PART 1 - GENERAL

1.1 DESCRIPTION

1. This section specifies requirements for supplying, hauling, placing, shaping and compacting of hot-mix asphalt concrete.

1.2 REFERENCES

1. ASTM International (ASTM).
    1. ASTM C136-96a, Sieve Analysis of Fine and Coarse Aggregates.
    2. ASTM D995-95b, Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
    3. ASTM D1559-89, Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
    4. ASTM D3203-94, Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

2. UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds

1.3 RELATED WORK

1. Refer to other Specification Sections for related information.

1.4 SOURCE SAMPLING

1. Inform Consultant of proposed source of asphaltic concrete, and provide access for sampling at least two weeks prior to commencing hauling this material to plant site.

1.5 PRODUCTION SAMPLING

1. Use only material approved by Consultant.

2. One or more samples per day to be taken of mix, or components thereof, being produced to determine compliance with general and special requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Hot-mix Asphaltic Concrete design mix formula to be provided to Consultant two weeks prior to commencing paving operations. Submit design mix for review providing at least the following information:
    1. Nominal aggregate size
    2. Marshall strength at 60âC
    3. Marshall stability at 60âC
    4. Flow Index
    5. Percent Air Voids in Mixture
    6. Min. % Voids in Mineral Aggregate
    7. Retained Stability

2. Consultant may approve use of current grading requirements of Nova Scotia Department of Transportation Standard Specification for Pavement mixture.

3. Permeable Asphalt to meet “UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds”.

4. Do not change job mix without prior approval of Consultant. Should a change in a material source be contemplated, a new job mix formula to be provided to Consultant and approved prior to installation.

PART 3 - EXECUTION

3.1 EQUIPMENT

1. Pavers: Provide mechanical grade controlled self powered pavers capable of spreading mix, within specified tolerances, true to line, grade, and crown indicated on plans.

2. Rollers: Provide sufficient number of rollers of type and weight to obtain specified density of compacted mix.

3. Haul Trucks: Provide trucks of such size, speed and condition to ensure orderly and continuous operation and as follows:
    1. Boxes with tight metal bottoms.
    2. Covers of sufficient size and mass to completely cover and protect asphalt mix when truck fully loaded.
    3. In cool weather or for long hauls, insulate entire contact area of each box.
    4. Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.
    5. Hand Tools:

1. Provide lutes or rakes with covered teeth during spreading operation when finishing by hand.
2. Provide straight edges, 2.4 m in length to test finished surface.
3. Provide tamping irons having weight not less than 12 kg and a bearing area not exceeding 310 sq. cm for consolidating material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, approved by Consultant, may be used instead of tamping irons.

3.2 PREPARATION

1. When paving over existing asphalt surface, clean pavement surface to remove dust, contaminants, loose and foreign materials, oil and grease.

2. Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

1. Transport mix to job site in vehicles cleaned of foreign material which may affect mix.

2. Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as often as required. After this operation, elevate truck bed and thoroughly drain; no excess solution is permitted.

3.4 PLACING

1. General
    1. Place asphalt mixtures only when base of lower course is dry and air temperature is above 5°C.
    2. When surface temperature on which material is to be placed falls below 10°C, provide extra rollers to compact mix before it cools too much to obtain required density.
    3. Do not mix and place hot-mix asphalt when moisture of aggregate in stockpile or from dryer interferes with quality of mix production or with normal plant operations, or when pools of water are observed on surface to be paved.
    4. Construct asphalt concrete to design depth, width, and grade.
    5. Place asphalt concrete mix at temperature not less than 120°C at time of placing.
    6. Place asphalt concrete mix in two mm thick layers.
    7. Commence spreading at high side of pavement or at crown.
    8. Employ experienced rakers to correct irregularities prior to rolling.
    9. Spread and strike off mixture with self-propelled mechanical finisher.
        1. Construct longitudinal joints and edges to true line markings.

2. When paving against a compacted mixture that has cooled, paint edge of previously laid lane with a thin coating of asphaltic material or heat joint with an Infra Red-type joint heater mounted on side of paving machine.
3. When segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
4. Correct irregularities in alignment left by paver by trimming directly behind machine.
5. Correct irregularities in surface of pavement course directly behind paver.

10. When hand spreading is used:
    1. Distribute material uniformly. Broadcasting of material will not be permitted.
    2. Provide heating equipment used for keeping hand tools free from asphalt. Prevent high heating temperatures which may burn material. Temperature of tools when used shall not be greater than temperature of mix being placed.

3.5 COMPACTING

1. Start rolling operations as soon as placed mixture can bear mass of roller without undue displacement of material or cracking of surface.

