

1 **SECTION 32 92 21**
2 **NATIVE SEEDING**

3 **PART 1 - GENERAL**

4 **1.1 SUMMARY**

- 5 A. Furnish labor, materials, tools, equipment, and services for Native Grass Seeding, Mulching and
6 Watering as indicated, in accordance with provisions of Contract Documents.
- 7 B. Note that areas will not have automatic irrigation.
- 8 1. Contractor shall provide necessary water by portable trucks or other approved temporary
9 means as required to assure acceptable germination and survival until final acceptance.
- 10 C. Completely coordinate with work of other trades.

11 **1.2 QUALITY ASSURANCE**

- 12 A. Regulatory Requirements
- 13 1. Comply with regulatory agencies for herbicide composition.
- 14 2. Provide certificate of compliance from authority having jurisdiction indicating approval of
15 seed mixture.
- 16 B. Qualifications
- 17 1. Installer Qualifications: Qualified landscape installer whose work on projects of
18 comparable size has resulted in successful establishment of Native Seed with a minimum
19 of 5 years documented experience.
- 20 C. Seed Quality:
- 21 1. Fresh, clean, new-crop seed in unopened bags labeled in accordance with USDA Rules and
22 Regulations under the Federal Seed Act in effect on date of bidding.
- 23 2. Seed which has become wet, moldy or damaged in transit or in storage will not be
24 acceptable.
- 25 3. Provide seed of species, proportions, and minimum percentages of purity, germination and
26 maximum percentage of weed seed as specified.

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28 **1.3 SUBMITTALS**

- 29 A. Project Information:
- 30 1. Certificates for seed mixture, stating botanical and common name, place of origin, strain,
31 and percentages of purity and germination, and amount of pure live seed (PLS).
- 32 2. Certify that each container of seed delivered is fully labeled in accordance with Federal
33 Seed Act and equals or exceeds specification requirements.
- 34 3. Type of herbicide.
- 35 B. Contract Closeout Information:
- 36 1. Warranty.
- 37 2. Maintenance data.

38 **1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- 39 A. Deliver seed in standard sealed containers labeled with producer's name and seed analysis,
40 showing percentage of each seed species in mix, year of production, net weight, date of
41 packaging and location of packaging.
- 42 B. Seed in damaged packaging is not acceptable.
- 43 C. Keep seed in dry storage away from contaminants.

1 **1.5 JOB CONDITIONS**

- 2 A. Perform seeding within the following timeframes and any planting outside of these dates
 3 requires approval from Contracting Officer Representative:
 4 1. Spring Planting: Between April 1st and July 1st.
 5 2. Fall Planting: Between August 30th and October 15th.
- 6 B. Fall seeding, conducted when the possibility of frost is near, is acceptable; but do not water until
 7 the following growing season.
- 8 C. No work shall be done when the ground is frozen, snow covered, too wet or in an otherwise
 9 unsuitable condition for planting.
 10 1. Special conditions may exist that warrant a variance in the specified planting dates or
 11 conditions.
 12 2. Submit a written request to the Contracting Officer Representative stating the special
 13 conditions and proposed variance.

14 **1.6 WARRANTY**

- 15 A. No warranty is provided after FINAL ACCEPTANCE.
 16 1. Contractor shall maintain Native Seed until FINAL ACCEPTANCE

17 **PART 2 - PRODUCTS**

18 **2.1 MATERIALS**

- 19 A. Seed:
 20 1. Seed mixes will be provided by NPS nursery.
 21 a. Percentages shown in seed mix tables are representative of foliar cover of plants.
 22 b. Contracting Officer to provide PLS calculations for each mix to Contracting Officer
 23 Representative for review.
 24 2. Place of origin: Native seed collected near each installation site provided by GRCA
 25 nursery.
 26 3. Provide mixture as follows:

| Seed Mix A (South Rim) | |
|---|----------------|
| Common and Botanical Name | % Foliar Cover |
| Bouteloua curitpendula (Side Oats Gramma) | 20% |
| Bouteloua eriopoda (Black Gramma) | 20% |
| Bouteloua gracilis (Blue Gramma) | 20% |
| Oryzopsis hymenoides (Indian Ricegrass) | 20% |
| Pleuraphis rigida (Big Galleta) | 20% |

