SECTION 32 90 00
PLANTING

PART 1 - GENERAL

1.1 DESCRIPTION

This work consists of furnishing and installing all planting materials required for landscaping and restoration hereinafter specified in locations as shown.

1.2 EQUIPMENT

Maintain all equipment, tools and machinery while on the project in sufficient quantities and capacity for proper execution of the work.

1.3 RELATED WORK

A. Section 31 20 00, EARTH MOVING, Stripping Topsoil and Stock Piling.
B. Section 01 45 29, TESTING LABORATORY SERVICES, Topsoil Testing.
C. Section 31 20 00, EARTH MOVING, Topsoil Materials.
D. Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

1.4 SUBMITTALS

A. Samples: Submit the following samples for approval before work is started:

Organic Mulch	2.3 kg (5 pounds) of each type to be used.
Pre-Emergent Herbicide	2.3 kg (5 pounds) of each type to be used.

B. Certificates of Conformance or Compliance: Before delivery, notarized certificates attesting that the following materials meet the requirements specified shall be submitted to the Resident Engineer/COTR for approval:
   1. Fertilizers.
   2. Lime
   3. Seed
   4. Asphalt Adhesive
C. Manufacturer's Literature and Data:
   1. Erosion control materials
   2. Hydro mulch
   3. Pre-emergent herbicide

1.5 DELIVERY AND STORAGE

A. Delivery:
   1. Deliver fertilizer and lime to the site in the original, unopened containers bearing the manufacturer's warranteed chemical analysis,

name, trade name or trademark, and in conformance to state and federal law. In lieu of containers, fertilizer and lime may be furnished in bulk and a certificate indicating the above information shall accompany each delivery.

2. During delivery: Protect seed from contamination.

B. Storage:

1. Keep seed, lime, and fertilizer in dry storage away from contaminants.

1.6 TURF INSTALLATION SEASONS AND CONDITIONS

A. No work shall be done when the ground is frozen, snow covered, too wet or in an otherwise unsuitable condition for planting. Special conditions may exist that warrants a variance in the specified planting dates or conditions. Submit a written request to the Resident Engineer/COTR stating the special conditions and proposal variance.

1.7 TURF ESTABLISHMENT PERIOD

A. The Establishment Period for turf shall begin immediately after installation, with the approval of the Resident Engineer/COTR, and continue until the date that the Government accepts the project or phase for beneficial use and occupancy. During the Turf Establishment Period the Contractor shall:

1. Water all turf to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of 25 mm (1 inch) of absorbed water per week either through natural rainfall or augmented by periodic watering. Apply water at a moderate rate so as not to displace the mulch or flood the turf.
2. Replace mulch as required.
3. Remove weeds and other undesired vegetation, including the root growth, before they reach a height of 75 mm (3 inches).
4. Provide the following turf establishment:
   a. Eradicate all weeds. Water, fertilize, overseed, and perform any other operation necessary to promote the growth of grass.
   b. Replant areas void of turf 0.1 m^2 (one square foot) and larger in area.
   c. Mow the new lawn at least three times prior to the final inspection. Begin mowing when grass is 100 mm (4 inches) high. Mow to a 65 mm (2-1/2 inch) height.

1.8 TURF WARRANTY

A. All work shall be in accordance with the terms of the Paragraph, "Warranty" of FAR clause 52.246-21, including the following supplements:

1. A One Year Turf Warranty will begin on the date that the Government accepts the project or phase for beneficial use and occupancy. The

Contractor shall have completed, located, and installed all turf according to the plans and specifications. All turf is expected to be living and in a healthy condition at the time of final inspection.

2. The Contractor will replace any areas void of turf immediately. A one year warranty for the turf that was replaced, will begin on the day the work is completed.
3. The Government will reinspect all turf at the end of the One Year Warranty. The Contractor will replace any dead, missing, or defective turf immediately. The Warranty will end on the date of this inspection provided the Contractor has complied with the work required by this specification. The Contractor shall also comply with the following requirements:
   a. Complete remedial measures directed by the Resident Engineer/COTR to ensure plant and turf survival.
   b. Repair damage caused while making turf replacements.

