

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 32 92 19 16 – Hydraulic Seeding
- .2 Section 32 92 23 – Sodding
- .3 Section 32 93 10 – Trees, Shrubs and Ground Cover Planting

1.2 PAYMENT

- .1 Testing of topsoil: Contractor will pay for cost of tests.

1.3 REFERENCES

- .1 Agriculture and Agri-Food Canada
 - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .2 Canadian Council of Ministers of the Environment
 - .1 PN1340-2005 or more recent, Guidelines for Compost Quality.
- .3 NQ 0605-100 “Aménagement paysager à l’aide de végétaux.”
- .4 NQ 2501-025, modified for mixed soils (organic and inorganic).
- .5 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 DEFINITIONS

- .1 Compost
 - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
 - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
 - .3 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.
 - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality control submittals:
 - .1 Indicate source(s) of proposed supply sources to Departmental Representative.

1.5 ACTION AND INFORMATIONAL SUBMITTALS (cont'd)

- .2 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties. Toxicology analysis of input values must comply with residential/parklands standards.
- .3 Certificates: Submit documents signed by manufacturer certifying that products and materials comply with performance characteristics and physical properties.
- .4 Provide one (1) sample of each soil type to Departmental Representative for approval.
- .5 Approval of each material type will depend on soil analysis results and inspection of samples. Do not commence work indicated under this section until materials have been approved by Departmental Representative.

1.6 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter and present recommendations for necessary soil conditioners and fertilizers.
- .4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
 - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

1.7 WORK SCHEDULE

- .1 Complete finish grading to allow sufficient lead time for grassing and planting under optimal conditions.

1.8 OBSTACLES

- .1 Contractor must take measures necessary to protect adjacent or underground Work.

1.9 ON-SITE STORAGE

- .1 Store soil in area protected from weather. Cover stockpiled soil with plastic or waterproof membrane.
- .2 Contractor must avoid excessive stockpiling on site or contamination by other materials.
- .3 Locate piles on clean surfaces to prevent contamination, no higher than 1.5 metres.

PART 2 PRODUCT

2.1 TOPSOIL

- .1 Topsoil salvaged from landscaping work and topsoil deposited on site from 2014 works.
- .2 Topsoil for seeded areas, planting beds: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth
 - .1 Contain no toxic elements or growth inhibiting materials.
 - .2 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .3 Consistence: friable when moist.
- .2 **Mix No. 1** (for turf and seeding):
 - .1 Composition:
 - 45% compost, sand, friable earth, black earth
 - 55% recycled content
 - .4 **Mix No. 2** (for planting)
 - .1 Composition:
 - 55% compost, organic fertilizer, sand, friable earth, black earth
 - 45% recycled content
- .3 Characteristics of mixes:
 - .1 General; mixes must be:
 - .1 Free of pesticide residues.
 - .2 Uniform, homogeneous.
 - .3 Must not contain materials bigger than two (2) centimetres in diameter.
 - .2 **Mix No. 1** (for seeding):
 - .1 Organic matter between 4% and 8% (dry).
 - .2 Water pH between 6 and 7.
 - .3 Cation exchange capacity (C.E.C.) above 10 and 20 meq/100 gr of soil.
 - .4 Settlement and compaction: 25%.
 - .5 Bulk density (wet, unsettled) 100 kg/m³.
 - .6 P (phosphorous): 80 ppm.
 - .7 K (potassium): 156 ppm.
 - .8 Mg (magnesium): 45 ppm.
 - .3 **Mix No. 2** (for planting):
 - .1 Organic matter between 8% and 12% (dry).
 - .2 Water pH between 6 and 7.
 - .3 Cation exchange capacity (C.E.C.) above 10 and 20 meq/100 gr of soil.

