

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 31 05 16 – Aggregate Materials.
2. Section 31 32 19 – Geotextiles.

1.2. REFERENCES

1. American Society for Testing and Materials (ASTM).
 1. ASTM D698-12 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600kN-m/m³.
 2. ASTM D1557-12 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 2,700 kN-m/m³.

1.3. SUBMITTAL PROCEDURES

1. Not applicable.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Transport unused aggregates to a quarry.

1.5. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 31 05 16 - Aggregate Materials and with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1. MATERIALS

1. The materials of the aggregate base courses must comply with the requirements of Section 31 05 16 – Aggregate Materials.
2. The geotextile must comply with the requirements of Section 31 32 19 – Geotextiles.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Install the geotextiles, as needed, according to the indications on the plans and the requirements of Section 31 32 19 – Geotextiles.
2. Spread the base course materials once the subgrade has been inspected and approved by the Departmental Representative.
3. Placing
 1. Construct aggregate base course to the depth and grades in areas indicated.
 2. Ensure that no frozen material is placed.
 3. Spread the materials onto a clean, unfrozen surface, free of snow and ice.
 4. Spread the material on the entire width of the work, in uniform layers not exceeding 150 mm in thickness after compaction.
 5. Shape each layer to smooth contour and compact to specified density before next layer is placed.
 6. Remove and replace that portion of layer in which material becomes segregated during spreading.

3.2. COMPACTION

1. Compact according to the instructions indicated on the plans, as per ASTM D698 and ASTM D1557.
2. Alternate between profiling and rolling to obtain a uniform base course layer, equally and evenly compacted.
3. Add, during compaction, the water required to obtain the required density.
4. In places where it is impractical to use compaction equipment (rolling equipment), compact the material until the required density with mechanical tampers approved by the Departmental Representative.
5. Correct surface irregularities by loosening the soil and adding or removing material until the surface level is in accordance with prescribed tolerances

3.3. SITE TOLERANCES

1. The tolerance for the finished base course is 10 mm, higher or lower than the prescribed spot elevations. This tolerance cannot, however, be uniform over the entire surface of the base course.

3.4. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

3.5. PROTECTION

1. Maintain the finished base course(s) in a state conforming to the requirements of this section until the completion of the next layer or acceptance of the work by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 31 05 16 – Aggregate Materials.
2. Section 31 32 19 – Geotextiles.
3. Section 32 11 23 – Aggregate Base Courses.

1.2. REFERENCES

1. Ontario Provincial Standard Specification
 1. OPSS 310-November 2010 Construction Specification for Hot Mix Asphalt.
 2. OPSS 1150-November 2008 Material Specification for Hot Mix Asphalt.

1.3. MEASUREMENT FOR PAYMENT

1. Measure stone mastic asphalt per square meter, including excavation, preparation of the sub-base, supply and construction of the granular base course, the geotextile membrane, the bitumen emulsion and the bituminous concrete, on-site transportation, implementation, and compaction.

1.4. DOCUMENTS AND SAMPLE TO SUBMIT

1. Submit data sheets and mix formula for the product.
2. Materials must be submitted for testing, conducted by a testing laboratory approved by the Departmental Representative.

PART 2 - PRODUCTS

2.1. MATERIALS

1. Aggregate Base Courses: made of materials that conform to the requirements of Section 31 05 16 – Aggregate Materials.
2. Geotextile: According to the provisions of Section 31 32 21 – Geotextiles.
3. Water: Drinking water free of minerals and impurities that could harm the environment.
4. Asphalt: The mix will be of type HL 3F, as specified by OPSS 1150.

1. Do not change the mixture's composition without prior approval of the Departmental Representative. If a change of the source of supply of any material is proposed, a new formula for determining the mixture must be approved by the Departmental Representative

PART 3 - EXECUTION

3.1. PREPARATION AND INSPECTION OF SUBGRADE

1. Before placing materials of the aggregate base course, verify that the level of the elements embedded in the pavement matches the grades indicated on the drawings (elevations and sections) and have the subgrade approved by the Consultant.

3.2. AGGREGATE BASE COURSE

1. Create the aggregate base course(s) according to the requirements of Section 32 11 23 – Aggregate Base Course.

3.3. ASPHALT PAVING

1. Proceed with the installation of the asphalt paving according to the OPSS 310 standard.

3.4. DRAINAGE

1. The asphalt surfaces should be installed so that no runoff water can accumulate on it. Paved surfaces shall in no case block or impede surface drainage.

3.5. CLEANING

1. Remove excess product at the locations indicated by the expert advice and eliminate these waste products as directed by the Consultant.
2. Remove oil, grease, dust, contaminants, loose particles and foreign bodies designated surfaces by using a method approved by the Consultant.
3. Finish cleaning with a vacuum sweeper, then a hand broom.

3.6. PROTECTION MEASURES

1. Do not let any vehicles circulate on the freshly laid surface before the temperature of the pavement surface is below 38 degrees Celsius. Do not allow static loads on the surface within 24 hours after its introduction.
2. Ensure free access to buildings, as needed, and ensure that the installation work of the pavement does not interfere with the normal use of the premises.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 32 11 23 – Aggregate Base Courses.

1.2. REFERENCES

1. American Association of State Highway and Transportation Officials (AASHTO).
 1. AASHTO M029-12-UL Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 2. AASHTO M325-08-UL Standard Specification for Stone Matrix Asphalt (SMA).
 3. AASHTO R046-08-UL Standard Practice for Designing Stone Matrix Asphalt (SMA).
 4. AASHTO T096-02-UL Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 5. AASHTO T305-09-UL Standard Method of Test for Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures.
 6. AASHTO T165-02-UL Standard Method of Test for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures.
 7. AASHTO T167-10-UL Standard Method of Test for Compressive Strength of Hot-Mix Asphalt.
2. Ontario Provincial Standard Specifications (OPSS).
 1. OPSS 1001-November 2005 Material Specifications for Aggregates - General

1.3. MEASUREMENT FOR PAYMENT

1. Measure stone mastic asphalt per square meter, including excavation, preparation of the sub-base, supply and construction of the granular base course, the geotextile membrane, the exposed screening, the bitumen emulsion and the bituminous concrete, on-site transportation, implementation, and compaction.

