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SECTION 02910

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SECTION 02910

NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE

PART 1 GENERAL

The Contractor shall furnish qualified personnel, equipment, labor, and materials, and perform all work for native plant material extraction, salvage, and temporary plant storage as specified herein, shown on the Contract Drawings, and as directed by the Contracting Officer. Plants shall be salvaged prior to clearing and grubbing operations.

1.1 PROFESSIONAL OVERSIGHT

The Contractor shall provide a landscape professional with previous, successful native plant salvage experience to oversee the extraction and salvage operations for the duration of this work type. To be considered qualified, the professional's experience must include at least 3 successful projects involving the extraction, salvage, and maintenance of riparian species. The Contractor shall use the landscape subcontractor they were successful low bidder with and who meets the required qualifications. No landscape subcontractor substitutions shall be allowed.

1.2 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 "RE" designates that the Resident Office will review the submittal for the Government. Submit the following in accordance with Section 01330, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Equipment; G, RE.

A listing of equipment to be used for the plant extraction and salvage operation.

Temporary Irrigation Plan; G, RE.

The Contractor shall submit an irrigation plan outlining the operation of a temporary irrigation system to water plant materials stored in the temporary nursery from the time of (cuttings) salvage to the time of transplanting. The irrigation plan shall include water source, water quality report from a water quality laboratory, irrigation equipment, and the specifics of operation. The irrigation plan shall include the proposed watering schedule and quantity of water to be applied per each application.

Methods to prevent run-off, puddling and plant wilting or water stress shall be described.

1.3 INSPECTION

All extracted and salvaged native plant materials shall be inspected for plant condition and damage prior to being taken to the temporary storage

facility. Plant materials that have been exposed to heat, excessive root drying, and damaged or mutilated stock shall be rejected and the Contractor will be charged for replacement fees at fair market value. All riparian plants shall be inspected to insure that the north orientation is clearly marked on each plant in such a manner that the marking will be protected during transport, storage, and transplanting. Any riparian plant materials that are salvaged without the north orientation being marked prior to extraction will be rejected by the Contracting Officer and the Contractor will be responsible for supplying replacement plants at no additional cost (if applicable). Rejected plants shall not be stored in the temporary nursery.

1.4 REPLACEMENT OF DAMAGED, DEAD, VANDALIZED OR MISSING PLANT MATERIAL

The Contractor shall replace any damaged, dead, vandalized, rejected or missing plant materials at no additional cost. Replacement plants shall be of the same species, and size as original stock, and shall be subject to inspection and approval by the Contracting Officer.

PART 2 PRODUCTS

2.1 PLANT MATERIALS

2.1.1 Salvage Plants

Prior to start of construction all designated plant materials shall be flagged by the Contracting Officer and salvaged by the Contractor, or replaced in-kind.

- a. willow spp.
- b. mule fat
- c. sedges
- d. bullrush spp.

2.2 WATER

Unless otherwise noted, irrigation water for salvage plant irrigation shall be the responsibility of the Contractor. Irrigation water shall not contain elements or metals toxic to plant life.

The temporary irrigation plan must be approved by the Contracting Officer prior to the Contractor beginning plant salvage operations. The Contractor shall submit a monthly report to the Contracting Officer documenting watering dates, application rates, person who can verify the watering schedule or answer questions pertaining to the required watering.

PART 3 EXECUTION

The Contractor shall submit a listing of equipment to be used for the plant extraction and salvage operation. The Contractor shall also submit the credentials and past project experience of the landscape professional. Past projects and current references that can verify the projects must be listed on the applicable submittal form.

3.1 EXTRACTION OF NATIVE PLANT MATERIALS

3.1.1 Extraction Time

Native plant materials shall be extracted and salvaged from September 30,

2003 through November 30, 2003 for fall work; and from March 1, 2004 through March 14, 2004 for spring work.

3.1.2 Salvage Conditions

Salvage operations shall be performed only during periods when beneficial results can be obtained. When drought, high temperatures, or other unsatisfactory conditions prevail, the work shall be stopped when directed.

