

**SECTION 32 90 00
LANDSCAPING**

PART 1 - GENERAL

1.1 DESCRIPTION

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

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 SUBMITTALS

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

Inert Mulch	2.3 kg (5 pounds) of each type to be used.
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. Manufacturer's Literature and Data:

1. Metal edging
2. Erosion control materials
3. Pre-emergent herbicide

1.4 DELIVERY AND STORAGE

- A. Delivery:

1. Notify the Resident Engineer of the delivery schedule in advance so the plant material may be inspected upon arrival at the job site. Remove unacceptable plant material from the job site immediately.
2. Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Protect trees during transport by tying in the branches and covering all exposed branches.

- B. Storage:

1. Sprinkle sod with water and cover with moist burlap, straw or other approved covering, and protect from exposure to wind and direct sunlight. Covering should permit air circulation to alleviate heat development.
2. Keep seed, lime, and fertilizer in dry storage away from contaminants.

3. Store plants not installed on the day of arrival at the site as follows:
 - a. Shade and protect plants from the wind when stored outside.
 - b. Heel in bare root plants.
 - c. Protect plants stored on the project from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.
 - d. Keep plants, including those in containers, in a moist condition until planted, by watering with fine mist spray.

1.5 PLANTING AND 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 stating the special conditions and proposal variance.

1.6 PLANT AND TURF ESTABLISHMENT PERIOD

- A. The Establishment Period for plants and turf shall begin immediately after installation, with the approval of the Resident Engineer, and continue until the date that the Government performs a final inspection. During the Plant and Turf Establishment Period the Contractor shall:
 1. Water all plants and 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 plants and turf.
 2. Prune plants and replace mulch as required.
 3. Replace and restore stakes, guy wires, and eroded plant saucers as required.
 4. In plant beds and saucers, remove grass, weeds, and other undesired vegetation, including the root growth, before they reach a height of 75 mm (3 inches).
 5. Spray with approved insecticides and fungicides to control pests and ensure plant survival in a healthy growing condition, as directed by the Resident Engineer.
 6. 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 m² (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.
- 7. Remove plants that die during this period and replace each plant with one of the same size and species.
- 8. The Contractor is not responsible for theft or damage to plants by non-contractor vehicles or vandalism once plants are installed and approved.

1.7 PLANT AND TURF GUARANTEE

- A. All work shall be in accordance with the terms of the Paragraph, "Guaranty" of Section GENERAL CONDITIONS, including the following supplements:
- B. A One Year Plant and Turf Guarantee will begin on the date that the Government performs the final inspection. The Contractor shall have completed, located, and installed all plants and turf according to the plans and specifications. All plants and turf are expected to be living and in a healthy condition at the time of final inspection.
- C. The Contractor shall replace any dead plant material and any areas void of turf immediately. A one year guarantee for the plants and turf that are replaced, will begin on the day the work is completed.
- D. Replacement of relocated plants, that the Contractor did not supply, is not required unless they die from improper handling and care during transplanting. Loss through Contractor negligence requires replacement in kind and size.
- E. The Government will re-inspect all plants and turf at the end of the One Year Guarantee. The Contractor shall replace any dead, missing, or defective plant material and turf immediately. The Guarantee 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:
 - 1. Replace dead, missing or defective plant material prior to final inspection.
 - 2. Mulch and weed plant beds and saucers. Just prior to this inspection, treat these areas to a second application of approved pre-emergent herbicide.
 - 3. From plants having been installed for one year, remove stakes, guy wires and any required tree wrappings.
 - 4. Complete remedial measures directed by the Resident Engineer to ensure plant and turf survival.
 - 5. Repair damage caused while making plant or turf replacements.