1.4. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Data sheet for the Stone Mastic Asphalt.
 2. Data sheet for the exposed screening.
 3. 1 kg sample of the exposed screening.

1.5. MOCK-UP

1. Prepare a mock-up of stone mastic asphalt.

2. This mock-up will be the on-site reference for installation and workmanship. Only stone mastic asphalt installations matching the approved final mock-up will be acceptable.
3. The mock-up location to be determined by Departmental Representative.
 1. The mock up will be approximately 3.0 long, spanning the width of the path, opposite a Pier.
4. Allow 48 hours for inspection of mock-up before proceeding with work.
 1. When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 2. Approved mock-up may remain as part of finished work. However, cold joints with abutting asphalt or stone mastic asphalt work must be treated appropriately.
5. Prepare three (3) transportable mock-up of the stone mastic asphalt. Mock-ups shall be enclosed within a solid, transparent box, such as plexiglass. The top will not be covered, the bottom may be made of wood.
 1. The mock-up will show about 50mm of base course, the stone mastic asphalt layer, and the coated exposed screening material.
 2. The box will have an approximate dimension of 300mm x 300mm x 125mm.

PART 2 - PRODUCTS

2.1. STONE MASTIC ASPHALT

1. The stone mastic asphalt must comply with the above standards.
2. Composition and Quality of Stone Mastic Asphalt Mixture.
 1. The Stone Mastic Asphalt shall be composed of high proportion of coarse aggregates, fine aggregates, mineral filler and a bituminous material mixed in a central plant. Cellulose fibers, either pure or bitumen coated, shall be added to the mix to absorb the excess binder and to improve the properties of the asphalt mix.
 2. At least three weeks prior to construction, the Contractor shall submit in writing a Job-Mix Formula (JMF) for each mixture supported by laboratory test data along with samples and sources of the components and viscosity-temperature relationships information to the Departmental Representative for testing and approval.
 3. Each JMF submitted shall propose definite single values for:
 1. The percentage of aggregate passing each specified sieve size.
 2. The percentage of binder material to be added.
 3. The temperature of the mixture delivered on the road.
 4. The kind and percentage of additive to be used.
 5. The kind and percentage of mineral filler to be used.
 4. After the JMF is established, all mixtures furnished for the project shall conform thereto within the following ranges of tolerances:

Aggregate Fraction	Permissible Variation from JMF (%)	
	Individual Results	Average of Three Consecutive Results
Coarser than 2.36mm	±5	±3
2.36 mm - 0.075 mm	±3	±2
Binder Content	±0.5	±0.3

5. Should a change in source of material be proposed or should Stone Mastic Asphalt particle size distribution and asphalt content prove unsatisfactory, a new JMF shall be submitted by the Contractor in writing and be approved by the Departmental Representative prior to production.
 6. Approval of a new job-mix formula may require laboratory testing and verification.
 7. The mixture shall have a minimum dry compressive strength of 1.4 MPa.
 8. The mixture shall have an index of retained strength of not less than 70% when tested by AASHTO T165.
3. Stone Mastic Asphalt Mixture
1. The bituminous material shall be asphalt cement and shall conform to the following:
 1. 70%-80% of coarse aggregate.
 2. 8%-12% of filler.
 3. 5.5%-7.2% of binder.
 4. 0.3%-0.5% of fiber.
4. Coarse Aggregates
1. The coarse aggregates shall consist of clean, hard, tough, durable fragments of crushed stone or crushed gravel of uniform quality throughout. It shall not contain more than one percent (1%) of material such as crusher dust, sand, elongated or soft, disintegrated pieces. It shall be free of mud, dirt, organic or other injurious materials. When tested by means of the Los Angeles Machine using AASHTO Method T096, the loss shall not exceed forty percent (40%).
5. Fine Aggregates
1. Fine aggregates passing the 4.75 mm sieve shall consist of natural sand, stone, stone screenings or slag screenings or a combination thereof and unless stipulated shall conform to the quality requirements of AASHTO M029.
6. Recommended Gradation Target Value Ranges.

Maximum Aggregate Sieve Designation, mm	Grading 'A' Base Course	Grading 'B' Surface Course
	Passing, %	Passing, %
19.00	90 - 100	100
12.5	55 - 85	100
9.5	-	90 - 100
4.75	-	30 - 50
2.36	18-35	20 - 30
0.60	-	-
0.30	-	-
0.075	3-13	8 - 13
0.02	3	-

Binder Asphalt Content		
% by Weight of Mix	4.5 – 6.5	5.5 – 7.2
% Air Voids in Mix	4.0 – 8.0	3.0 – 5.0
Cellulose fibers (pure fiber) % by Weight of Mix	0.3 – 0.4	0.3 – 0.4
Cellulose fibers (bitumen-coated) % by Weight of Mix	0.33 – 0.45	0.33 – 0.45
Layer Depth (mm)	40	35

7. Stabilizing Additives.

1. Cellulose fibers, either pure or bitumen coated should be used as additives to Stone Mastic Asphalt to inhibit the loss of bituminous binder by drainage from the aggregate. Both cellulose fibers, in pellets form, shall conform to the following:
2. Appearance: Grey cylindrical fiber pellets.
3. Residue on Ignition (%): 15 (approx.).
4. Moisture Content (%): 6 (approx.).
5. Ph: 7 (approx.).
6. Bulk Density (g/l): 25 (approx.).
7. Bitumen/Polymer Content (%): 0% if pure cellulose fiber; 0.1% to 0.34% if bitumen coated cellulose fiber.
8. Cellulose Fiber (% by Weight): 0.3% to 0.4% (3-4 kg/m.t.) if pure cellulose fiber; 0.33% to 0.45% (3.3-4.5 kg/m.t.) if bitumen coated cellulose fiber.
9. Sieve Analysis (Alpine Air Draught Sieve Method) :
 1. < 800 urn (%): 85 (approx.).
 2. < 200 urn (%): 50 (approx.).
 3. < 32 urn (%): 15 (approx.).

8. Mineral Filler.

1. Mineral filler shall be the fraction of fine aggregates that predominantly passes the 0.075 mm sieve. It may consist of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, fly ash or other suitable mineral matter. It shall be free from organic impurities and at the time of use, shall be sufficiently dry to flow freely and shall be essentially free from agglomerations.