When special conditions warrant a variance to the extraction and salvage operations, the Contractor shall propose alternate times for approval by the Contracting officer.

3.1.3 Plant Orientation and Plant Locations

The north orientation of each individual riparian species plant being salvaged shall be marked prior to extraction from the growing site (if applicable). The marking must be clearly visible and must stay on the plant throughout the extraction, salvage, storage and planting phases. If necessary a compass shall be used to determine the north orientation at the time of marking. Marking shall not result in any damage to the plant such as cuts, bruises, or insertion of any foreign objects into plant tissues. Planting locations shall be determined by the Contracting Officer in the field prior to planting operations. Contractor shall inform Contracting Officer 5 days before start of planting operations.

3.1.4 Plant Extraction, Salvage, and Storage

Salvaged plant cuttings shall be as shown on the drawings. The contractor shall obtain cuttings prior to clearing and grubbing operation. Plant cuttings shall be planted in the ground and protected during the grading operations. Trees and plugs that are salvaged shall have as much of the root ball as possible when dug and the rootball shall be protected at all times prior to replanting. At the Contractor's option and responsibility, plants may be stored in adequate sized boxed containers with the root-ball protected. Plugs shall be placed in adequate sized containers as approved by the contracting officer. Roots shall be protected at all times from drying and physical damage. The contractor shall salvage the quantities shown on the drawings plus 25%. Mycorrhizal fungi inoculum shall be added as recommended by the manufacturer for the salvage plant material specified. All plants shall be watered as necessary during storage to maintain the health of each plant.

3.2 TEMPORARY ON-SITE PLANT STORAGE

The Contractor shall establish an on-site, temporary plant nursery in a location as approved and directed by the Contracting Officer. The temporary nursery shall not be in the way of major construction traffic which could damage the salvage plant material. The temporary nursery shall include plant pits as necessary to store the plant materials. The topography of the nursery shall be slightly sloped to drain so that no ponding will occur from irrigation of stored plant materials. The Contractor shall maintain this nursery site until all plants are replanted.

The contractor shall provide a temporary security fence to be placed around the plant nursery area of 50' x 100' with a gate, lock and keys (min. 3) for maintenance access. The fence and gate shall be capable of preventing unauthorized entry. The fence shall consist of 9-gauge chain link-fence fabric (2" square mesh) and be a minimum of six (6) feet high. Posts shall be 2" galvanized, set plumb, 10 feet O.C. in alignment and set in concrete as required for support.

3.2.1 Plant Protection During Storage Period

All native plant materials salvaged from the construction site shall be stored in the designated temporary nursery. Plants shall be protected from exposure to wind and direct sunlight, predators and vandals during the storage period. Plants shall be delivered to the temporary nursery as soon as possible after extraction to avoid drying of plant roots. Plants shall be supported and protected from tipping over or breaking off from winds or other forces. The Contractor shall replace unprotected plants that break from strong winds or vandilized at no additional cost to the Government. Replacement plants shall be equal in size and structure to plants being replaced.

3.2.2 Watering Stored Plant Materials

The native plant materials shall be watered 2 to 3 times per week during the hottest summer months and once per month in cool months (or as required to maintain healthy plant materials) for the duration of the time they are held in the temporary nursery or as directed by the Contracting Officer. Water shall be applied at a rate sufficient to ensure moist soil conditions at a depth that reaches the bottom of the root zone of each plant. Run-off, puddling, and wilting shall be prevented. Plants shall be protected from damage from equipment used to perform the watering. Plants damaged by watering activities shall be replaced by the Contractor at no additional cost.

3.2.3 Soil and Plant Damage Caused by Irrigation

Any damage to stored plants that result from the Contractor's excessive or irregular irrigation practices shall be the responsibility of the Contractor and such plants shall be replaced at no additional cost.