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| Seed Mix B (South Rim) | |
|---|----------------|
| Common and Botanical Name | % Foliar Cover |
| Arctostaphylos pungens (Pointleaf Manzanita) | 8% |
| Artemisia tridentata (Big Sagebrush) | 10% |
| Bouteloua eriopoda (Black Gramma) | 8% |
| Bouteloua gracilis (Blue Gramma) | 8% |
| Ephedra viridis (Mormon Tea) | 5% |
| Oryzopsis hymenoides (Indian Ricegrass) | 10% |
| Pleuraphis rigida (Big galleta) | 9% |
| Koeleria macrantha (Prairie Junegrass) | 9% |
| Eriogonum umbellatum (sulphur-flower buckwheat) | 5% |
| Mahonia fremontii (Fremont's mahonia) | 9% |

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|---|-----|
| Siler's penstemon (<i>Penstemon linarioides</i> ssp. Sileri) | 9% |
| <i>Gutierrezia sarothre</i> (broom snakeweed) | 10% |

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| Seed Mix C (Phantom Ranch) | |
|---|-----------------------|
| Common and Botanical Name | % Foliar Cover |
| <i>Bouteloua aristidoides</i> (Needle Grama) | 20% |
| <i>Bouteloua curtipendula</i> (Sideoats Grama) | 20% |
| <i>Encelia farinose</i> (Brittlebush) | 10% |
| <i>Imperata brevifolia</i> (Satintail) | 10% |
| <i>Isocoma acradenia</i> (Alkali Goldenbush) | 15% |
| <i>Sporobolus Airoides</i> (Alkali dropseed) | 15% |
| <i>Sphaeralcea ambigua</i> (Desert Globemallow) | 10% |

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| Riparian Seed Mix (Bright Angel and Garden Creeks) | |
|---|-----------------------|
| Common and Botanical Name | % Foliar Cover |
| <i>Baccharis salicifolia</i> (Blooming Shrub) | 20% |
| <i>Baccharis salacina</i> (Willow Baccharis) | 20% |
| <i>Carex aquatilis</i> (Leafy Tussock Sedge) | 5% |
| <i>Disichilis spicata</i> (Saltgrass) | 30% |
| <i>Equisetum ferrissii</i> (Horsetail) | 5% |
| <i>Imperata brevifolia</i> (Satintail) | 20% |

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| Bench Seed Mix (Bright Angel and Garden Creeks) | |
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| Common and Botanical Name | % Foliar Cover |
| <i>Disichilis spicata</i> (Saltgrass) | 40% |
| <i>Isocoma acrodynia</i> (Alkali Goldenbush) | 30% |
| <i>Sporobolus cryptandrus</i> (Sand Dropseed) | 30% |

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| Upland Seed Mix A (Bright Angel and Garden Creeks) | |
|---|-----------------------|
| Common and Botanical Name | % Foliar Cover |
| <i>Achnatherum humenoides</i> (Indian Ricegrass) | 20% |
| <i>Aristida arizonica</i> (Arizona threeawn) | 20% |
| <i>Encelia farinosa</i> (Brittlebush) | 20% |
| <i>Erigeron lobatus</i> (Lobed Fleabane) | 10% |
| <i>Isocoma acrodynia</i> (Alkali Goldenbush) | 5% |
| <i>Opuntia basilaris</i> (Prickly Pear Cactus) | 10% |
| <i>Quercus tubinella</i> (Shrub Oak) | 5% |
| <i>Sphaeralcea grossularifolia</i> (Globemallow) | 10% |

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| Upland Seed Mix B (Between Garden Creek and the Colorado River) | |
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| Common and Botanical Name | % Foliar Cover |
| <i>Achnatherum humenoides</i> (Indian Ricegrass) | 15% |
| <i>Aristida arizonica</i> (Arizona threeawn) | 15% |

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| Coleogyne ramosissima Torr. (Blackbrush) | 20% |
| Encelia farinosa (Brittlebush) | 15% |
| Erigeron lobatus (Lobed Fleabane) | 10% |
| Isocoma acrodynia (Alkali Goldenbush) | 5% |
| Opuntia basilaris (Prickly Pear Cactus) | 10% |
| Sphaeralcea grossularifolia (Globemallow) | 10% |

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- B. Herbicide:
 1. Pre-emergents and soil sterilization agents: At the Contracting Officer Representative's option, to aid in weed control during grass establishment.
 2. Use only EPA registered and approved, of type recommended by manufacturer for application.
- C. Water: Provide clean, fresh water free from impurities injurious to vegetation.
- D. Water for planting purposes:
 1. Supplied by Government.
 2. Provide equipment necessary to transport water from source to required locations.
 3. Do not waste water.

13 **PART 3 - EXECUTION**

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- A. Seeding without cover crop:
 1. Plow areas to be seeded to shallow depth as soon as ground can be worked without clodding.
 2. Leave ground fallow until weeds germinate, approximately 3 to 4 weeks.
 3. Disc entire area again to turn over weeds.
 4. Disc at least twice prior to planting, with seeding done immediately following final discing.