1.8 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 Z60.1-1990.....Nursery Stock
 - ANSI Z133.1-1994.....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, MacMillan Publishing Co. 1978.
- D. American Society For Testing And Materials (ASTM) Publications:
 - C136-96(Rev. A).....Sieve Analysis of Fine and Coarse Aggregates
 - C516-80(Rev. 1996).....Vermiculite Loose Fill Thermal Insulation
 - C549-81(Rev. 1995).....Perlite Loose Fill Insulation
 - D977-98.....Emulsified Asphalt (AASHTO M140 1988)
 - D2028-97.....Cutback Asphalt (Rapid-curing Type)
 - D2103-97.....Polyethylene Film and Sheeting
- E. Turf Producers International:
 - Guideline Specifications to Turfgrass Sodding 1995 ed.
- F. U. S. Department of Agriculture Federal Seed Act of August 9, 1939:
 - 53 Stat. 1275.....Rules and Regulations
- G. American Wood Preservative Association (AWPA):
 - C2-95.....Lumber, Timbers, Bridge Ties and Mine Ties, Pressure Treatment

PART 2 - PRODUCTS

2.1 GENERAL

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

2.2 PLANTS

- A. Plants shall be in accordance with ANSI Z60.1, except as otherwise stated in the specifications or shown on the plans. Where the drawings or specifications are in conflict with ANSI Z60.1, the drawings and specification shall prevail.
- B. Provide well-branched and formed planting stock, sound, vigorous, and free from disease, sunscald, windburn, abrasion, harmful insects or insect eggs with healthy, normal, and unbroken root systems. Provide trees, deciduous and evergreen, that are single trunked with a single leader, unless otherwise indicated, display no weak crotches. Provide

symmetrically developed deciduous trees and shrubs of uniform habit of growth, with straight boles or stems and free from objectionable disfigurements, and evergreen trees and shrubs with well developed symmetrical tops with typical spread of branches for each particular species or variety. Provide ground cover and vine plants with the number and length of runners for the size specified, and the proper age for the grade of plants specified. Provide vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections. Plants shall have been grown under climatic conditions similar to those in the locality of the project. Spray all plants budding into leaf or having soft growth with an anti-desiccant at the nursery before digging.

- C. The minimum acceptable sizes of all plants, measured before pruning with branches in normal position, shall conform to the measurements designated. Plants larger in size than specified may be used with the approval of the Resident Engineer, with no change in the contract price. When larger plants are used, increase the ball of earth or spread of roots in accordance with ANSI Z60.1.
- D. Provide nursery grown plant material conforming to the requirements and recommendations of ANSI Z60.1. Dig and prepare plants for shipment in a manner that will not cause damage to branches, shape, and future development after planting.
- E. Balled and burlapped (B&B) plant ball sizes and ratios will conform to ANSI Z60.1, consisting of firm, natural balls of soil wrapped firmly with burlap or strong cloth and tied.
- F. Bare-root (BR) plants shall have the root system substantially intact, but with the earth carefully removed. Cover roots with a thick coating of mud by "puddling" after the plants are dug.
- G. Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers, but shall not be root bound.
- H. Make substitutions only when a plant (or its alternates as specified) is not obtainable and the Resident Engineer authorizes a change order providing for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics with an equitable adjustment of the contract price.
- I. When existing plants are to be relocated, ball sizes shall conform to requirements for collected plants in ANSI Z60.1, and plants shall be dug, handled, and replanted in accordance with applicable sections of these specifications.

2.3 LABELS

Each plant, or group and bundles or containers of the same species, variety, and size of plant, shall be legibly tagged with a durable, waterproof and weather-resistant label indicating the correct plant name and size specified in the plant list. Labels shall be securely attached and not be removed.

2.4 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 EARTHWORK, 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 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, TESTING. Amend topsoil not meeting the pH range specified by the addition of pH adjusters.

2.5 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%.

2.6 SOIL CONDITIONERS

- A. Peat shall be a natural product of sphagnum moss peat derived from a fresh-water site conforming to Fed. Spec. Q-P-166, except as otherwise specified. Peat shall be shredded and granulated to pass through a 13 mm (1/2 inch) mesh screen and conditioned in storage piles for at least six months after excavation.
- B. Sand shall be clean and free of toxic materials.
- C. Perlite shall conform to ASTM C549.
- D. Vermiculite shall be horticultural grade and free of any toxic materials and conform to ASTM C516.

2.7 PLANTING SOIL MIXTURE

The planting soil mixture shall be composed of four parts topsoil, and one part peat.