9. Proportioning of Mixture.

1. The proportion of bituminous materials, on the basis of total weight of mix, shall be from 5.5 to 7.2 mass percent for Grading "B" while 4.5 to 6.5 mass percent for Grading "A". The exact percentage to be used shall be fixed by the Departmental Representative in accordance with job-mix formula and other quality control requirements.
2. Cellulose fibers, in pellets or loose fiber form, are usually added to the bituminous mixtures in the amount of 0.3% to 0.4% by weight (3 to 4 kg. per metric tonnes) if pure, while 0.33% to 0.45% by weight (3.3 to 4.5 kg. per metric tonnes) is added if bitumen coated. Mineral filler shall be added to the mixture during the mixing operation in the amount of 0.5% to 1.0% mass percent dry aggregate basis. The lower percentage limit is applicable to aggregates which are predominantly calcareous.

2.2. EXPOSED SCREENING MATERIAL

1. Aggregates

1. The aggregates for the exposed screening shall be according to OPSS 1001.

2. Gradation and Source

1. The exposed screening shall be from a source selected at the Contractor's option.
2. The gradation of this material shall meet the following:

Sieve Size	Requirement % Passing
4.75 mm	100
2.36 mm	90 - 100
1.18 mm	50-65
600 µm	25-35
150 µm	0 – 5
75 µm	0 - 3

3. Colour must be approved by the Departmental Representative.

3. Coating

1. The exposed screening shall be processed through a hot mix plant to incorporate an asphalt cement content of 0.8% to 1.0%. The coated exposed screening shall be prepared, handled and transported to the contract site in a manner such that its temperature at time of placement is at least 80°C, and that it is free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

2.3. COATED EXPOSED SCREENING SPREADING MATERIAL

1. The coated exposed screening shall be spread from hoppers attached to a roller.
2. The equipment shall be designed to ensure that the coated exposed screening is distributed uniformly at the specified application rate.
3. A sufficient amount of coated exposed screening shall be available so that screening operations can keep up with surface paving operations.

PART 3 - EXECUTION

3.1. EQUIPMENT

1. All equipment shall be in good working order and free of asphalt concrete mix buildup. All equipment shall be available for inspection and demonstration of operation twenty-four (24) hours prior to placement of Stone Mastic Asphalt mix.

3.2. BITUMINOUS MIXING PLANT

1. Contractor shall use an asphalt plant designed to dry aggregates, maintain accurate temperature control, and accurately proportion asphalt cement and aggregates. Contractor shall calibrate the asphalt plant not more than thirty (30) days in advance of production and furnish copies of the data to the Departmental Representative at least one day prior to Stone Mastic Asphalt Concrete production.
2. The asphalt plant shall have a scalping screen to prevent oversize material or debris from being incorporated into the Stone Mastic Asphalt Concrete mixture. Aggregate and asphalt cement sampling locations meeting safety requirements shall be provided.

3.3. HAULING EQUIPMENT

1. Trucks used for hauling asphalt mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of paraffin oil, lime water solution, or other manufactured asphalt release agent. Diesel fuel or fuel oil shall not be used as an asphalt release agent.
2. Each truck shall have a watertight canvas cover of such size as to extend at least 300mm over the sides and end of the truck bed and be adequately secured to protect the Stone Mastic Asphalt Concrete mixture.

3.4. ASPHALT PAVERS

1. Asphalt pavers shall be self-propelled units provided with a heated vibratory screed. Grade and cross slope shall be controlled through the use of automatic grade and slope control devices. The paver screed control system shall be automatically actuated by the use of an erected string line or a mobile string-line (ski) at least nine (9) metres in length on the high side of the paver. Grade control shall be used on either a) both the high and low sides or b) grade control on the high side and slope control on the low side.
2. The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the Stone Mastic Asphalt Concrete mixture uniformly in front of the screed.
3. The screed assembly shall produce a finished surface of the required smoothness, thickness, and texture without tearing, shoving, or displacing the Stone Mastic Asphalt Concrete mixture. Screed extensions used for paving a constant width shall be heated and vibrated. Auger extensions shall be within 450mm of the screed extension on both sides.
4. The use of a pick-up machine to transfer the Stone Mastic Asphalt Concrete mixture from a windrow to the paver hopper will be permitted, provided the pick-up machine is capable of collection of the windrowed material without damage to the underlying course. The Departmental Representative will not allow the continued use of the pick-up machine if segregation, excessive temperature loss, or any detrimental effects are observed.

3.5. ROLLERS

1. Contractor shall supply a roller weighing a maximum of 5 tons to compact the mixture to the required density while maintaining the pace of the paving operations. Rollers shall be of the static steel wheel or vibratory steel wheel type. The roller drums shall be a minimum of 1.20 metres wide. The rollers shall be self-propelled and capable of reversing without backlash. They shall be specifically designed to compact hot asphalt concrete mixtures. The use of equipment which results in crushing of the aggregate, or pick-up of the Stone Mastic Asphalt Concrete mixture will not be permitted.

3.6. WEATHER LIMITATIONS

1. Bituminous stone mastic plant mix shall not be placed on any wet surface or when weather conditions would prevent the proper handling or finishing of the bituminous mixtures.

3.7. AGGREGATE BASE COURSES

1. Ensure that the aggregate base courses correspond to the requirements of Section 32 11 23 – Aggregate Base Courses.

3.8. MIXING PROCEDURE WITH CELLULOSE FIBER ADDITIVES

1. Heat the aggregate between 160°C and 180°C.
2. Add the cellulose fibers, in pellets form, on the dry mix aggregates and allow approximately 5-15 seconds mixing time. It shall be added through a separate inlet directly into the weigh hopper above the pug-mill or through an opening in the pug-mill.
3. Add/spray bitumen/asphalt cement on the dry mix for 5-15 seconds.
4. The standard wet mixing time shall be observed to ensure adequate blending with asphalt cement

3.9. LAYING

1. The mixture shall be placed at a temperature of not less than 120°C and a maximum of 180°C measured in the truck before dumping into the spreader.
2. The mixture shall be spread to the grade and elevation established. Bituminous pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable.