3.3 CLEAN UP

3.3.1 Pruning

Pruning shall be accomplished by trained and experienced personnel (min. 5 years of documented experience in the field). The pruning of salvage trees shall be in accordance with standard landscape practice. The total amount of foliage shall be pruned by one-fourth to one-third on salvage trees to compensate for loss of roots and transplanting shock. The typical growth habit of individual plant material shall be retained. Dead and broken material shall be pruned. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

3.3.2 Clean Up

Organic waste material generated from the plant extraction/salvage operation, clearing and grubbing activities shall be disposed of off-site in a location approved by the Contracting Officer. Inorganic waste materials must be hauled off-site to a landfill.

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SECTION 02921

HYDROSEEDING

PART 1 GENERAL

1.1 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.

ASTM INTERNATIONAL (ASTM)

ASTM D 4972 (2001) pH of Soils

ASTM D 5268 (1992; R 1997) Topsoil Used for Landscaping Purposes

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act (1940; R 1988; R 1998) Federal Seed Act

1.2 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 "RE" designates that the Resident Office will review the submittal for the Government. Submit the following in accordance with Section 01330, SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment.

A listing of equipment to be used for the seeding operation.

Delivery.

Delivery schedule.

Topsoil.

Topsoil from the stripping and stock piling operation.

Quantity Check.

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Seed Establishment Period.

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record.

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of seeded plants.

Maintenance Plan; G, RE.

Maintenance plan indicating the contractor's method(s) to establish a healthy stand of native plants. Provide irrigation system layout plan and or indicate method(s) of water application and maintenance required to meet specification. The maintenance plan shall cover one year of plant establishment and shall include a watering and maintenance schedule.

Application of Pesticide.

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

Wood cellulose fiber mulch and tackifier.

Application rates recommended by the manufacture.

SD-04 Samples

Delivered Topsoil.

Samples taken from several locations at the source.

Soil Amendments.

A 5 lbs sample.

Mulch.

A 5 lbs sample.

Erosion Control Material

Soil erosion control material sample meeting requirements.

SD-06 Test Reports

Equipment Calibration.

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test.

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Seed.

Topsoil.

pH Adjuster.

Fertilizer.

Soil Conditioner.

Mulch.

Pesticide.

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

- a. Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.
- b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical, mechanical and plant growth analyses.
- c. pH Adjuster. Calcium carbonate equivalent and sieve analysis.
- d. Fertilizer. Chemical analysis and composition percent.
- e. Soil Conditioner: Composition and source.
- f. Mulch: Composition and source.
- g. Pesticide. EPA registration number and registered uses.

1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.4.1.1 Delivered Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site.

1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.4.1.3 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.4.3 Storage

Materials shall be stored in designated areas. Seed and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.4.4 Handling

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

1.4.5 Time Limitation

- a. Hydroseed slurry mixture for Seed Mix which has not been applied within twenty (20) minutes after mixing shall be rejected and replaced at the Contractor's expense.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-certified seed of the latest season's 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 Seed Act and

applicable state seed laws.

2.1.2 Hydroseed Native Seed Species and Mixtures

Grassland Native seed species shall be as follows:

Pure Live Seed (PLS)		
Botanical Name	Common Name	In Pounds Per Acre
SEED MIX :		
Nassella pulchra	Purple needlegrass	3.0
Nassella lepida	Foothill needlegrass	3.0
Elymus glaucus	Blue wild rye	.25
Poa secunda	One-sided brome	.25
Bromus carinatus	California brome	<u>2.0</u>
TOTAL PLS in LBS/ACRE		8.50

California Walnut Woodland seed species shall be as follows:

Pure Live Seed (PLS)		
Botanical Name	Common Name	In Pounds Per Acre
SEED MIX :		
Eriophyllum confertiflorum	Golden yarrow	2.0
Eschscholzia californica	California poppy	.50
Mimulus aurantiacus	Bush monkeyflower	2.0
Salvia leucophylla	Purple sage	<u>.50</u>
TOTAL PLS in LBS/ACRE		5.0

Broadcast Mitigation seed species for channel invert shall be as follows:

Pure Live Seed (PLS)		
Botanical Name	Common Name	In Pounds Per Acre
SEED MIX :		
Ambrosia psilostachya	Western ragweed	2.0
Artemisia douglasiana	Douglas mugwort	4.0
Solanum xanti	Purple nightshade	1.0
Galium sp.	Bedstraw	<u>2.0</u>
TOTAL PLS in LBS/ACRE		9.0

2.1.3 Seed Quality

- a. Weed seed shall not exceed one percent (1%) by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.
- b. Native plant seed shall have been inoculated with mycorrhizal fungi prior to purchase.

2.1.4 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as verified by the Contracting Officer.

2.1.5 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer. The contractor shall make all arrangements with the seed vendor(s) to hold the required amount of seeds needed for the project. The contractor shall verify and secure from the seed vendor(s) the required native seed species and quantity no later than 160 days or sooner prior to seeding operations.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When additional topsoil is required beyond the available topsoil, the topsoil shall be delivered and amended as recommended by the soil test(s) for the seed specified. The contractor shall pay for all soils tests as directed by the Contracting Officer. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 3 inches in diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, and soil conditioner meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall not be less than 99 percent elemental sulfur. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall conform to applicable State and Federal regulations and shall bear the manufacturer's guaranteed statement of analysis.

Fertilizer 1:

Nitrogen	5%
Phosphoric Acid	3%
Water Soluble Potash	1%
Humus (composted organic and mineral matter)	50%
Humic Acids (derived from compost)	15%
Soluble Metallic Iron	1%

Fertilizer 2 [based in a four (4) to six (6) month release form]:

Coated Slow Release Nitrogen*	9%
Urea Nitrogen	2%
Available Phosphoric Acid**	8%
Soluble Potash***	8%
Humus (composted organic and mineral matter)	25%
Humic Acid (derived from compost)	5%
Iron (derived from iron sulfate)	2%
Manganese (derived from manganese sulfate)	.05%
Zinc (derived from zinc sulfate)	.05%
Sulfur	7%

* derived from sulfur coated urea (controlled release)

** derived from triple super phosphate

*** derived from compost and muriate of potash

2.3.3 Agricultural Gypsum

Agricultural gypsum shall be commercially packaged, free flowing, of a finely ground form and an agricultural grade, minimum ninety-two percent (92%) calcium sulfate by volume, free of any toxic material. One-hundred

percent (100%) of the ground material shall pass through a ten (10) mesh screen and at least fifty percent (50%) of the material shall pass through a 100-mesh screen.

2.3.4 Agricultural Sulfur

Agricultural sulfur shall be first quality commercial grade, commercially packaged, free flowing, of a flour of sulfur finely ground form.

2.3.5 Decomposed Wood Derivatives

Decomposed wood derivatives shall be rotted sawdust that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted. Rotted sawdust shall be stabilized with 7.5 pounds of nitrogen added uniformly to each cubic yard of material.

2.3.6 Wood Cellulose Fiber

Wood cellulose fiber for use with hydraulic application of seed shall consist of specially prepared wood cellulose fiber processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual monitoring of the application of materials (sawdust or grass clippings are not acceptable fibers). On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of twelve percent (12%) moisture, plus or minus three percent (3%) at the time of manufacture. The pH range shall be between 4.5 and 6.5.

2.4 WATER

Water for native seeding and plant establishment shall be the responsibility of the Contractor, unless otherwise noted. The contractor shall pay all water cost for the entire duration of the contract. Water shall not contain elements toxic to plant life.

2.5 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

2.6 Erosion Control Material

Soil erosion control material shall be heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and four feet (4') wide with mesh openings of approximately one inch (1") square. Erosion control material shall be placed on all channel slopes (banks) as shown on the drawings. Deviation from this requirement shall be approved by the Contracting Officer.

Erosion control anchor material shall be installed as recommended by the manufacturer and as shown on the drawings.