2.8 PLANT FERTILIZER

- A. Provide plant fertilizer that is commercial grade and uniform in composition and conforms to applicable state and federal regulations.
- B. For new plant material, provide packet, table, or pellet forms of slow release fertilizers, bearing the manufacturer's guaranteed statement of analysis.

2.9 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 guaranteed statement of analysis.

2.10 MEMBRANES

- A. Polyethylene shall conform to ASTM D2103 and shall be 0.1 mm (four mils) thick and clear in color.
- B. Fiberglass mat shall be of lime borosilicate glass fibers with an average fiber diameter of 0.3 mm (8 to 12 microns) and 50 to 100 mm (2 to 4 inch) strands of fiber bonded with phenol formaldehyde resin. The mat shall be 100 percent textile glass fiber. Mat shall be roll type, water permeable, and a minimum of 6 mm (1/4 inch) and maximum of 13 mm (1/2 inch) thick with a density of not less than 12 kg/m³ (3/4 pound per cubic foot).

2.11 MULCH

- A. Mulch shall be free from deleterious materials and shall be stored as to prevent inclusion of foreign material.
- B. Inert mulch materials shall be riverbank stone and shall range in size from 25 mm (one inch) to 65 mm (2-1/2 inches) in accordance with ASTM C 136.
- C. Organic mulch materials shall be wood chips, pine needles or cocoa bean shells:

2.12 ASPHALT ADHESIVE

Not used

2.13 EROSION CONTROL

- A. Erosion control net material shall be heavy, twisted jute mesh. Openings between strands shall be approximately 13 mm square (1/2 inch square)
All erosion control material is to be installed according to the respective manufacturer's recommendations.

- B. Erosion control blanket material shall be cellulose fiber blanket bonded to 6 mm (1/4 inch) square plastic net weighing 10 kg/100 m² (20 pounds per 1000 square feet) in 1250 mm (50 inch) wide rolls.

2.14 TREE WOUND DRESSING

Tree wound dressing shall be clear shellac.

2.15 TREE WRAP

Tree wrap shall be two thicknesses of crinkled paper cemented together with a layer of bituminous material. Wrapping material shall be a minimum of 100 mm (4 inches) in width and have a stretch factor of 33-1/3 percent. Twine for tying shall be lightly tarred medium or coarse sisal yarn.

2.16 STAKES AND GUYING WIRES

- A. Provide stakes for tree support of rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Stakes shall be a minimum of 50 mm by 50 mm (2 inches by 2 inches), or 65 mm (2-1/2 inches) in diameter, by 2400 mm (8 feet) long and pointed at one end.
- B. Guying wire shall be 2.7 mm (12 gage) annealed galvanized steel.
- C. Hose chafing guards shall be new or used 2-ply reinforced rubber or plastic hose of all the same color on the project.
- D. Flags to be fastened to guys shall be surveyor's plastic tape and 150 mm (6 inches) in length.
- E. Guying cable shall be a minimum of five strand twisted, 5 mm (3/16 inch) diameter steel cable.
- F. Turnbuckles shall be galvanized or cadmium plated and have a 75 mm (3 inch) minimum lengthwise opening fitted with screw eyes.
- G. Eye bolts shall be galvanized or cadmium plated having a 50 mm (one inch) diameter eye with a minimum screw length of 40 mm (1-1/2 inches).
- H. Deadmen shall be 100 mm by 200 mm (4 inch by 8 inch) rectangular, or 200 mm (8 inch) diameter by 900 mm (36 inch) long sound wood.
- I. Arrow shaped or auger iron anchors shall be noncorrosive, and sized according to the manufacturer's recommendation.

2.17 EDGING

Metal edging shall be galvanized steel or aluminum with slots provided for stakes and shall be 5 mm (3/16 inch) thick by 100 mm or 4 inches deep in standard lengths. Steel edging shall be treated with a rust preventative coating and factory finished in color green. Anchoring stakes shall be of similar material and 400 to 450 mm (16 to 18 inches) long and tapered.