3.10. APPLICATION OF COATED EXPOSED SCREENING MATERIAL

1. The coated exposed screening material shall be applied to the SMA surface at a rate of $0.75 \pm 0.10 \text{ kg/m}^2$.
2. The coated exposed screening shall be applied full path width.
3. The screening shall be applied after the Stone Mastic Asphalt has been laid and immediately after the initial compaction by the roller. The rolling pattern shall, as far as practicable, provide a single application of screening for the full roller width, with no overlap.
4. The Stone Mastic Asphalt shall then be compacted to achieve density requirements specified. When the Stone Mastic Asphalt has reached ambient temperature, any surplus screening shall be removed carefully using either mechanical means (power brooming or vacuuming) or manually.
5. Ensure that the screening does not stick to the roller by controlling its humidity.
6. The screening application shall be controlled so that it does not impact adjacent surfaces or structures.
7. The Contractor shall take suitable measures to prevent screening from entering catch basins.
8. Construction traffic shall be kept off the freshly placed coated exposed screening material until the asphalt surface has been cleaned by the Contractor.
9. The finished surface should have an overall uniform appearance.

3.11. COMPACTION

1. Rolling shall be continued until roller marks are eliminated and a minimum of at least 97% of the theoretical density has been obtained. After the in-placed density has been achieved, rolling operations must stop.
2. Vibratory compaction (8-10 tonnes tandem roller) shall only be used after the static rollers have been applied and when the temperature of the mixture is sufficiently high. Vibratory rolling shall be limited to a maximum of 3 passes at a mixture temperature of not less than 100°C.

3. The newly paved section shall be closed to vehicular traffic until such time that the temperature lowers to 60-70°C.

3.12. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 32 11 23 – Aggregate Base Courses.

1.2. REFERENCES

1. Canadian General Standards Board (CGSB).
 1. CAN/CGSB-8.2-M88 Sieves, Testing, Woven Wire, Metric.
2. Canadian Standards Association (CSA International).
 1. CSA-A23.1-09/A23.2-09 Concrete Materials and Methods of Construction/Methods of Test for Concrete.
 2. CSA-A179-04 (R2009) Mortar and Grout for Unit Masonry.
3. American Society for Testing and Materials International, (ASTM).
 1. ASTM C117-13 Standard Test Method for Materials Finer than 75µm (No. 200) Sieve in Mineral Aggregates by Washing.
 2. ASTM C136-06 Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

1.3. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Sand for sand bed.
 1. Submit a data sheet of this product for approval.
 2. Joint sand.
 1. Submit a data sheet of this product for approval.
 2. Submit a 1kg sample of this product for approval.

1.4. QUALITY ASSURANCE

1. Inspect all limestone pavers delivered to the site, with the Departmental Representative, at the time of delivery.

1.5. MOCK-UP

1. Prepare a mock-up of limestone pavers.
2. This mock-up will be the on-site reference for installation and workmanship. Only stone paver's installations matching the approved final mock-up will be acceptable.

3. The mock-up location to be determined by Departmental Representative.
 1. The mock up will be approximately 3.0 long, spanning the width of the path, opposite a Pier.
4. Allow 48 hours for inspection of mock-up before proceeding with work.
5. When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.6. TRANSPORTATION AND HANDLING

1. Limestone pavers.
 1. The Contractor is to obtain limestone pieces from the Departmental Storage Facility in the National Capital Region and transport to the worksite.
 2. Limestone pieces are to be inspected with the Contractor and the Departmental Representative at the Storage Facility, and at the job site following transportation, otherwise the Contractor shall be responsible for all damaged pieces.
 1. Provide Departmental representative with seven (7) days' notice prior to transportation to the job site.
 2. Inspect wrapping, protection, wood pallets and attachments to ensure limestone pieces can be properly handled and transported.
 3. Departmental Representative will be responsible for any visible limestone pieces found damaged upon inspection at the Storage Facility.
 4. Departmental Representative will be responsible for any limestone pieces hidden from view that are found damaged on unpacking at job site, provided that this damage is not attributable to the Contractor's transport and handling.
 1. Contractor shall be deemed responsible for damage to limestone pieces hidden from view if further damage to visible limestone pieces or to the wood pallets are discovered upon delivery at the job site.
 3. Deliver to the site all the specified limestone pieces.
 4. Provide forklifts and other equipment required for loading and handling limestone pieces.
 5. Co-ordinate shipping schedules with Departmental Representative to ensure uninterrupted timely deliveries and availability when required at the project site.

1.7. ON-SITE STORAGE

1. Store limestone pieces at the job site in an area acceptable to the Departmental Representative, where they do not interfere with circulation and will be protected from damage or staining. Organize limestone pieces to allow for their qualitative and quantitative checks.
2. Provide forklifts and other equipment required for unloading and handling limestone pieces.
3. Unload limestone pieces only onto stable, secure ground.
4. Do not remove limestone pieces from their original packaging until installation.

1.8. WASTE MANAGEMENT

1. Remove from site and dispose of packaging materials at appropriate recycling facilities.
2. Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
3. Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1. MATERIALS

1. Limestone pavers.
 1. Limestone pavers will be supplied by Departmental Representative.
 2. The properties below are provided for information purposes only and for paver type identification.
 1. Types and Sizes (note: these dimensions are planned to leave a gap of 3mm between pavers during installation).
 1. Type A: 100 x 147 x 147 mm, Finish Type 1.
 2. Type B: 100 x 147 x 297 mm, Finish Type 1.
 3. Type C: 100 x 147 x 447 mm, Finish Type 2.
 4. Type D: 100 x 297 x 297 mm, Finish Type 1.
 5. Type E: 100 x 297 x 447 mm, Finish Type 3.
 6. Type F: 100 x 297 x 597 mm, Finish Type 2.
 7. Type S: 100 x 297 x 495 mm, Finish Type 2.
 8. Type X: 100 x 372 x 672 mm, Finish Type 1.
 9. Types-Y : 100 x 372 x 522 mm, Finish Type 2.
 10. Type Z: 100 x 372 x 672 mm, Finish Type 3.
 2. Finishes.
 1. Top.
 1. Finish Type 1: Bush hammered 1.4 dots per square centimetre.
 2. Finish Type 2: Smooth and sand blasted over.
 3. Finish Type 3 : Layed.
 2. Bottom, Sides and Ends: Sawcut.
2. Manufactured sand for bedding: hard, durable, crushed stone particles, conforming to gradation of concrete sand as specified in CAN/CSA A23.1. Sand: free from clay lumps, cementation, organic material, frozen material and other deleterious materials. Do not use limestone screenings or stone dust.