20 **3.2 SEEDING**

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- A. Do not use seed which is wet, moldy, or otherwise damaged.
- B. Employ satisfactory methods of broadcast seed application
 1. Following broadcast seeding the contractor shall immediately rake or harrow the seeds into the surface.
 2. Raking shall be accomplished using metal-tined garden or landscape rakes.
 3. If harrowing is used, an English harrow or its equivalent shall be used.
 4. Seed must be uniformly distributed in the broadcasting device, and seed must be evenly distributed throughout the re-vegetation site.
- C. Cover the applied seed with a soil thickness no greater than 0.5 inches in depth.
- D. Seeded areas damaged due to circumstances beyond the Contractor's control shall be repaired and re-seeded as ordered.
 1. Payment for this corrective work, when ordered, shall be agreed to with Contracting Officer's Representative.
- E. Seed shall not be drilled during windy weather or when the ground is frozen or otherwise untillable.
- F. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds excessive moisture, or other factors.
 1. Resume work only when favorable conditions develop.
- G. Lightly rake seed into soil followed by light rolling or cultipacking.
- H. Native Seed Establishment Watering:

- 1 1. After seeding and mulching, and when soil temperatures are warm enough (about 65
- 2 degrees for warm season grasses and about 55 degrees for cool season grass), germination
- 3 requires keeping the soil surface moist until substantial germination is achieved.
- 4 2. Following germination, immediately re-seed areas without germinated seeds that are larger
- 5 than 8 by 8 inches.

6 3.3 HYDROMULCHING

- 7 A. Immediately protect seeded areas against erosion by mulching.
 - 8 1. Following the installation of seed as specified, hydromulch all seeded areas.
 - 9 2. Incorporate hydromulch materials and water to form a homogeneous slurry.
 - 10 3. Apply slurry evenly in a minimum of two (2) passes over the seeded areas.
 - 11 a. First pass: apply 50% of material from the bottom of the slope, directed upward on the
 - 12 slope, applying hydromulch materials to the entire area.
 - 13 b. Second pass: apply 50% of material from the top of the slope, directed downward on
 - 14 the slope, applying hydromulch materials to the entire slope area.
 - 15 c. Using the color of the mulch as a metering agent, spray the slurry mixture uniformly
 - 16 over the designated seeded area, taking care to avoid 'shadows' and bare spots in the
 - 17 application of the material.
 - 18 4. The hydromulch mixtures shall be applied at the following rates:
 - 19 a. Wood Cellulose Fiber Mulch application rate: 2,500 lbs/acre
 - 20 b. Tackifier application rate: 175 lbs/ac
 - 21 c. Apply additional seed in hydromulch slurry mix per acre at an application rate of 10%
 - 22 of drill seed application rate per acre.
 - 23 5. Do not hydro-mulching the presence of surface water.
 - 24 6. Thoroughly clean site amenities after mulching.
 - 25 7. Hydraulic mulching equipment and accessories: Obtain Contracting Officer's approval for
 - 26 use.
- 27 B. Protect seeded slopes against erosion with erosion netting or other methods approved by
- 28 Contracting Officer's Representative.
 - 29 1. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated
 - 30 topsoil trench.
 - 31 2. Provide 12 inch overlap of adjacent rolls.
 - 32 3. Backfill trench and rake smooth, level with adjacent soil.
 - 33 4. Secure outside edges and overlaps at 36 inch intervals with stakes.
 - 34 5. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
 - 35 6. At sides of ditches, lay fabric laps in direction of water flow.
 - 36 a. Lap ends and edges minimum 6 inches.
- 37 C. Protect seeded areas against traffic or other use by erecting barricades and placing warning
- 38 signs.

39 3.4 MAINTENANCE

- 40 A. General:
 - 41 1. Begin maintenance of planted areas immediately after each portion is planted and continue
 - 42 until final acceptance or for a specific time period as stated below, whichever is longer.
 - 43 2. Provide and maintain temporary piping, hoses, and watering equipment as required to
 - 44 convey water from water sources and to keep planted areas uniformly moist as required for
 - 45 proper growth.
 - 46 3. Protection of new materials:
 - 47 a. Provide barricades, coverings or other types of protection necessary to prevent damage
 - 48 to existing improvements indicated to remain.
 - 49 b. Repair and pay for all damaged items.
 - 50 4. Replace unacceptable materials with materials and methods identical to the original
 - 51 specifications unless otherwise approved by the Contracting Officer Representative.
 - 52 5. Seeded areas damaged due to circumstances beyond the Contractor's control shall be
 - 53 repaired and reseeded as ordered.