2. Operate roller slowly initially to avoid displacement of material. Subsequent rolling not to exceed 5 km/h for steel-wheeled rollers and 8 km/h for pneumatic-tired rollers.

3. Overlap successive trips of roller by at least one half width of roller and alternate trip lengths.

4. Keep wheels of roller slightly moistened with water to prevent pick-up of material, but do not over water.

5. Roll material continuously to a density not less than 98% of density obtained with marshall specimen prepared from plant mix.

6. General:
    1. Provide minimum two rollers paver and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be a pneumatic-tired type.
    2. Operate rollers at a slow but uniform speed with drive roll or wheel nearest paver.
    3. Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling. Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

7. Breakdown Rolling:
    1. Commence breakdown rolling immediately following rolling of longitudinal joint and edges.
    2. Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
    3. Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
    4. Use only experienced roller operators for this work.

8. Second Rolling:
    1. Use pneumatic-tired, tandem or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix is still of a temperature that will result in maximum density from this operation.
    2. Rolling shall be continuous after initial rolling until mix placed has been thoroughly compacted.

9. Finish Rolling:
    1. Accomplish finish rolling with two-axle tandems or three-axle tandems while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, Consultant shall specify use of pneumatic-tired rollers.
    2. Conduct rolling operations in close sequence.

3.6 JOINTS

1. General:
    1. Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
    2. Paint joint face with thin coat of hot asphalt cement or cut back asphalt or preheat joint face with approved heater, prior to placing of fresh mixture.
    3. Overlap previously laid strip with spreader by 100 mm.
    4. Rake fresh mixture against joint and thoroughly tamp and roll.
    5. Remove any material from surface of previously laid strip.
    6. Do not throw surplus material on freshly screened mat surface.

2. Longitudinal Joints:
    1. Roll longitudinal joints directly behind paving operation.
    2. Before rolling, carefully remove with a lute or rake, and discard coarse aggregate in material overlapping joint.
    3. Ensure joints are offset at least 150 to 200 mm from those in lower layers.

3.7 FINISH TOLERANCES

1. Finish pavement surfaces smooth and true to design line, crown, and grade.

2. Remove irregularities exceeding 5 mm when checked with a 2.4 m long straight edge placed in any direction and replace with new material and compact.

3. Use straight edge at transverse joints and along pavement to check for surface irregularities.

3.8 DEFECTIVE WORK

1. Repair areas showing checking or hairline cracking to the approval of the Consultant.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

1. Section 01 33 00 Submittal Procedures.

2. Division 01 to be included.

1.2 REFERENCES

1. American Society for Testing and Materials International (ASTM)
    1. ASTM C117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
    2. ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    3. ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.
    4. ASTM D698-00ae1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

2. Canadian General Standards Board (CGSB)
    1. CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.
    2. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

3. Canadian Standards Association (CSA International)
    1. CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

1. Submit samples, product data and required submittals for products, including adhesives, sealants, paints, and coatings

2. Submittals in accordance with Section 01 33 00 Submittal Procedures.

3. Inform Departmental Representation of proposed source of materials and provide access for sampling at least 1 week prior to commencing work.

1.4 DELIVERY, STORAGE AND HANDLING

1. Waste Management and Disposal:
    1. Separate waste materials for recycling in accordance with Section 01 33 00 – Submittal Procedures.
    2. See Section 01 74 21.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

2. Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcement.

3. Granular base:
   1. Crushed stone or gravel as indicated.

4. Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

PART 3 - EXECUTION

3.1 GRADE PREPARATION

1. Do grade preparation work in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

3.2 GRANULAR BASE

1. Obtain Departmental Representation's approval of subgrade before placing granular base.

2. Place granular base material to lines, widths, and depths as indicated.

3. Compact granular base in maximum 150 mm layers to at least 95% of maximum density to ASTM D698.

3.3 CONCRETE

1. Obtain Departmental Representation approval of granular base prior to placing concrete.

2. Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3. Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.

4. Provide edging as indicated with 10 mm radius edging tool.

5. Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representation can be demonstrated. Hand finish surfaces when directed by Departmental Representation.

3.4 TOLERANCES

1. Finish surfaces to within 3 mm in 3 m as measured with straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

1. Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m.

2. Install expansion joints as indicated.

3. When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION JOINTS

1. Install isolation joints along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

2. Install joint filler in isolation joints as indicated.

3.7 CURING

1. Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representation.

2. Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.

3. Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.8 BACKFILL

1. Allow concrete to cure for 7 days prior to backfilling.

2. Backfill to designated elevations with material as directed by Departmental Representation.

3.9 LINSEED OIL TREATMENT

1. Apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.

2. Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.