1. Gradations: within limits specified when tested to CAN/CSA A23.2. Sieve sizes to CAN/CGSB-8.2-M88.

Sieve Designation	% Passing
10 mm	100
5 mm	95-100
2.5 mm	80-100
1.25 mm	50-90
0.630 mm	25-65
0.315 mm	10-35
0.160 mm	2-10
0.080 mm	0-3

3. Joint sand: to CSA A179 standard. Hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials. Do not use limestone screenings or stone dust.

1. Polymeric.
2. Gradations: within limits specified when tested to CAN/CSA A23.2. Sieve sizes to CAN/CGSB-8.2-M88.

Sieve Designation	% Passing
5 mm	100
2.5 mm	90-100
1.25 mm	85-100
0.630 mm	65-95
0.315 mm	15-80
0.160 mm	0-35
0.080 mm	0-1

3. Colour to match limestone pavers. Must be approved by Departmental Representative.

PART 3 - EXECUTION

3.1. AGGREGATE BASE COURSES

1. Ensure that the aggregate base courses conform to Section 32 11 23 – Aggregate Base Courses before commencing stone paving works.
2. Ensure that structural surface is not frozen or standing water is present during installation.

3.2. PROTECTION

1. Prevent damage to stone wall, stone piers, stair and adjacent property. Make good any damage.
2. Coordinate paving schedule to minimize interference with normal use of premises.

3.3. SITE CONDITION

1. Carry out work of this section only when surfaces are at least +2°C and the temperature is rising
 1. Suspend paving operation when temperature falls below specified minimum.

2. Ensure bedding sand and aggregate base courses are not saturated prior to placement of limestone pavers, cobble stone.

3.4. STONE CUTTING ON-SITE

1. Provide suitable equipment, to cut limestone pavers to fit site conditions and specified paving patterns accurately.
2. Carry out all required cutting for site adjustments, within or adjacent to paved areas.
3. Limestone pavers cut on site shall, when set in position, not reveal a gap between adjacent surfaces of more than 6 mm, or 15mm at wall or pier face.
4. Clean all sawn faces of rust stains and iron particles.
5. Paver wedges:
 1. Avoid installing pieces smaller than 50mm in length or width.
 2. Substitute (and cut to size) an oversize paver (Type X, Y or Z) to replace an adjoining standard-sized paver and the offending paver wedge, as shown on the plans.

3.5. BEDDING SAND

1. Place and spread bedding sand to a compacted thickness shown on the plans.
 1. The maximum thickness after compaction may vary to ensure positive drainage.
2. Use material other than bedding sand to compensate for depressions that exceed specified tolerances in surface of base.
3. Do not use joint sand for bedding sand.

3.6. INSTALLATION OF PAVERS

1. Install stone paving true to grade on the bedding sand, as indicated on the plans.
2. Paver alignment and orientation: as shown on the plans.
3. Provide for 3mm joint between pavers.
4. Where required, cut stone pavers accurately without damaging edges.
5. Compact and level the stone with min. 22 kN force mechanical plate vibrator; use minimum 19 mm thick plywood or neoprene pad under plate compactor and over stone until units are true to grade and free of movement.
6. Fill joints with joint sand.
7. Pass mechanical plate vibrator over unit paving to achieve compaction of sand in joints. Ensure joints are full at completion of compaction.
8. At completion of each work day, ensure work within 1 m of laying face is left fully compacted with sand filled joints.
9. Surface of finished pavement: free from depressions exceeding 3 mm as measured with 3 m straight edge.
10. Sweep surface clean and check final elevations for conformance to drawings.

3.7. ALLOWABLE TOLERANCES

1. Finish paving surfaces must be within 6 mm of established elevations, cross-sections and locations and 0.5mm with the adjoining paver.
2. Cuts and installation must be within :
 1. 15 mm horizontally at joints between limestone pavers and junctions with stone wall,
 2. 3 mm of other surfaces at joints between, other paving types, manholes and other features within paved areas;
 3. 3 mm vertically along a 3 m long straightedge.

3.8. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 31 05 16 – Aggregate Materials.
2. Section 31 14 11 – Grading Works.
3. Section 32 11 23 – Aggregate Base Courses.

1.2. REFERENCES

1. Canadian Standards Association (CSA).
 1. CAN/CSA A23.1-09 Concrete: materials and methods of concrete construction.
 2. CAN/CSA A165.2-04 Concrete Brick Masonry Units.
2. Canadian General Standards Board (CGSB).
 1. CAN/CGSB 19.13-M87 Sealing Compound, One-Component, Elastomeric, Chemical Curing.
3. American Society for Testing and Materials (ASTM).
 1. ASTM C568/C568M-10 Standard Specification for Limestone Dimension Stone.

1.3. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Lean Concrete.
 1. Submit a data sheet of this product for approval.
 2. Aggregates.
 1. Submit a data sheet for each type of aggregate.

1.4. QUALITY ASSURANCE

1. Inspect all limestone borders delivered to the site, with the Departmental Representative and supplier, at the time of delivery.

1.5. TRANSPORTATION AND HANDLING

1. Limestone borders
 1. The Contractor is to obtain limestone pieces from the Departmental Storage Facility in the National Capital Region and transport to the worksite.

2. Limestone pieces are to be inspected with the Contractor and the Departmental Representative at the Storage Facility, and at the job site following transportation, otherwise the Contractor shall be responsible for all damaged pieces.
 1. Provide Departmental representative with seven (7) days' notice prior to transportation to the job site.
 2. Inspect wrapping, protection, wood pallets and attachments to ensure limestone pieces can be properly handled and transported.
 3. Departmental Representative will be responsible for any visible limestone pieces found damaged upon inspection at the Storage Facility.
 4. Departmental Representative will be responsible for any limestone pieces hidden from view that are found damaged on unpacking at job site, provided that this damage is not attributable to the Contractor's transport and handling.
 1. Contractor shall be deemed responsible for damage to limestone pieces hidden from view if further damage to visible limestone pieces or to the wood pallets are discovered upon delivery at the job site.
3. Deliver to the site all the specified limestone pieces.
4. Provide forklifts and other equipment required for loading and handling limestone pieces.
5. Co-ordinate shipping schedules with Departmental Representative to ensure uninterrupted timely deliveries and availability when required at the project site.

