



SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The WORK under this section consists of the revegetation with seeded grasses. CONTRACTOR shall furnish all labor, materials, equipment, tools, and transportation required to complete the WORK, and shall perform all operations in connection with and reasonably incidental to establishing, maintaining, and warranting the reseeded areas.
- B. All WORK shall be completed in accordance with these SPECIFICATIONS, the DRAWINGS and CONTRACT DOCUMENTS, and in a manner consistent with accepted horticultural practices. All permits, licenses, and fees associated with any WORK under this CONTRACT are the responsibility of CONTRACTOR, unless otherwise noted.

1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
 - 1. Section 01 57 19, Temporary Environmental Controls
 - 2. Section 31 41 13 Topsoil and Wetland Topsoil Stripping and Stockpiling
 - 3. Section 31 23 00 Excavation and Fill
 - 4. Section 31 25 00 Erosion and Sedimentation Controls
 - 5. Section 32 93 00 Landscape Planting

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. Association of Official Seed Analysts (AOSA).

1.04 SUBMITTALS

- A. CONTRACTOR shall be required to submit statements of guarantee and/or certifications from vendors who supply seed, mulches, tackifiers, and fertilizers.
- B. CONTRACTOR shall furnish to ENGINEER a signed statement certifying that the seed furnished is from a lot that has been tested by a recognized laboratory for seed testing within six (6) months prior to the date of delivery.
- C. Seed container labels shall be submitted to ENGINEER at the completion of PROJECT.



- D. CONTRACTOR shall submit to ENGINEER the manufacturers guaranteed chemical analysis, name, trade name, trademark, and conformance to state law of all fertilizers and herbicides.
- E. Submit compost sample for approval.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be furnished in original manufacturers shipping bags or containers and remain in these bags or containers until they are used. All materials shall be stored in a manner that will prevent them from coming into contact with precipitation, surface water, or any other contaminating substance.
- B. Fertilizer: It shall be delivered in original, unopened containers, unless provisions are made and approved by ENGINEER for bulk deliveries to the site of the WORK.
- C. Herbicide: It shall be delivered in original, unopened containers, unless provisions are made and approved by ENGINEER for bulk deliveries to the site of the WORK. All herbicides will be stored in a manner that satisfies local, State and Federal Guidelines for Herbicide Storage.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials used shall be new and without flaws or defects of any type, and shall be the best of their class and kind. Seeds shall be prepared for sale during the year of installation.
- B. All materials and equipment furnished shall be free of noxious weeds including, but not limited to Russian knapweed, diffuse knapweed, Canada thistle, field bindweed, Johnsongrass, leafy spurge, kochia, or any state-listed noxious weed species.
- C. Any materials that have become wet, moldy, or otherwise damaged in transit or in storage shall not be used.

2.02 SEED

- A. Seed shall be only that which is specified by ENGINEER or PLANT ECOLOGIST (refer to DRAWINGS). All seed shall be mixed by a wholesale seed supplier in order to obtain the specified mixture and application rate required by ENGINEER or PLANT ECOLOGIST. No species substitutions shall be permitted without prior approval of the ENGINEER or PLANT ECOLOGIST.
- B. All seed shall conform to all current State and Federal regulations and shall be subject to the testing provisions of the Association of Official Seed Analysts.
- C. All seed and seed mixes shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the common, scientific, and variety name(s) of the seed(s), the lot number, point of origin, net weight, percent of weed content, and the guaranteed percentage of purity and germination.



- D. All seed shall be guaranteed for purity and germination, free of noxious weed seed and supplied on a Pure Live Seed (PLS) basis.

2.03 FERTILIZER

- A. Fertilizer shall be as shown on the DRAWINGS. All fertilizer shall be a standard commercial product of uniform composition, free flowing and conforming to applicable State and Federal laws.
- B. No cyanamide compounds shall be permitted in fertilizers.

2.04 MULCH

- A. The type of mulching material to be used shall be crimped weed-free straw. At least seventy percent (70%) of the mulch by weight shall be ten (10) inches or more in length. Mulch shall not contain any noxious weed, must, mold, cake, or decay. No hay may be used on the PROJECT unless approved in advance by the PLANT ECOLOGIST.

2.05 ORGANIC TACKIFIER/BINDER

- A. Organic tackifier/binder shall be applied as shown on the DRAWINGS.

2.06 EROSION CONTROL NETTING, BLANKETS, MATS, FABRICS

- A. Erosion control blankets, mats, or other commercial products for stabilizing land disturbed areas may be required in certain areas. If so, the type, manufacturer, and installation method for these products shall be specified by ENGINEER or PLANT ECOLOGIST.