1.9 APPLICABLE PUBLICATIONS

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

B. American National Standards Institute (ANSI) Publications:
   ANSI Z60.1-04.....Nursery Stock
   ANSI Z133.1-06.....Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush- Safety Requirements

C. Hortus Third, A Concise Dictionary of Plants Cultivated in the U.S. and Canada.

D. American Society for Testing and Materials (ASTM) Publications:
   C136-06.....Sieve Analysis of Fine and Coarse Aggregates
   C516-02.....Vermiculite Loose Fill Thermal Insulation
   C549-06.....Perlite Loose Fill Insulation
   D977-05.....Emulsified Asphalt (AASTHO M140)
   D2028-97 (Rev. 2004)....Cutback Asphalt (Rapid-curing Type)
   D2103-05.....Polyethylene Film and Sheeting

E. Turfgrass Producers International:
   Turfgrass Sodding.

F. U. S. Department of Agriculture Federal Seed Act.
   1998.....Rules and Regulations

G. American Wood Protection Association (AWPA):
   C2-02.....Lumber, Timbers, Bridge Ties and Mine Ties, Pressure Treatment

PART 2 - PRODUCTS

2.1 GENERAL

All turf material will conform to the varieties specified and be true to botanical name as listed in Hortus Third.

2.2 TOPSOIL

A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 5.0 nor more than 7.5.

B. Obtain material from stockpiles established under Section 31 20 00, EARTH MOVING, subparagraph, Stripping Topsoil, that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.

C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Resident Engineer/COTR of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES. Amend topsoil not meeting the pH range specified by the addition of pH adjusters.

2.3 LIME

Lime shall be agricultural limestone containing not less than 90 percent calcium and magnesium carbonates. Lime must be ground to such a fineness that not less than 90% must pass No. 8 mesh and not less than 25% must pass No. 100 mesh. Moisture is not to exceed 10%.

2.4 SOIL CONDITIONERS

A. Coarse Sand

Coarse concrete sand, ASTM C-33 Fine Aggregate, shall be clean, sharp, free of limestone, shale and slate particles and of toxic materials.

B. Perlite shall conform to ASTM C549.

C. Vermiculite shall be horticultural grade and free of any toxic materials and conform to ASTM C516.

D. Organic Matter shall be commercially prepared compost, composted sufficiently to be free of all woody fibers, seeds, and leaf structures, and free of toxic and nonorganic matter.

E. Fertilizer: Agricultural fertilizer of a formula indicated by the soil test. Fertilizers shall be organic, slow-release compositions whenever applicable

2.5 TURF FERTILIZER

Provide turf fertilizer that is commercial grade, free flowing, uniform in composition, and conforms to applicable state and federal regulations. Granular fertilizer shall bear the manufacturer's warranteed statement of analysis Liquid starter fertilizer for use in the hydro seed slurry will be commercial type with 50 percent of the nitrogen in slow release form.

2.6 MULCH

A. Mulch shall be free from deleterious materials and shall be stored as to prevent inclusion of foreign material.

B. Organic mulch materials shall be straw, hay , or wood cellulose fiber:

1. Straw for lawn seed bed mulch shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold or other objectionable material. Straw shall be in an air-dry condition and suitable for placing with blower equipment.
2. Wood cellulose fiber for use with hydraulic application of grass seed and fertilizer 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 metering of the application of materials. On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of 12 percent moisture, plus or minus three percent at the time of manufacture. The pH range shall be from 3.5 to 5.0. The wood cellulose fiber shall be manufactured so that:
   a. After addition and agitation in slurry tanks with fertilizers, grass seeds, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry.
   b. When hydraulically sprayed on the ground, the material will form a blotter like cover impregnated uniformly with grass seed.
   c. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlaying soil.

2.7 ASPHALT ADHESIVE

Asphalt adhesive for application with straw mulch shall be liquid asphalt conforming to ASTM D2028, designation RC-70, or emulsified asphalt conforming to ASTM D977, Grade RS-1.

2.8 EROSION CONTROL

A. Erosion control mats shall be as shown on the drawings.

2.9 WATER

Water shall not contain elements toxic to plant life. It shall be obtained by coordination with the Firestation as specified in Section 01 00 00, GENERAL REQUIREMENTS, paragraph, Temporary Services at no cost to the Contractor.

2.10 SEED

Seed shall be state-certified seed of the latest season's crop and shall be delivered in original sealed packages bearing the producer's warranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Seed shall be labeled in conformance with U. S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable. Onsite seed mixing shall be done only in the presence of the Resident Engineer/COTR. Seed mixtures shall be proportioned by weight as follows:

E.H. GRIFFITH "E" PLUS LAWN SEED MIXTURE

PURE SEED	KIND OF SEED	GERMINATION
16.7%	AWARD KENTUCKY BLUEGRASS	85%
16.7%	RUGBY II t KENTUCKY BLUEGRASS	85%
16.7%	AMAZING GS PERENNIAL RYEGRASS	90%
16.7%	MIDNIGHT KENTUCKY BLUEGRASS	85%
16.7%	APPLE GL PERENNIAL RYEGRASS	90%
16.7%	HOME RUN PERENNIAL RYEGRASS	90%
0.50%	CROP	
0.01%	WEEDS	
0.79%	INERT	

2.11 HERBICIDES

All herbicides shall be properly labeled and registered with the U.S. Department of Agriculture. Keep all herbicides in the original labeled containers indicating the analysis and method of use.