1.6. ON-SITE STORAGE

1. Store limestone pieces at the job site in an area acceptable to the Departmental Representative, where they do not interfere with circulation and will be protected from damage or staining. Organize limestone pieces to allow for their qualitative and quantitative checks.
2. Provide forklifts and other equipment required for unloading and handling limestone pieces.
3. Unload limestone pieces only onto stable, secure ground.
4. Do not remove limestone pieces from their original packaging until installation.

PART 2 - PRODUCTS

2.1. AGGREGATES

1. 20-0 mm stone, according to the requirements of Section 31 05 16 – Aggregate Materials.

2.2. FILL MATERIAL

1. Use Type 3 (Class B) fill material, conforming to the requirements of Section 31 05 16 – Aggregate Materials for materials used to fill surface depressions.

2.3. LIMESTONE BORDERS

1. Limestone borders will be supplied by Departmental Representative.
2. The properties below are provided for information purposes only.
 1. Dimensions: 100 x 200 x 1000 mm.
 2. Curved limestone borders radius:
 1. Inside: 1500mm.
 2. Outside: 1600mm.
 3. Finishing: Honed on top and long sides.

2.4. BEARING BRICKS

1. Concrete brick, conforming to the requirements of the CAN/CSA A165.2, standard, type I-35, or limestone block of approximate dimension 100mm x 100mm x 150mm.
 1. Limestone paver or border cuttings are accepted.

2.5. LEAN CONCRETE PROPORTIONING

1. Prepare the concrete in accordance with the CAN/CSA A23.1 standard.
 1. Use type 10 normal Portland cement.
 2. Minimum resistance to compression at 28 days: 15 MPa.
 3. Nominal coarse aggregate size: 19 mm, conforming to CAN/CSA A23.1 standard.
 4. Slumping at time and point of discharge: 75mm.

PART 3 - EXECUTION

3.1. INSPECTION

1. Have the work approved at the end of each step, and before the concrete pouring.

3.2. GRADING

1. Perform excavation and backfilling as required in Section 31 14 11 – Grading Works.

3.3. AGGREGATE BASE COURSES

1. Place and compact aggregate materials according to the requirements of Section 32 11 23 – Aggregate Base Courses.
2. Ensure that the granular base course is not frozen or that standing water is not present during installation.

3.4. LIMESTONE BORDERS INSTALLATION

1. Handle the borders carefully so as not to chip the edges. Borders must be laid in accordance with the slopes, levels, dimensions, layouts and patterns shown on the plans.
2. When cutting is required, it must be done with appropriate tools in order to obtain clean and straight surfaces. No border should be cut to a length less than 300 mm.

3.5. LEAN CONCRETE

1. Before pouring concrete, verify alignments and levels of concrete borders to ensure that they correspond to those indicated on the plans, within the tolerances prescribed below.
2. Before pouring concrete, ensure area is free of debris and other impediments.
3. The pumping of concrete is prohibited and will be permitted only after the material and mixing is approved.
4. Ensure that the borders are not displaced during the concrete pouring.
5. Maintain records of concrete works, indicating the date and location of each pouring, the concrete's characteristics, air temperature and test samples taken.
6. Defective concrete: concrete will be considered defective:
 1. When it does not meet all the requirements prescribed in these specifications;
 2. When it contains too many debris;
 3. When its average resistance to compression at 28 days in any specified point is less than 95% of the minimum resistance to compression required;
7. All concrete work had been vandalized or damaged shall be demolished and rebuilt at the Contractor's expense.
8. Any concrete work has been executed using concrete that is found defective by the Departmental Representative or the designated laboratory shall be demolished and rebuilt at the Contractor's expense.

3.6. TOLERANCE

1. The borders should be installed with a maximum deviation of 6 mm compared to the prescribed alignment and elevation, and 0,5mm in relation to each adjoining limestone piece.

3.7. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 32 11 23 – Aggregate Base Courses.

1.2. REFERENCES

1. Not applicable.

1.3. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Aluminium edging.
 1. Submit a data sheet of this product for approval.
 2. Submit a sample of this product for approval.

PART 2 - PRODUCTS

2.1. ALUMINIUM EDGINGS

1. Interlocking, commercial grade, natural, aluminum edgings 6063 alloy containing silicon and magnesium, hardness T-6 according to The Aluminum Association, fitted with pegs, alloy 6061, T-6 hardness according to the Aluminum Association.
 1. Edgings:
 1. Dimension: 4.8 x 102 mm. Length as supplied by manufacturer.
 2. Anchoring devices: aluminum anchors designed for specified edgings, length of 305 mm.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Install the aluminium edgings according to the manufacturer's recommendations.
 1. Place anchoring devices at a minimum rate or three (3) pegs per section of 2440 mm, or five (5) pegs per section 4900 mm.

1. When placed against the Wall, additional anchoring devices may be needed to ensure that the aluminium edging follows the Wall contours, leaving a gap of 10-35mm for the granitic screening.
2. Install the granitic screening according to section 32 11 23 – Aggregate Base Courses.

3.2. TOLERANCE

1. The aluminium edgings should be installed with a maximum deviation of 6 mm compared to the prescribed alignment and elevation.

3.3. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 31 14 11 – Grading Works.

1.2. REFERENCES

1. Canadian Council of Ministers of the Environment
 1. PN1340-2005 Guidelines for Compost Quality.
2. American Society for Testing and Materials (ASTM).
 1. ASTM D2974-13 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

1.3. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Topsoil.
 1. Submit a data sheet of this product for approval.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Take unused amendment products to a licensed site for hazardous waste collection approved by the Departmental Representative.
2. It is forbidden to dump unused amendment products into a sewer, a water course, a lake, into the soil or at any other place where it could pose a risk to health or the environment.