3. Apply treatment when air temperature above 10° C.

4. Apply first coat at 135 mL/m².

5. Apply second coat at 90 mL/m² when first coat has dried.

3.10 CLEANING

1. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

2. See Section 01 74 11.

END

PART 1 – GENERAL

1.1 SUMMARY

1. Section Includes supply and placement of topsoil and planting soil, including soil analysis and amendments.

1.2 RELATED SECTIONS

1. 01 33 00 - Submittal Procedures
2. 01 74 21 - Waste Management
3. 32 92 20 - Mechanical Seeding
4. 32 92 23 - Sodding
5. 32 93 10 - Tree, Shrub and Groundcover Planting

1.3 SOURCE QUALITY CONTROL

1. Advise Consultant of source of topsoil to be utilized 7 days in advance of starting work.
2. All topsoil used in this project shall be tested for compliance with soil texture specification by a laboratory approved by Consultant. Soil sampling, testing and analysis to be in accordance with Provincial regulations and standards. Contractor will arrange and pay for cost of tests. Contractor shall submit copies of Soils Texture Report to the Consultant for approval prior to delivery to the site.
3. Contractor is responsible for analysis of soil nutrients and requirements for amendments to topsoil as specified. All soil shall be tested by the N.S. Dept. of Agriculture & Marketing laboratory in Truro, NS and a copy of this analysis made available to the Consultant prior to delivery of soil to the site. The Contractor

shall make whatever modifications to the topsoil which are stated in the analysis. All soil shall be re-tested for compliance prior to acceptance. Contractor shall pay for the costs of all testing, as specified in Section 01 33 00 – Submittal Procedures.

1.4 SUBMITTALS

1. Submit copies of the topsoil analysis described above.

2. LEED Submittals
    1. Submit in accordance with Section 01 35 21 - LEED Requirements.
    2. Submit samples, product data and required submittals for products, including adhesives, sealants, paints, and coatings.

PART 2 – PRODUCTS

2.1 TOPSOIL

1. Topsoil: imported material consisting of a mixture of mineral particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

2. Soil texture: sandy loam, based on The Canadian System of Soil Classification, to consist of 20 to 70% sand and contain 2 to 10% organic matter by weight.

3. Fertility: major soil nutrients present in following ratios:
    1. Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
    2. Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.
    3. Potassium (K): 80 to 120 micrograms of potash per gram of topsoil.
    4. Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

4. Ph value: 6.5 to 8.0.

5. Contain no toxic elements or growth inhibiting materials.

6. Free from:
    1. Debris and stones over 25 mm diameter.
    2. Course vegetative material, 12 mm diameter and 100 mm length, Occupying more than 2% of soil volume.
    3. Weeds and weed seed.

7. Consistency: friable when moist.

2.2 PLANTING SOIL

1. Clay Loam to meet the following:
    1. an average of 35 percent by volume of sand content
    2. no more than 40 percent clay or silt content by volume (particles smaller than 0.16 mm)
    3. no less than 10 percent dry weight of organic matter (carbon content), well Decomposed
    4. lime to bring the pH value to average 6.2 to 7.0 as per soil test or, lime to bring the pH value to meet the needs of the specific landscape plants.

2. Free from:
    1. Debris and stones over 25 mm diameter.
    2. Course vegetative material, 12 mm diameter and 100 mm length, Occupying more than 2% of soil volume.
    3. Weeds and weed seed.

2.3 SOIL AMENDMENTS

1. Peatmoss:
    1. Derived from partially decomposed species of Sphagnum Mosses.
    2. Elastic and homogeneous, brown in colour.
    3. Free of wood and deleterious material which could prohibit growth.
    4. Shredded particle minimum size: 6 mm.
    5. Acidity range: 4.5 - 6 pH.

2. Limestone:
    1. Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
    2. Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

3. Fertilizer:
    1. Complete, commercial, with 35% soluble nitrogen.
    2. Well aged manure, free of seeds.

4. Compost:
    1. Mixture of soil and decomposing organic matter containing not less than 50% organic matter as determined by the LOI test of its equivalent under the Walkley-Black test.
    2. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25/50) and contain no toxic or growth inhibiting contaminants or heavy metals.
    3. Composed bio-solids must meet the requirements of the Guidelines For Compost Quality, Category A, produced by the Canadian Council of the Minister of the Environment, January 1996.
    4. The Contractor is responsible for providing certification of compost material.

5. Manure:
    1. Organic matter may be composed of well aged manure, free of lumps and impurities. Well decomposed, minimum 2 years old, with particle size meeting organic matter requirements.