2.18 WATER

Water shall not contain elements toxic to plant life. It shall be obtained at no cost to the Contractor.

2.19 ANTIDESICCANT

Antidesiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration.

2.20 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 guaranteed 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 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.

2.21 SOD

Sod shall be nursery grown as classified in the TPI Guideline Specifications to Turfgrass Sodding.

2.22 SPRIGS

Sprigs shall be lateral stems 100 to 150 mm (4 to 6 inches) long with roots and leaves attached. Sprigs may be delivered in air tight bags to keep them from drying out. If sprigs are delivered unwrapped, keep them in moist burlap or other wrappings until planting.

2.23 PLUGS

Plugs shall be 50 to 100 mm (2 to 4 inches) across and 50 mm (2 inches) deep of live health grass. Keep plugs moist until planting.

2.24 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 LAYOUT

Stake plant material locations and bed outlines on project site for approval by the Resident Engineer before any plant pits or beds are dug. The Resident Engineer may approve adjustments to plant material locations to meet field conditions.

3.2 EXCAVATION FOR PLANTING

- A. Prior to excavating for plant pits and bed, verify the location of any underground utilities. Damage to utility lines will be repaired at the Contractor's expense. Where lawns have been established prior to planting operation, cover the surrounding turf before excavations are made in a manner that will protect turf areas. Barricade existing trees, shrubbery, and beds that are to be preserved in a manner that will effectively protect them during the project construction.
- B. Remove rocks and other underground obstructions to a depth necessary to permit proper planting according to plans and specifications. Where underground utilities, construction, or solid rock ledges are encountered, the Resident Engineer may select other locations for plant material.
- C. Dig plant pits by any approved method so that they have vertical sides and flat bottoms. When pits are dug with an auger and the sides of the pits become glazed, scarify the glazed surface. Size the plant pits as shown, otherwise, the minimum allowable dimensions of plant pits shall be regardless of width, 150 mm (6 inches) deeper for shrubs and 225 mm (9 inches) deeper for trees than the depth of ball or root spread; for ball or root spread up to 600 mm (2 feet), pit diameters shall be twice the ball or root spread; for ball or root spread from 600 to 1200 mm (2 to 4 feet), pit diameters shall be 600 mm (2 feet) greater; for ball or root spread over 1200 mm (4 feet), pit diameters shall be 1-1/2 times the ball or root spread.
- D. Where ground cover and planting beds occur in existing turf areas, remove turf to a depth that will ensure the removal of the entire root system, with additional bed preparation as specified in the next paragraph.
- E. Where existing soil is to be used in place, till new ground cover and plant beds to a depth of 100 mm (4 inches). Spread peat uniformly over the bed to depth of 50 mm (2 inches) and thoroughly incorporate it into the existing soil to a depth of 100 mm (4 inches) using a roto-tiller or similar type of equipment to obtain a uniform and well pulverized soil mix. During tillage operations, remove all sticks, stones, roots, and other objectionable materials. Bring plant beds to a smooth and even surface conforming to established grades.
- F. In areas of new grading where existing soil is being replaced for the construction of new ground cover and plant beds, remove 100 mm (4 inches) of existing soil and replace with topsoil. Plant beds shall be

brought to a smooth and even surface conforming to established grades. Till 50 mm (2 inches) of peat into the topsoil as specified.

- G. Using topsoil, form earth saucers or water basins for watering around plants.
- H. Treat plant saucers, shrub, and ground cover bed areas, prior to mulching, with an approved pre-emergent herbicide. Plant ground cover in areas to receive erosion control material through the material after material is in place.