PART 2 - PRODUCTS

2.1. TOPSOIL

1. Topsoil for seeded or sodded areas, a mixture of particles, micro-organisms and other organic matter constituting an environment conducive to plant growth desired.
 1. Texture based on the Canadian System of Soil Classification: soil consisting of 50-70% sand, 25-35% of silt, 7 to 10% clay and 5 to 10% by weight of organic matter.
 2. Do not contain toxic elements or growth inhibitors.
 3. Producing a finished surface free of:

1. Debris and stones over 50 mm in diameter;
2. Coarse plant material 10 mm in diameter and 75 mm in length, and accounting for more than 2% of soil volume.
4. Consistency: crumbly soil when humid.
5. Acidity: pH between 6 and 7.

2.2. SOIL AMENDMENTS

1. Fertilisers.

1. Fertility: major soil nutrients present in following amounts:
 1. Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 2. Phosphorus (P): 40 to 50 micrograms of P per gram of topsoil.
 3. Potassium (K): 75 to 110 micrograms of K per gram of topsoil.
 4. Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination or establishment of intended vegetation.
 5. Ph value: 6.5 to 8.0.
 6. Industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2. Peat Moss.

1. Composed of different varieties of partially decomposed sphagnum moss.
2. In elastic and uniform consistency, brown in colour.
3. Exempts of wood and harmful materials that could inhibit growth.
4. Composed of shredded particles of at least 5mm in diameter.

3. Sand: washed silica sand, medium to coarse texture.

4. Lime.

1. Ground agricultural lime.
2. Particle size requirements: 90% of the lime must pass through a sieve of 1.0 mm, and 50% through a sieve of 0.125 mm.

5. Compost.

1. Mixture of soil and decaying organic matter used as fertilizer, mulch or soil amendment product.
2. The compost is made, at 40% or more, of processed organic matter, this percentage being determined by the Walkley-Black test or ASTM D2974 (loss on ignition).
3. The product must be stable enough (matter sufficiently decomposed) so as not to have any adverse effect on plant growth (C/N ratio below 25), and it must not contain any toxic elements or growth inhibitors.

4. The composted solid matters of biological origin should conform to the guidelines for compost quality, category A, published by the Canadian Council of Ministers of the Environment, in January 1996.
6. Organic Matter.
 1. Compost of category A (in accordance with CCME PN1340 standard), untreated organic matter such as decomposed manure, hay, straw, bark residue or sawdust, in accordance with applicable requirements for organic matter content, compost maturity and contaminants.

2.3. QUALITY CONTROL AT THE SOURCE

1. Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
 1. Testing must be performed and topsoil approved before it can be delivered on site.
2. Soil testing should be performed by a recognized laboratory designated by the Departmental Representative and cover pH, phosphorus, potassium and organic matter, as well as particle size.
 1. Soil sampling, testing and analysis to be in accordance with Provincial standards.
3. The laboratory shall determine the need for amendment products so as to be able to provide topsoil that meets the requirements.
4. Incorporate the amendments required by the laboratory.
5. Before its placement, the Departmental Representative will examine the topsoil and the result of the analysis, and determine if the material is acceptable.

PART 3 - EXECUTION

3.1. TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent surfaces or properties, according to requirements of authorities having jurisdiction.
2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2. PREPARATION OF THE EXISTING SUBGRADE

1. Ensure that the existing subgrade meets the requirements of Section 31 14 11 – Grading Works.
2. Remove debris, roots, branches, stones over 50 mm in diameter and other harmful substances. As well, remove soil contaminated with calcium chloride, toxic materials and petroleum products, and any debris protruding from the surface. Remove from the job site all these unwanted materials.
3. Loosen the soil over the entire area that is to receive a layer of topsoil, down to a depth of at least 100mm. Repeat this operation perpendicularly to the direction of the first pass on any surfaces where transport or spreading equipment has compacted the soil

3.3. PLACING AND SPREADING OF THE TOPSOIL

1. Once the Departmental Representative has accepted the subgrade, spread the topsoil in order to create a uniform layer of a depth, after settlement, as indicated on the plans.
2. If a thickness of over 150mm is required, spread topsoil in uniform layers not exceeding 150 mm thick.
3. For areas to be sodded, bring the level of the topsoil to 15mm of the finished grade.
4. Manually spread the topsoil around trees, shrubs and obstacles

3.4. SOIL AMENDMENT

1. Apply amendment products and mix them properly throughout the thickness of the layer of the prescribed topsoil, in the proportions prescribed in the soil test report.

3.5. FINISH GRADING

1. Do not perform work when conditions are unfavorable, such as when the ground is frozen or waterlogged, or when covered with snow, ice or standing water.
2. Level the ground to eliminate any bumps and hollows and promote good drainage. All depressions or pockets that cannot drain themselves must be eliminated. Create a friable topsoil by loosening the soil and raking it. This tillage should only be done under adequate soil conditions, when it is dry, free of ice, snow, puddles or debris.
3. Firm up the topsoil in order to obtain the required apparent bulk density, using equipment approved by the Departmental Representative. Leave the surfaces smooth, uniform and firm so it does not form deep scars under the weight of a person.
4. Remove debris, roots, branches, stones larger than 50 mm in diameter and other harmful substances. Also remove soils contaminated by calcium chloride, toxic materials and petroleum products, as well as any debris protruding from the surface. Remove from the site all such unwanted material.
5. All undulations or irregular variations of the finished grade which cannot be maintained with normal machinery without damaging the site must be removed in order to allow unimpeded maintenance.

3.6. SURPLUS MATERIALS

1. Remove surplus material from the job site.

3.7. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

3.8. ACCEPTANCE

1. The Departmental Representative will examine and analyze the topsoil in place, and will determine if the material, the thickness of the topsoil layer and finish grading are acceptable.

END OF SECTION

PART 1 - GENERAL

1.1. RELATED SECTIONS

1. Section 32 91 19 – Topsoil Placement & Finish Grading.

1.2. REFERENCES

1. Not applicable.

1.3. SUBMITTAL PROCEDURES

1. At least four (4) weeks before the start of the works, submit to the Departmental Representative the following items:
 1. Sod.
 1. Submit a data sheet of this product for approval.
 2. Submit a one (1) sq.m. sample of this product for approval.

1.4. QUALITY CONTROL AT THE SOURCE

1. The supply source of sod must be approved by the Departmental Representative. Once the sod's source of supply approved, no other sources can be used without the written authorisation of the Departmental Representative.
2. The sod material must be approved at the source of supply by the Departmental Representative.