2.7 Tackifier

Tackifier shall be Ecology Control M-binder or approve equal.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from 1 October to 31 January.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed.

A time variance to the seeding operations will not be allowed, unless approved by the Contracting Officer.

3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, mechanical and plant growth analysis. Sample collections on site shall be random over the entire site.

Sample collections for stockpiled topsoil shall be at different levels in the stockpile. Three (3) samples shall be tested and the locations shall be determined by the Contracting Officer. The planting soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test of stockpiled topsoil shall determine if addition quantities of soil amendments and soil conditioners are required to meet local growing conditions for the seed species specified.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed prior to the commencement of the seeding operation.

Seeded (and planted) areas shall be filled or have surplus soil removed for repair of erosion or other grade deficiencies to attain a smooth finished soil surface. Drainage patterns shall be maintained. Imported topsoil used for repair of erosion or grade deficiencies shall conform to "topsoil" requirements.

3.2.2 Application of Soil Amendments

Fertilizer and soil amendments shall be incorporated into the soil as part of the tillage operation to the depth of tillage at the following rates per

1,000 square feet of seeded area and watered in thoroughly such that soils are wet to a minimum depth of six inches (6") at least once prior to seeding/planting operations:

- a. for 2:1 or less slopes:
 - 150 pounds Fertilizer 1
 - 30 pounds Fertilizer 2
 - 40 pounds Agricultural Gypsum
 - 20 pounds Agricultural Sulfur

- b. for 2:1 or more slopes:
 - 90 pounds Fertilizer 1
 - 20 pounds Fertilizer 2
 - 28 pounds Agricultural Gypsum
 - 12 pounds Agricultural Sulfur

3.2.3 Tillage

- a. Tillage shall be accomplished by plowing, disking, harrowing, rototillage machinery, or other approved operations until the condition of the soil is acceptable. Undulations or irregularities in the surface shall be leveled before the next specified operations.
- b. Slopes up to a 2:1 (horizontal:vertical ratio) shall be tilled to a depth of at least six inches (6").
- c. Slopes between a 2:1 (horizontal:vertical ratio) and 1:1 shall be tilled to a depth of at least two inches (2").
- d. Slopes steeper than 1:1, shall be hand raked to a depth of at least one inches (1").

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Debris

Debris over a minimum 2 inch in any dimension shall be removed from the surface. Rocks and stones may remain in the surface soil at the discretion of the Contracting Officer.

3.2.4.3 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding methods shall be by Hydroseeding and Broadcast. Seeding procedure shall ensure even coverage.

3.3.1.1 Broadcast Seeding

Broadcast Seeding shall be uniformly broadcast at the rate shown per acre using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1-1/2" by raking, or other approved device. Equipment used for broadcast seeding shall be approved by the contracting officer.

3.3.1 Application Operations

Slurry shall be uniformly applied in the following two (2) step process under pressure over the entire area utilizing a sweeping arched stream motion allowing the fiber to build on itself until a uniform coat is achieved. Both operations shall be completed for a particular area in one (1) working day. The hydroseeded area shall not be rolled.

- a. Seed mixture and one-third (1/3) of the wood cellulose fiber mulch and tackifier shall be added to the appropriate amount of water, thoroughly mixed to produce a homogeneous slurry, and be applied to designated areas.
- b. After the initial spraying, the Contractor shall then mix the remaining two-thirds (2/3) of the wood cellulose fiber mulch and tackifier with the appropriate amount of water, thoroughly mixed to produce a homogeneous slurry, and apply to designated areas.

Slurry shall be allowed to dry for approximately two (2) hours and then immediately commence syringe irrigation to germinate seed. Water shall be applied at a rate sufficient to ensure continuously moist soil conditions to a minimum depth of one inch (1"). Run-off and puddling shall be prevented.

3.3.2 Wood cellulose fiber mulch and tackifier

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

3.3.3 Watering Seed

The contractor shall submit a watering and maintenance plan prior to start of seeding operation. Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering of other adjacent areas or plant material shall be prevented.