PART 3 - EXECUTION

3.1 TILLAGE FOR TURF AREAS

Thoroughly till the soil to a depth of at least 100 mm (4 inches) by scarifying, disking, harrowing, or other approved methods. This is

particularly important in areas where heavy equipment has been used, and especially under wet soil conditions. Remove all debris and stones larger than 25 mm (one inch) remaining on the surface after tillage in preparation for finish grading. To minimize erosion, do not till areas of 3:1 slope ratio or greater. Scarify these areas to a 50 mm (one inch) depth and remove debris and stones.

3.2 FINISH GRADING

After tilling the soil for bonding of topsoil with the subsoil, spread the topsoil evenly to a minimum depth of 100 mm (4 inches). Incorporate topsoil at least 50 to 75 mm (2 to 3 inches) into the subsoil to avoid soil layering. Do not spread topsoil when frozen or excessively wet or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic. Complete lawn work only after areas are brought to finished grade.

3.3 APPLICATION OF FERTILIZER AND LIME FOR TURF AREAS

A. Apply turf fertilizer at the rate of 7 kg/100 m2 (30 pounds per 1,000 square feet). In addition, adjust soil acidity and add soil conditioners as required herein for suitable topsoil under PART 2, Paragraph, TOPSOIL.

B. Spread lime at the rate of .9 kg/100 m^2(100 pounds per 1,000 square feet).

C. Incorporate fertilizers and lime into the soil to a depth of at least 100 mm (4 inches) as part of the finish grading operation. Immediately restore the soil to an even condition before any turf work.

3.4 MECHANICAL SEEDING

A. Broadcast seed by approved sowing equipment at the rate of 2.4 kg/100 m^2 (5 pounds per 1,000 square feet). Sow one half of the seed in one direction, and the remainder sown at right angles to the first sowing. Cover seed to an average depth of 6 mm (1/4 inch) by means of spike-tooth harrow, cultipacker, or other approved device.

B. Immediately after seeding, firm up the entire area with a roller not exceeding 225 kg/m (150 pounds per foot) of roller width. Where seeding is performed with a cultipacker-type seeder or where seed is applied in combination with hydro-mulching, no rolling is required.

C. Immediately after preparing the seeded area, evenly spread an organic mulch of straw by hand or by approved mechanical blowers at the rate of 0.5 kg/m^2 (2 tons per acre). Application shall allow some sunlight to penetrate and air to circulate but also reduce soil and seed erosion and conserve soil moisture. Anchor mulch by either a mulch tiller, asphalt emulsion, twine, or netting. When asphalt emulsion is used, apply either

simultaneously or in a separate application. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plantings.

3.5 HYDROSEEDING

When hydroseeding, mix the seed and slow release starter fertilizer, or the seed, fertilizer, lime when required and approved wood cellulose mulch material in the required amount of water to produce a homogeneous slurry and then uniformly apply slurry under pressure at the following rate. Slurry proportions shall be as recommended by the manufacturer. When using wood cellulose mulch, incorporate it as an integral part of the slurry mix after the seed and fertilizer have been thoroughly mixed. Apply the slurry mix at the rate of 27 kg/100 m^2 (55 pounds per 1,000 square feet) (dry weight).

3.6 WATERING

Apply water to the turf areas immediately following installation at a rate sufficient to ensure thorough wetting of the soil to a depth of at least 100 mm (4 inches). Supervise watering operation to prevent run-off. Supply all pumps, hoses, pipelines, and sprinkling equipment. Repair all areas damaged by water operations.

3.7 PROTECTION OF TURF AREAS

Immediately after installation of the turf areas, protect against traffic or other use by erecting barricades, as required, and placing approved signs at appropriate intervals until final acceptance.

3.8 EROSION CONTROL MATERIAL

A. Install erosion control mats at the locations indicated as recommend by manufacturer and as shown

3.9 RESTORATION AND CLEAN-UP

Where existing or new turf areas have been damaged or scarred during planting and construction operations, restore disturbed area to their original condition. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. In areas where turf work have been completed, clear the area of all debris, spoil piles, and containers. Clear all other paved areas when work in adjacent areas is completed. Remove all debris, rubbish and excess material from the station.

3.10 ENVIRONMENTAL PROTECTION

All work and Contractor operations shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

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