3.3 SETTING PLANTS

- A. Handle balled and burlapped and container-grown plants only by the ball or container. Remove container-grown plants in such a way to prevent damage to plants or root system. Set plants plumb and hold in position until sufficient soil has been firmly placed around the roots or ball. Set plants in relation to surrounding grade so that they are even with the depth at which they were grown in the nursery, collecting field, or container. Plant ground cover plants after the mulch is in place. Avoid contaminating the mulch with the planting soil. Add slow release packet, tablet or pellet fertilizer as each plant is installed as per manufacturer's recommendation for method of installation and quantity.
- B. Backfill balled and burlapped and container-grown plants with planting soil mixture as specified to approximately half the depth of the ball and then tamp and water. For balled and burlapped plants, carefully remove excess burlap and tying materials and fold back. Where plastic wrap or treated burlap is used in lieu of burlap, completely remove these materials before backfilling. Tamp and water remainder of backfill Planting Soil Mixture; then form earth saucers or water basins around isolated plants with topsoil.
- C. Plant bare-root stock arranging the roots in a natural position. Remove damaged roots with a clean cut. Paint cuts larger than 13 mm (1/2 inch) in diameter with tree wound dressing. Carefully work Planting Soil Mixture in among the roots. Tamp and water the remainder of Planting Soil Mixture; then form earth saucers or water basins around isolated plants with topsoil.

3.4 TRUNK WRAPPING

Not used.

3.5 STAKING AND GUYING

- A. Stake and guy plants as shown on the drawings and as specified.
- B. Drive stakes vertically into the ground to a depth of 800 to 900 mm (2-1/2 to 3 feet) in such a manner as not to injure the ball or roots, unless otherwise shown on the drawings.

C. Remove stakes and guy wires after one year.

3.6 EDGING PLANT BEDS

- A. Uniformly edge beds using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn.
- B. Install metal edging materials in accordance with manufacturer's recommendations and as shown on the plans.

3.7 MULCHING PLANTS

- A. Mulch within 48 hours after planting and applying a pre-emergent herbicide. Do not mulch in ground cover areas that shall have organic material placed before planting.
- B. Placing Inert Material: Place fiberglass mat with edges lapped 150 mm to 300 mm (6 inches to 12 inches) to receive inert mulch material. Punch a grid of 6 mm (1/4 inch) holes for drainage in the fiberglass mat 300 mm (one foot) on centers over the entire area. Spread inert mulch to a uniform thickness over the membrane as shown.
- C. Placing Organic Material: Spread mulch to a uniform minimum thickness of 50 mm (2 inches).
- D. Keep mulch out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.

3.8 PRUNING

- A. Prune new plant material in the following manner: Remove dead, broken and crossing branches. Prune deciduous trees and shrubs to reduce total amount of anticipated foliage by 1/4 to 1/3 while retaining typical growth habit of individual plants with as much height and spread as is practicable. Make cuts with sharp instruments as close as possible to the branch collar. Do not make flush cuts. Do not make "Headback" cuts at right angles to line of growth. Do not pole trees or remove the leader. Remove trimmings from the site. Paint cuts 13 mm (1/2 inch) in diameter and larger with the specified tree wound dressing.
- B. Existing trees to be pruned are shown on the drawings. Perform tree pruning and cavity work by in accordance with ANSI Z 133.1. Remove dead wood 13 mm (1/2 inch) or more in diameter, branches interfering with or hindering the healthy growth of the trees, and diseased branches with a clean cut made flush with the parent trunk. Cut back or remove branches as necessary to give the trees proper shape and balance. In removing large limbs, make the initial cut on the underside at a safe distance from the trunk or lateral, to prevent ripping of bark. Ensure branches and trimmings do not endanger traffic or cause damage to property during removal. Section large branches or limbs that cannot be removed in one piece without endangering traffic or property. Lower sections by ropes.

Repair any damage resulting from the Contractor's negligence during pruning. Workmen are not permitted to climb trees with climbing spurs. To promote proper healing, cut off flush stubs or limbs that have resulted from improper cuts or broken as a result of former pruning. Remove girdling roots. Clean cuts or wounds measuring 13 mm (1/2 inches) or more in diameter, and exposed wood and scars resulting from previous work or damage. Remove decayed wood to expose healthy tissue. Shape cavities to provide drainage.