3.4 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine

the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.5 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program.

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

3.6 Weed Abatement

Irrigation system installation, tillage operations, and finish grade shall be completed and approved prior to weed abatement operations. Contractor shall then perform a two (2) step procedure as follows:

- a. Contractor shall operate the irrigation system to keep seeded areas uniformly moist for a period of three (3) weeks. At the end of the three (3) week period, Contractor shall spray all visible weeds with a contact herbicide. Application method shall be as recommended by manufacturer. After spraying, areas shall remain unwatered for a minimum of forty-eight (48) hours. Contractor shall then remove the weeds from the project.
- b. Contractor shall water seven (7) additional consecutive calendar days from the first application of herbicide, and apply a contact herbicide. After the second spraying, water shall not be applied for an additional forty-eight (48) hour period. Contractor shall then remove the weeds from the project and commence hydroseeding operations.

3.7 Placing Erosion Control Material

Jute mesh shall be placed as indicated in accordance with the manufacturer's recommendations and as shown on the drawings. Jute mesh shall be installed on all channel slopes (banks). Placement of the erosion control material shall be accomplished without damage to installed material or without deviation to finished grade.

3.8 RESTORATION AND CLEAN UP

3.8.1 Restoration

Seeded areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.8.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite on a daily bases. Adjacent paved areas shall be cleaned as directed by the contracting officer.

3.9 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed. Signage shall be in accordance with this specifications.

3.10 SEED ESTABLISHMENT PERIOD

3.10.1 Commencement

The plant establishment period to obtain a healthy stand of plants shall begin after seeding operation have been completed and approved by the contracting Officer. The seed establishment period shall be 1 year from the date of Contracting Officer's approval. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.10.2 Proper Stand of seed

An acceptable healthy seed condition is defined as follows:

- a. SEED MIX shall have a solid soil surface growth ground covering with bare spots no larger than six inches (6") square and with barren areas not exceeding four percent (4%) of the total seeded area. Within this growth covering there shall be at least one (1) woody type plant species from the required seed mix (or as supplemented by planted stock) per twenty-four inches (24") square over the entire seeded area.

3.10.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting seeded areas from surface erosion; maintaining slopes to design conditions; protecting installed areas from traffic; trash removal; watering; and post-fertilization. Weeds shall be removed as soon as possible and as directed by the Contracting Officer. The contractor shall provide sufficient work force to remove weeds on a daily bases.

3.10.4 Post-Fertilization

- a. Forty-five (45) calendar days after commencement of establishment, Fertilizer 1 shall be general broadcast over all seeded areas at the rate of twenty-five (25) pounds per 1,000 square feet and thoroughly irrigated into soils immediately after application.
- b. Fertilizer 1 shall be general broadcast over all planting areas at the rate of twenty-five (25) pounds per 1,000 square feet at the end of the Establishment Period.

3.10.5 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.10.6 Repair or Reestablishment

Unsatisfactory stand of native plants and mulch shall be repaired or reinstalled. Eroded areas shall be repaired in accordance with paragraph SITE PREPARATION and per 3.3.1.1 Broadcast Seeding.

3.10.7 Maintenance Record

The Contractor is required to furnish, upon written request from the Contracting Officer, daily maintenance records describing the maintenance work performed; daily watering information and amount, including durations, areas weeded (if applicable), areas repaired or reinstalled (if applicable), and diagnoses for unsatisfactory stands of grass plants.

3.11 FINAL ACCEPTANCE

3.11.1 Preliminary Inspection

Prior to the completion of the establish period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be establish in writing. The acceptability of the seeded areas in accordance with the specification shall be determined. An unacceptable stand of hydroseeded area shall be replanted per 3.3.1.1 Broadcast Seeding and as directed by the Contracting Officer as soon as seeding conditions permit.

3.11.2 Final Inspection

A final inspection shall be held by the Contracting Officer to determined that the deficiencies noted in the preliminary inspection have been corrected. Time for the final inspection shall be in writing.

-- End of Section --