2.07 WATER

- A. All water used on the PROJECT shall be free of any substances harmful to plant germination and growth or to the environment in general. CONTRACTOR shall be responsible for furnishing and applying water that meets these requirements. ENGINEER or PLANT ECOLOGIST may, at CONTRACTOR's expense, submit samples of water used on the PROJECT for laboratory analysis (of a reasonable number and kind) to ensure the quality of the water. Onsite water shall not be used unless approved by OWNER or OWNERS REPRESENTATIVE.

2.08 TOPSOIL AND WETLAND TOPSOIL

- A. Topsoil and Wetland Topsoil shall meet the requirements of Section 32 91 13

2.09 ORGANIC COMPOST (SOIL AMENDMENT)

- A. For use as a component for seed establishment use a well decomposed, stable, weed free organic matter source, derived from agricultural food, or industrial residuals' biosolids (treated sewage sludge); yard trimmings, or source-separated or mixed solid waste. The product shall contain no substances toxic to plants and shall be reasonably free (less than one percent [$<1\%$] by dry weight) of man-made foreign matter. Compost shall be processed at sustained high heat so that any weed seeds contained



within it shall no longer be viable and it shall possess no objectionable odors and shall not resemble the raw material from which it was derived.

- B. Compost shall have the following characteristics:
1. pH Range: 5.5 - 8.0.
 2. Moisture Content: 35% - 55%.
 3. Particle Size: Pass through 1-inch screen or smaller.
 4. Stability: Stable to highly stable, providing nutrients for plant growth.
 5. Maturity/Growth Screening: Demonstrate ability to enhance plant growth.
 6. Soluble Salt Concentrations: 2.5 dS (mmhos/cm) or less preferred.
 7. Organic Matter Content: 30% - 70%.
 8. Suggested Source: A-1 Organic, Eaton, Colorado (970) 454-3492 or an approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor's Site Responsibilities: It shall be the responsibility of CONTRACTOR to locate and protect all utilities, structures, roadways, parking areas, fences, survey markers, and existing vegetation (such as, trees and shrubs) on all WORK sites. Any damage caused by CONTRACTOR or SUBCONTRACTORS shall be immediately repaired or corrected by CONTRACTOR at no expense to OWNER.
- B. Timing of the Work: Seeding shall be completed as soon as practical after the completion of final grading. CONTRACTOR shall coordinate the actual start of the seeding operation with ENGINEER or PLANT ECOLOGIST. Seeding shall occur between September 15 and April 15, unless otherwise permitted by the ENGINEER or PLANT ECOLOGIST
- C. Notice to Proceed: CONTRACTOR shall inform ENGINEER when they are ready to commence permanent revegetation. Upon agreement with CONTRACTOR's preparation for this WORK ENGINEER shall provide CONTRACTOR with a Notice to Proceed. CONTRACTOR shall begin and complete the WORK as specified in this section.
- D. Performance of the WORK: All WORK is to be performed by personnel thoroughly familiar with proper and accepted methods for soil preparation, herbicide applications, fertilizing, seeding, and mulching. All WORK is to be performed under the direct supervision of CONTRACTOR's superintendent, who shall be thoroughly familiar with the provisions of this CONTRACT.
- E. Project Monitoring: CONTRACTOR shall notify ENGINEER prior to the commencement of any WORK under this section. ENGINEER shall monitor the progress of the WORK throughout the CONTRACT period, and shall assist in



determining where soils samples, as required in Article Submittals, are to be collected. ENGINEER or PLANT ECOLOGIST shall also collect samples of the seed used on the PROJECT, and may collect samples of fertilizers, soil additives, water, or other materials as they deem necessary to ensure the PROJECT SPECIFICATIONS are met.