6. Sewage sludge is not acceptable for organic content.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

1. Verify that grades are correct. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

2. Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

3. Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 50 mm above surface. Dispose of removed material off site.

4. Course cultivate entire area which is to receive topsoil to depth of 100 mm. Cross- cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL

1. Place topsoil after Consultant has accepted subgrade.

2. Spread topsoil in uniform layer over unfrozen subgrade free of standing water.

3. For sodded areas keep topsoil 12 mm below finished grade.

4. Spread topsoil to following minimum depth of 150 mm after settlement and compaction to 90% Standard Proctor density.

5. Manually spread topsoil around trees, shrubs and obstacles.

3.3 PLACING AND SPREADING OF PLANTING SOIL

1. Place planting soil after Consultant has accepted preparation of planting areas.

2. Place planting soil to depths indicated on the drawings.

3. Manually spread planting soil around trees, shrubs and obstacles.

3.4 FINISH GRADING

1. Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

2. Consolidate topsoil to required bulk density using equipment approved by Consultant. Leave surfaces smooth, uniform and firm against deep footprinting.

3.5 ACCEPTANCE

1. Consultant will inspect topsoil and planting soil in place and determine acceptance of material, depth of soil and finish grading. Contractor will test soil in place. Approval of soil material subject to soil testing and analysis.

3.6 RESTORATION OF STOCKPILE SITES

1. Restore stockpile sites acceptable to Consultant.

3.7 SURPLUS MATERIALS

1. Dispose of materials not required off site.

END

PART 1 - GENERAL

1.1 WORK INCLUDED

1. This section specifies requirements for sodding. Work includes supply and placement of sod, complete with all related components and accessories and maintenance.

1.2 RELATED WORK

1. 01 33 00 - Submittal Requirements
2. 01 74 21 - Waste Management
3. 32 991 21 - Soil Placement and Grading

1.3 SCHEDULING

1. Sod to be laid when soil is not frozen and when soil moisture conditions are suitable, after April 15 and before Nov. 15.
2. Do not schedule sodding for the period July 1 to Aug. 15 or for any other time when weather is extremely hot and dry.
3. Sod shall be laid immediately after preparation of soil surface.

1.4 DELIVERY AND STORAGE

1. Schedule delivery of sod to coincide with end of topsoil execution. Minimize period of storage on site.
2. Deliver, unload and store sod on pallets.

3. Protect sod against damage during delivery and transportation.

4. Protect sod when stored on site to prevent drying or damage by rainfall. If necessary cover sod with protective cover and apply water to keep moist.

1.5 QUALITY CONTROL

1. Inform Consultant of source of sod to be supplied and provide sample. Do not commence work prior to approval of sod.

2. Confirm approval of sod by Consultant prior to laying.

3. Confirm approval of sod installation by Consultant prior to start of establishment period.

4. Confirm approval of watering schedule and operations by Consultant during the maintenance period.

5. Confirm approval of rolling equipment and procedure by Consultant prior to rolling.

1.6 WARRANTY

1. All sodded areas shall remain free of defects for a period of one full year following date of acceptance.

2. End of warranty inspection to be conducted by Consultant.

3. Warranty to be extended if development and growth is not sufficient to ensure future survival as determined by Consultant.

PART 2 – PRODUCTS

2.1 MATERIALS

1. Turfgrass Nursery Sod:
    1. sod that has been seeded and cultivated in a sod nursery field as turf grass sod.
    2. mature and having grown a minimum of two years from date of seeding
    3. quality and source to comply with Canadian Nursery Trades Association; Canadian Standards for Nursery Stock, latest Edition
    4. to be grown in a sandy loam media
    5. sod grown in soils containing greater than 25% clay content will not be accepted
    6. Number One Kentucky Bluegrass: sod grown from a seed mixture containing equal proportions of 3 compatible Kentucky Bluegrass varieties
    7. sod to contain:

90% Kentucky Bluegrass
10% Improved Perennial Ryegrass

8. sod shall be free of clover, with no more than 1 broadleaf weed per 40 square metres of sodded area
9. mowing height of sod when lifted to be 40 to 70 mm
10. there shall be no surface soil visible when sod is mowed to a height of 70mm
11. sod shall be well rooted with no burnt or bare spots
12. soil portion shall be uniform in thickness and not exceed 19mm in thickness, and to Section 17 of the Canadian Standards for Nursery Stock
13. thickness of thatch on soil portion shall be less than 6 mm

.2 Water:

1. to be supplied by Contractor
2. potable, free of impurities.