1.5. TRANSPORTATION AND HANDLING

1. The sod must be delivered to the job site within 24 hours after its collection.
2. The sod must be rolled or folded so as to limit the risk of breakage during handling and to reduce the risk of drying out during transportation.
3. Properly cover the sod cover during transport to limit the drying of the roots.
4. The sod will not be dumped from vehicles, but will be carefully unloaded and stored.

1.6. CONSTRUCTION SCHEDULE

1. Establish the timetable for the laying of sod so that it coincides with the surface preparation and the spreading of the topsoil.
2. Do not lay the sod during hot days (above 30°C).
3. The Contractor shall obtain the necessary authorization from the Departmental Representative before starting sodding works.

4. Do not perform work when conditions are unfavorable, for example when the ground is frozen or waterlogged, or when covered with snow, ice or standing water.

1.7. WASTE MANAGEMENT AND ELIMINATION

1. Send unused amendment and fertilizer products to a licensed site for the collection of hazardous materials approved by the Departmental Representative.
2. It is forbidden to dump unused amendment and fertilizers products into sewers, watercourses, lakes, onto the soil or at any other place where it could pose a risk to health or the environment.

PART 2 - PRODUCTS

2.1. MATERIALS

1. Number one grade cultivated grass: turf grass specially seeded and cultivated in sod nurseries.
 1. Types of cultivated grass.
 1. Number one grade Kentucky Blue Grass / Fescue sod, grown only from seed mixtures of cultivars of Kentucky bluegrass and red fescue grass or creeping red fescue, and containing at least 40% of cultivars of Kentucky bluegrass and 30% creeping red fescue.
 2. Number one grade cultivars: grass grown from certified seed.
 2. Quality of cultivated grass.
 1. Lawn containing more than 2 broadleaf weeds or 10 other type of seeds per 40 square meters.
 2. Turf with a density such that the soil is invisible from a height of 1500 mm, after mowing to a height of 60 mm.
 3. Maximum mowing height of 60-65 mm.
 4. The sod will come from a land where the soil surface is composed of particles of sand, silt and clay with properties of both sand and clay.
 5. The sod will be cut in a professional manner, using equipment designed for this work, according to the manufacturer's size, plus or minus 12mm in width, and 5% more or less in length.
 6. Thickness of sod soil: 15 mm.
 7. The minimum age of sod will be 12 months, with roots that can withstand the weight of the sod roll, without tearing, when suspended vertically by holding the top corners.
2. Water.
 1. Potable water supplied by the Contractor at the designated location.
3. Fertilisers.
 1. Fertilisers complying with the Fertilisers Act and Fertilisers Regulations of the Government of Canada.

2. 100% natural fertiliser, of a 3-14-3 formula.
4. Herbicide.
 1. The type, rate and method of application are subject to approval by the Departmental Representative.

PART 3 - EXECUTION

3.1. PREPARATION WORK

1. Ensure that the ground level is adequate and that the surfaces to be sodded conform to Section 32 91 19 – Topsoil Placement & Finish Grading.
2. Remove weeds, debris, stones of a diameter of 50mm or more, soil contaminated by oil, gasoline and other deleterious matter, and remove these from the job site.
3. Have the finish grading approved by the Departmental Representative before commencing the sodding work.

3.2. SOD PLACEMENT

1. Place the sod within 24 hours following its collection.
2. Place the sod in parallel strips, with staggered joints. Place them tightly one against the other so as to leave no gap or overlap.
3. Cut any narrow or irregularly-shaped pieces using sharp tools.
4. Perform a light rolling (light roll, 320 to 540kg/m³), designed to ensure contact of the sod with the soil. It is forbidden to use a heavy roller to correct surface irregularities. If the soil is dry, water the sod before rolling.

3.3. FERTILISATION PROGRAMME

1. Apply fertilizer during the turf's grow-in and warranty periods, i.e. a month after the completion of sodding.
2. Apply fertilizer uniformly, at a rate of 0.5 kg of nitrogen per 100 square meters, and water the grass properly.

3.4. MAINTENANCE DURING ESTABLISHMENT PERIOD

1. Perform the following maintenance work from the sodding date until the date of provisional acceptance of the work
 1. Water sodded areas with sufficient quantity and frequency to maintain optimal moisture in the lawn, to a depth of 75-100 mm.
 2. Repair and re-sod bare areas and areas of dead grass, to the satisfaction of the Departmental Representative.
 3. Mow the turf to 60mm in height before or when it reached 80mm, and remove any clippings that could smother the turf.

4. Keep lawns free of weeds at 98%.
 1. Weed by mechanical means using acceptable methods of integrated pest management.

3.5. CLEANING

1. Progress cleaning: leave work area clean at end of each day.
2. Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment and proceed with cleaning.

3.6. WORK PROVISIONAL ACCEPTANCE

1. Sodded areas will be accepted by the Departmental Representative if the following conditions are met:
 1. The turf has established properly;
 2. Turf areas are free of dead grass and bare areas;
 3. Soil remains invisible from a height of 1500 mm, after mowing the lawn to a height of 60 mm;
 4. Lawns have been mowed at least two (2) times prior to the acceptance of the work;
2. The turf will be accepted no sooner than one (1) month after sodding completion.
3. Areas sodded after September 30th will be accepted the following spring, one month after the beginning of the growing season, if the above conditions are met.

3.7. MAINTENANCE DURING WARRANTY PERIOD

1. Perform the following work from the date of provisional acceptance of the work until the end of the warranty period.
 1. Water sodded areas on a weekly basis to maintain optimal moisture in the lawn to a depth of 100mm.
 2. Repair and re sod all barren areas and areas of dead grass, to the satisfaction of the Departmental Representative.
 3. Mow grass at a height of 60 mm and remove clippings that could smother turf, according to the Departmental Representative.
 4. Apply fertilizers on sodded areas based on the established turf fertilization programme. Apply in one direction half the required amount of fertilizer, and then spread the rest perpendicularly. Water properly so that the fertiliser penetrates into the soil.
 5. Keep lawns free of weeds at 98%, using acceptable mechanical methods of integrated pest management.

END OF SECTION