3.02 SOIL/SEEDBED PREPARATION, SOIL AMENDMENTS

- A. All ripping and tilling operations shall be done in a direction which follows the natural contour of the land on slopes of three to one (3:1) or less. Soils on slopes greater than three to one (3:1) shall be prepared for planting in a manner specified by ENGINEER. Any irregularities in the ground surface resulting from soil preparation operations shall be corrected and sloped to drain.
- B. Limit subgrade preparation to areas that shall be planted in the immediate future.
- C. Prior to spreading salvaged topsoil and seeding, thoroughly till or rip to a depth of twelve (12) inches all areas compacted by access, staging, or construction traffic. Till all remaining areas to a depth of six (6) inches. Channel bottom areas are to be ripped to a depth of at least twelve (12) inches on approximately two- (2-) to four- (4-) foot centers. The soils shall be worked until no clods greater than two (2) inches in diameter remain, unless directed otherwise by ENGINEER. Remove rocks and other objects three (3) inches or greater in any dimension.
- D. Spread topsoil to depth required to meet grades and elevations shown on DRAWINGS after light rolling and natural settlement.
- E. Either mix soils with soil amendments and fertilizers before spreading or apply soil amendments or fertilizers on surface of spread topsoil and till thoroughly into top four (4) inches before planting. Mix soil amendments at the rate that is indicated on the DRAWINGS. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
- F. Organic Compost:
 - 1. Organic Compost Soil Amendment shall be applied at a rate of three (3) cubic yards per one-thousand (1,000) square feet or as shown on the DRAWINGS.
 - 2. Organic Compost shall only be applied if required and designated on the DRAWINGS.
- G. Prior to seeding, grade the areas to be seeded to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Soils shall meet grades and elevations shown on DRAWINGS after light rolling and natural settlement. Limit fine grading to areas that can be planted in the immediate future.
- H. Moisten prepared areas to be seeded prior to planting when soils are dry. Water thoroughly and allow surface to dry before seeding. Do not create muddy conditions. Restore prepared areas if eroded or disturbed after fine grading and before planting.



3.03 SEEDING

- A. General: ENGINEER or PLANT ECOLOGIST shall be on site during seeding operations and will collect representative samples of the seed used on any PROJECT for testing/compliance purposes. CONTRACTOR shall notify ENGINEER or PLANT ECOLOGIST when seeding is to take place so these samples can be obtained (seed tags from all mixtures shall also be supplied to the ENGINEER or PLANT ECOLOGIST).
- B. Drill Seeding:
1. All seed is to be drilled one-quarter (1/4) inch to one-half (1/2) inch into the soil at the specified pure live seed (PLS) per acre rate with a mechanical grass drill with depth bands and an agitator in the seed box. Rows shall be spaced not more than seven (7) inches apart. CONTRACTOR shall drill one-half (1/2) of the required PLS per acre in one compass direction, and then drill the remaining half of the required PLS per acre in a direction ninety degrees (90°) to the first half.
 2. Following drill seeding of all areas, the forb patch seed mix and the grass/shrub patch seed mix should be broadcast in the areas specified on the DRAWINGS. All forb and grass/shrub patch areas shall be both drill seeded with the appropriate upland or riparian mix as specified on the DRAWINGS and then immediately broadcast with the appropriate forb or grass/shrub patch seed mix prior to mulch application
- C. Broadcast Seeding:
1. Some portions of PROJECT areas may be inaccessible to a drill. In these areas, which shall be agreed upon by CONTRACTOR and ENGINEER or PLANT ECOLOGIST, seed shall be uniformly broadcast at twice the specified PLS per acre and covered with soil to a depth of one-quarter (1/4) inch to one-half (1/2) inch by hand raking or harrowing by some other means acceptable to ENGINEER or PLANT ECOLOGIST.
 2. Broadcast seeding shall be accomplished using hand-operated “cyclone-type” seeders or rotary broadcast equipment attached to construction or revegetation machinery. All machinery shall be equipped with metering devices. Broadcasting by hand shall be acceptable on small, isolated sites. Prior to hand broadcast seeding, divide the seed required into two portions. Apply the first half of the seed and then follow up by applying the second portion to ensure complete coverage by seed. When broadcast seeding, passes shall be made over each site to be seeded in a manner to ensure an even distribution of seed. When using hopper type equipment, seed shall be frequently mixed within the hopper to discourage seed settling and uneven planting distribution of species.
 3. Broadcast seeding shall take place immediately following the completion of final seedbed preparation techniques and upon inspection and approval of ENGINEER. Broadcast seeding should not be conducted when wind velocities would prohibit even seed distribution.



3.04 FERTILIZATION

- A. Any fertilizers specified by ENGINEER or PLANT ECOLOGIST shall be applied and mixed with the soil as specified in Article Soil/Seedbed Preparation, Soil Amendments. In some instances, as directed by ENGINEER or PLANT ECOLOGIST, fertilizers shall be spread evenly on the surface of the soil rather than tilled into the top four (4) inches. All fertilizers shall be applied using standard application equipment at rates indicated by required soils tests (Article Submittals), or in some cases as specified by ENGINEER or PLANT ECOLOGIST.

