shall determine which of the following seeding methods to use: broadcast, drill, or hydroseed.] Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rain, traffic or other cause, shall be reworked to restore the ground for optimum seedbed conditions.

##### 3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast using mechanical broadcast seeders at the rate as specified under paragraph SEED SPECIES AND SEEDING RATES. Half of seed shall be broadcast in one direction, and the remainder at right angles to the first direction. Seed shall be covered to an average depth of  $\frac{1}{4}$  inch by harrowing with steel mat or chain drag, cultipacker, or other approved device. For slopes steeper than 2H:1V or inaccessible areas, hand broadcasting may be required and harrow or hand raking where practical.

##### 3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum  $\frac{1}{2}$  inch depth and at the rate specified under paragraph SEED SPECIES AND SEEDING RATES, using equipment having drills a maximum 7 inches apart. Row markers shall be used with the drill seeder. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

##### 3.1.3 Hydroseeding

Seed species shall be mixed to ensure a seeding rate as specified under paragraph SEED SPECIES AND SEEDING RATES. Wood cellulose fiber shall be added to the mixture after the water and other mixture components have been thoroughly mixed to produce a homogeneous slurry. The slurry shall have the proper consistency to adhere to the earth slopes without lumping or running. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Slurry shall be uniformly applied under pressure over the entire designated area. The hydroseeded area shall not be rolled. The Contractor shall employ the following two-step hydroseeding process:

###### 3.1.3.1 Step 1:

Apply the first step as a complete mixture as indicated below:

- A. Wood Cellulose Fiber, at a rate of 500 lbs per acre
- B. Seed Mix, as specified and at rate specified
- C. [Fertilizer, at a rate of 300 lbs per acre]
- D. [Endomycorrhizal Inoculum, at a rate of 3,600,000 propagules per acre]
- E. [Organic Compost, at a rate of 1,500 lbs per acre]

### 3.1.3.2 Step 2:

Apply the second step as a complete mixture as indicated below:

- A. Wood Cellulose Fiber, at a rate of 1,500 lbs per acre
- B. Tackifier, at a rate of 100 lbs per acre

## 3.2 APPLYING ENDOMYCORRHIZAL INOCULUM

The Contractor shall apply Endomycorrhizal inoculum as per requirements for method used.

### 3.2.1 Application with Broadcast Seeding

The Contractor shall incorporate Endomycorrhizal Inoculum by broadcasting prior to seeding operations. Inoculum shall be applied at the rate of 3,600,000 propagules per acre based on the supplier's certification or an analysis returned by an independent laboratory. The broadcast device shall not grind or unduly compress the carrier granules or fungal spores. The inoculum shall be incorporated into the soil within three hours of broadcasting by disking, tilling, harrowing, trackwalking, or ripping the soil and shall result in incorporation of 80% of the inoculum granules to a depth of 1 to 4 inches.

### 3.2.2 Application with Drill Seeding

The Contractor shall incorporate Endomycorrhizal Inoculum as part of seed drilling operations. Inoculum shall be applied at the rate of 3,600,000 propagules per acre (8,900,000 per hectare) based on the supplier's certification or an analysis returned by an independent laboratory. The inoculum shall be added to the seed bin of the drill seeder and mixed into the seeds and such materials as wheat bran. Endomycorrhizal inoculum must not be placed in any equipment that has heated up in the sun to a temperature higher than 90 degrees F (32 degrees C). If the seed drill is equipped with a separate bin for mycorrhizal inoculum, the inoculum shall be dispensed from the separate bin in accordance with the operating procedures specified for the equipment.

### 3.2.3 Application with Hydroseeding

Endomycorrhizal inoculum shall be applied at the rate of 3,600,000 propagules per acre (8,900,000 per hectare) based on the supplier's certification or an analysis returned by an independent laboratory before or in the same application as the seeds. Inoculum must be applied within one hour of addition to the mixing tank. In no case shall Endomycorrhizal inoculum be applied after the seeds. Inoculum must be applied within one hour of addition to the mixing tank. A second pass with mulch at the rate of is required to cover exposed seed and inoculum. If temperatures will exceed 90 degrees F (32 degrees C), remaining erosion control applications must be applied within three ours of the application of the inoculum.

## 3.3 MULCH AND TACKIFIER

All seeded areas, where designated on the drawings, shall be mulched and tackified after seeding operations.

### 3.3.1 Applying Straw

Straw mulch shall be applied to all seeded areas upon completion and approval of the seeding application by the Contracting Officer. Mulch shall be spread by hand, blower-type mulch spreader or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of a steep slope and continued uniformly until the area is covered. The mulch shall be applied loose and not be bunched. All [seeded] [designated] areas shall be mulched within 48 hours of seeding.

Rate of mulch application shall be 2 tons per acre for wheat, barley, or native grass straw or 1-1/2 tons per acre for rice straw.

### 3.3.2 Applying Tackifier

All straw mulch areas shall be anchored with a commercially available dyed organic tackifier.

### 3.3.3 Crimping or Punching

As a substitute for tackifying, all straw areas shall be mechanically crimped or punched into soil.

### 3.3.4 Applying Fiber

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

## 3.4 MAINTENANCE DURING SEEDNG PERIOD

Maintenance shall begin immediately after seeding is completed and shall continue throughout the Seeding Period. Maintenance of the seeded areas shall include the following until Seeding Acceptance is given: regular observations of the site(s), [watering], spraying for weed control, and repair of damaged areas.

### 3.4.1 [Watering

The Contractor shall keep the soil at the seeded area moist.]

### 3.4.2 Spraying for Weed Control After Seeding

The Contractor shall provide pesticide spraying over the entire seeded area(s) for broadleaf infestation of weeds. Spraying shall take place 4-6 weeks after seeding is completed. Application rate shall be as per manufacturer's recommendations for targeted species.

### 3.4.3 Repair

All Contractor damaged areas shall be repaired by the Contractor to their original condition within 5 working days.

## 3.5 CLEANUP

Excess and waste material shall be removed from the seeded and staging areas and shall be disposed of off the site.

### 3.6 EXOTIC GRASS ESTABLISHMENT

#### 3.6.1 Establishment Duration

The Contractor shall be required to provide maintenance for the seeded area for a period of [60] [90] continuous days starting from Seeding Acceptance or until the entire project is accepted and turned over to the non-federal local sponsor, whichever is greater.

#### 3.6.2 Establishment Tasks

The Contractor shall perform the following tasks:

#### 3.6.3 Watering

The Contractor [shall water the seeded area(s) and keep the soil continuously moist for the duration of the Seeding Period] [is not required to provide water to the seeded area(s)].

#### 3.6.4 Weeding

The Contractor shall provide pesticide spraying over the entire seeded area(s) for broadleaf infestation of weeds. Spraying shall take place 4-6 weeks after seeding is completed. Application rate shall be as per manufacturer's recommendations for targeted species.

-- End of Section --