.3 Fertilizer:

1. To Canada "Fertilizers Act" and "Fertilizers Regulations".
2. Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

1. Obtain approval from Consultant of source of sod.

2. When proposed source of sod is approved, use no other source without written authorization.

PART 3 – EXECUTION

3.1 PREPARATION

1. Verify that grades are correct and prepared in accordance with **Section 32 91 21 - Topsoil Placement and Grading**. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

2. Do not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil or soil covered with snow, ice, or standing water.

3. Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 6 mm, surface to drain naturally.

4. Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.

5. Cultivate fine grade approved by Consultant to 25 mm depth immediately prior to sodding.

3.2 SOD PLACEMENT

1. Lay sod within 36 h of being lifted.

2. Lay sod sections in rows, longitudinally, along contours of slopes, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

3. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.3 MAINTENANCE

1. Site conditions:
    1. Do not perform maintenance operations after heavy rainfall or when soil is wet. Do not mow when turf is wet.

2. Equipment:
    1. All machinery shall be equipped with turf tires and designed to specifically perform the intended operation.
    2. Maintain mowing blades well sharpened and free of rust and abrasions.

3. Watering
    1. Water sodded areas throughout the maintenance periods in sufficient quantity and at frequency required to maintain optimal soil moisture conditions to a depth of 100 mm.
    2. Watering to be done between 7:00 am and 10:00 am and 4:00 pm and 10:00 pm, using best horticultural practice.

3. The contractor shall provide a record indicating the dates and duration of watering operations.

4. Mowing:
   1. Mow sodded area throughout the growing season to maintain the turf between 70 mm and 90 mm. Do not cut any more than 1/3 of the leaf at one time.
   2. Mowing operations shall done in cross mode.

5. Fertilizing:
   1. Fertilize sodded areas two to three weeks after laying of sod with 1-2-2 ratio with a minimum of 50% slow release nitrogen applied at a rate of 0.25 kg N / 100 square metres per application.
   2. For sod laid after Sept. 21, postpone fertilization with high nitrogen content until the beginning of the next growing season and fertilize with a high potassium slow release fertilizer.
   3. Apply 1-2-2 ratio fertilizer at a rate of 0.50 kg per 100 square metres three time over the growing season during the following periods:
      .1 mid spring (May 1 - June 1)
      .2 early summer (June 21 - July 15)
      .3 late summer (Sept. 1- 21).

6. Control of weeds, diseases and insects:
   1. Maintain sodded areas free of weeds, disease and insects through proper cultural, and maintenance practice including but not limited to aeration, watering, ph control, fertilization, proper mowing practice, over seeding and control of grass coverage thickness.
   2. Any application of pesticide will be performed in accordance with federal, provincial and municipal regulations as and when required to control insects, fungus and diseases.
   3. Submit pesticide data and schedule to consultant for approval prior to application.

3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD

1. Perform following operations from time of installation until acceptance:
   1. Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 100 mm.
   2. Cut grass to 70 mm when it reaches height of 90 mm. Remove clippings which will smother grassed areas.
   3. Maintain sodded areas weed free.
   4. Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

5. Replace any dead or poor quality sod immediately as directed by Consultant.
6. Inspect and ensure all sod on sloped areas is secure. Provide wooden pegs if required, as directed by Consultant.

3.5 ACCEPTANCE

1. Sodded areas will be accepted by Consultant provided that:
    1. Sodded areas are properly established and turf is growing vigorously with a healthy root system penetrating into the topsoil layer.
    2. Sod is free of bare / dead spots, free of weeds, disease and insects and without noxious or invasive species.
    3. No surface soil is visible from height of 1.5 m when grass has been cut to height of 70 mm.
    4. There are no visible gaps between pieces of sod.
    5. Surface is even and without depressions and gradients meet specifications.
    6. Sodded areas have been cut within 24 h prior to acceptance.
    7. Fertilizing has been carried out at least once.
    8. That a 6 inch tine aerator will penetrate to its full depth into the soil and in all areas in the sports field, without adding extra weight to the aerator.

2. Areas sodded in the fall will be accepted in the following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.6 MAINTENANCE DURING WARRANTY PERIOD

1. Perform following operations during the warranty period:
    1. Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 100 mm.
    2. Cut grass to 70 mm when it reaches height of 90 mm. Remove clippings which will smother grassed areas.
    3. Maintain sodded areas free of noxious and invasive species.
    4. Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles, water in.
    5. Replace any dead or poor quality sod immediately as directed by Consultant.
    6. Inspect and ensure all sod on sloped areas is secure. Provide additional wooden pegs if required, as directed by Consultant.

END