3.05 MULCHING

- A. Straw mulch shall be applied immediately after seeding has been completed with a mechanical spreader at a rate not less than one and one-half (1-1/2) tons per acre, and not more than two (2) tons per acre. Straw mulch shall then be anchored to the soil with a standard commercial crimper which shall crimp the fiber four (4) inches or more into the soil. Failure to apply designated mulch at the specified rate may result in the ENGINEER or PLANT ECOLOGIST requiring the CONTRACTOR to remobilize and complete the specified WORK at no additional cost to the OWNER.

3.06 HERBICIDE/CHEMICAL APPLICATIONS

- A. All noxious weed growth on the site shall be controlled by the CONTRACTOR during the construction period and until the final inspection by spot application of herbicides which have been pre-approved by the ENGINEER or PLANT ECOLOGIST. Spot application of herbicides means detailed application of only the targeted weed species by wand or wick with a backpack applicator. No herbicides shall be permitted for general application (broadcast) during a time when it would cause detrimental impact to germination or establishment of the seeded grasses.
- B. Herbicides or other chemicals, if required, shall be applied using well-maintained spraying equipment by individuals working for CONTRACTOR who are appropriately licensed by any State and/or Federal agency having jurisdiction over such applications. It shall be the responsibility of CONTRACTOR to be knowledgeable of any and all current laws and regulations pertaining to herbicide and other chemical applications, and to advise ENGINEER or PLANT ECOLOGIST immediately if any requests for these applications made by ENGINEER or PLANT ECOLOGIST are inappropriate as they pertain to these laws and regulations. Herbicide application shall be conducted by trained weed control personnel who also can recognize the targeted weed species.
- C. Herbicides and other chemicals shall not be applied during periods when wind or other physical conditions cause the herbicides or chemicals to be transported a distance of more than five (5) feet from the immediate area where they are being placed. It shall be the responsibility of CONTRACTOR to stop WORK immediately and to notify ENGINEER or PLANT ECOLOGIST if any weather or other physical condition exists which would make the application of herbicides or other chemicals inappropriate.
- D. All herbicides or other chemicals used (except solid fertilizers, Article Fertilizers) shall be applied at a rate and strength, and by the method recommended by the manufacturer of the product being used. Failure to properly apply herbicides (spot



treatment) may result in the ENGINEER or PLANT ECOLOGIST requiring the CONTRACTOR to reseed the damaged area at no cost to the OWNER.

3.07 EROSION CONTROL NETTING, BLANKETS, MATS, FABRICS

- A. Slopes over three to 1 (3:1), concave areas on slopes, drainage swales, areas along the edges of hard surfaces (trails and roads), and any other areas which may rill, shall be mulched with jute netting or other erosion control fabric as specified in DRAWINGS. These fabrics shall be installed only after the installation area is graded smooth. All clods or rocks shall be removed from the area, so that the fabric will lie flat on the surface of the soil and not bridge over it. The edges of the fabric shall be secured by two- (2-) foot wooden stakes installed two (2) feet on center along all edges and seams. Seams shall overlap one (1) foot and the body of the fabric shall be further secured to the soil surface on three- (3-) foot centers. The fabric shall not be stretched tight.

3.08 FIELD QUALITY CONTROL

- A. Final Acceptance:

1. When WORK has been completed for the PROJECT, CONTRACTOR and ENGINEER shall inspect the site together and determine the total area of the WORK, and whether or not the WORK is complete and has been done in accordance with CONTRACT DOCUMENTS and SPECIFICATIONS. If mutual agreement cannot be reached on these issues, the determinations made by ENGINEER shall be final. Deficiencies in the WORK, if any, shall be noted and a checklist of these deficiencies given to CONTRACTOR by ENGINEER. CONTRACTOR shall immediately correct any deficiencies listed on the checklist at no cost to OWNER.
2. When all checklist items are completed to the satisfaction of ENGINEER, ENGINEER shall issue a Certificate of Final Acceptance. CONTRACTOR shall then submit these items for payment to OWNER based on the original project BID prices and any CHANGE ORDERS which have been agreed to and signed by both parties.

3.09 CLEANING

- A. All WORK sites shall be kept clean and free from all debris. At the conclusion of WORK at any site, CONTRACTOR shall remove and haul from the site all excess materials, debris, and equipment. Any damage (for example, damaged fencing, damaged road surfaces, excessive tire furrows, mud tracked onto pavement) resulting from CONTRACTOR's activities shall be repaired by CONTRACTOR to ENGINEER's satisfaction at no expense to OWNER.

END OF SECTION