3.9 FERTILIZATION OF EXISTING TREES

Apply fertilizer to existing trees shown on the drawings at the rate of 36 g/mm (2 pounds per inch) caliper. Apply in 300 mm to 450 mm (12 inch to 18 inch) deep holes 40 to 50 mm (1-1/2 to 2 inches) in diameter, made by an earth auger, distributed evenly at not more than 600 mm (2 feet) on center throughout the outer half of the branch spread zone of each tree. Fertilize to within 100 mm (4 inches) of the surrounding grade. Use topsoil to bring the surface up to the surrounding grade. When using fertilizer in packet, tablet, or wedge form, apply in accordance with manufacturer's recommendations.

3.10 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.

3.11 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.

3.12 APPLICATION OF FERTILIZER AND LIME FOR TURF AREAS

- A. Apply turf fertilizer. In addition, adjust soil acidity and add soil conditioners as required herein for suitable topsoil under PART 2, Paragraph, TOPSOIL.

3.13 MECHANICAL SEEDING

- A. Broadcast seed by approved sowing equipment at the rate of _____ kg/100 m² (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/m² (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.

3.14 HYDROSEEDING

Not used.

3.15 SODDING

- A. Accomplish sodding in accordance with the ASPA Guideline Specifications for sodding. Lay sod at right angles to slope or the flow of water. On slope areas, start at the bottom of the slope.
- B. After completing the sodding operation, blend the edges of the sodded area smoothly into the surrounding area.

3.16 SPRIGGING

Accomplish sprigging after the finish grading has been properly prepared and thoroughly soaked a day in advance. Set sprigs in rows, one foot apart each way, and in furrows 50 mm to 75 mm (2 to 3 inches) deep. Provide 35 L (one bushel) of sprigs for every 38 to 47 m² (400 to 500 square feet). Place the sprigs at intervals of 150 to 300 mm (6 to 12 inches), making sure that some of the leafy part of each sprig projects above the surface. Cover all but the top leaves by hand with topsoil, pressing it firmly in place and smoothing out the surface. Water thoroughly and keep soil moist. Do not treat sprig area with herbicide. Weed by hand or hoe.

3.17 PLUGGING

Accomplish plugging after the finish grading has been properly prepared. Dig holes for the plugs with a plugging tool of the proper diameter. Space the holes 300 mm (12 inches) apart on a 300 mm (12 inch) planting square grid. Provide one square meter (one square yard) of plugs for every 30 to 32 m² (325 to 350 square feet). Fill each hole with water and allow to drain. Set each plug in the hole so that the base of the grass stem is slightly above the ground level. Press down on each plug with the heel of the shoe to bring the roots firmly into contact with the soil. Smooth the soil surface between the plugs with a rake. Water thoroughly and keep soil moist. Do not treat plug area with herbicide. Weed by hand or hoe.

3.18 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.

3.19 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.

3.20 EROSION CONTROL MATERIAL

- A. Install and maintain erosion control material meeting the requirements of this specification on the designated areas as shown and specified. Prepare, fertilize and vegetate the area(s) to be covered, as specified, before the erosion material is placed. Immediately following the planting operations, lay the material evenly and smoothly and in contact with the soil throughout. Omit the straw mulch from all seeded areas receiving the erosion control material.
- B. For waterways, unroll the material in the direction of waterflow. When two or more strips are required to cover a ditch area, they shall overlap at least 100 mm (4 inches). In case a strip is to be spliced lengthwise, the ends of the strips shall overlap at least 150 mm (6 inches) with the upgrade section on top.
- C. When using erosion control material on slopes, place the material either horizontally or vertically to the slope with the edges and ends of adjacent strips butted tightly against each other.

- D. Staple each strip in three rows (each edge and center with the center row alternately spaced) with staples spaced not more than 1200 mm (4 feet) longitudinally. When using two or more strips side by side on slopes, use a common row of staples on the adjoining strips. Staple all end strips at 300 mm (one foot) intervals at the end. Firmly embed staples in the underlying soil.
- E. Maintenance shall consist of repairs made necessary by erosion, wind, or any other cause. Maintain, protect, repair, or replace the erosion control material until the Termination of the Plant and Guaranty Period.

3.21 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 planting and 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.

3.22 ENVIRONMENTAL PROTECTION

All work and Contractor operations shall comply with the requirements of Section, ENVIRONMENTAL PROTECTION.

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