2.1 TOPSOIL (cont'd)

- .4 Settlement and compaction: 30%.
- .5 Bulk density (wet, unsettled): 800 kg/m³.
- .6 P (phosphorous): 200 Ppm.
- .7 K (potassium): 200 Ppm.
- .8 Mg (magnesium): 67 Ppm.
- .4 Particle size:
 - .1 Planting soil mix must comply with grading ranges of the BNQ-2501-025 standard, amended for mixed soils (organic and inorganic).
- .5 Soil analysis:
 - .1 Provide a soil analysis certificate signed by a chemist indicating organic matter, pH, P, K, Mg and Ca as well as particle size distribution if requested, at least 30 days before Work starts.
 - .2 Amend soil if it does not comply with the requirements of these specifications.
 - .3 Examine soil samples using procedures described in "Méthodes d'analyse des sols, des fumiers et des tissus végétaux – Agdex 533," of the Conseil des productions végétales du Québec.
 - .1 PR-1: Preparation of samples.
 - .2 PH-1: Water pH.
 - .3 PH-2: Buffer pH.
 - .4 MA-1: Organic matter (under 20%).
 - .5 MA-2: Organic matter (over 20%).

- .4 Chemical elements: planting soil mixes must comprise certain chemicals in the proportions provided in the table below:

Chemical elements	No. 1	No. 2
Phosphorous (P)	80 ppm	200 ppm
Potassium (K)	< 155 ppm	<200 ppm
Magnesium (Mg)	> 45ppm	> 67 ppm
Calcium (Ca)	> 357 ppm	> 535 ppm

Manufacturer must amend soil to correspond to indicated proportions.

2.2 SOIL AMENDMENTS

- .1 Loam:
 - .1 Arable soil (cultivable soil) not too clayey (more or less 50%), nor too sandy (more or less 50%) with organic matter between 4% and 5% for sandy loam and between 2% and 3% for clayey soil. Soil must be free of subsoil, roots, grass clumps, weeds, toxic matter, stones or other foreign matter.

2.2 SOIL AMENDMENTS (cont'd)

.2 Black soil:

.1 Decomposing materials, relatively supple and homogeneous, free of colloidal residue, wood, sulphur and iron. Size of shredded particles must be 6 mm or less.

.2 PH coefficient may vary between 5 and 7. Soil must contain at least 60% organic matter in weight. Adsorption capacity between 150% and 500%.

.3 Course sand:

.1 Natural sand only, particle size as follows. No more than 45% of particles passing between two consecutive sieves in the table. Particle size must be determined using CAN/CSA-A23.2-2A test method.

Particle (sieve) size	Percentage passing %
10 mm	95 to 100
5 mm	80 to 100
2.5 mm	50 to 85
1.25 µm	25 to 65
630 µm	10 to 35
315 µm	2 to 10
160 µm	

.4 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: 5 mm minimum.

.5 Organic matter: compost Category A, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.6 Fertilizer:

.1 Commercial synthetic or preferably organic fertilizer, minimum 65% insoluble nitrogen content. Industry standard product containing nitrogen, phosphorous, potassium and other micronutrients suitable for plants and specific applications or according to soil analyses.

.2 Fertility: major soil nutrients present in following amounts.

.3 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.

.4 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.

.5 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

.6 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

2.2 SOIL AMENDMENTS (cont'd)

- .3 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
 - .3 Composition and quantity as recommended by laboratory.

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 properties and walkways. If grass seed or sod cannot be planted before winter, install membrane to prevent runoff erosion using wood or metal stakes.
- .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 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated by Departmental Representative after area has been cleared of grasses and removed from site.
- .2 Strip topsoil.
 - .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Stockpile topsoil.
 - .1 Stockpile height not to exceed 2 m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill.
- .5 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.

3.3 PREPARATION OF EXISTING GRADE (suite)

- .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
- .2 Remove debris which protrudes more than 75 mm above surface.
- .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
 - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 PLACING AND SPREADING OF TOPSOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil as indicated to following minimum depths after settlement:
 - .1 150 mm for seeded areas.
 - .2 400 mm for shrub beds.
 - .3 300 mm minimum around tree container.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- .6 For planting holes, spread topsoil in successive 300 mm layers for planting trees and shrubs, to avoid subsequent settling of soil. Compacting method must be approved in advance by Departmental Representative. Soil must be compacted to 90% P.M.

3.5 IMPLEMENTATION OF MESH

- .1 Apply at locations specified by the steel mesh bands on the ground, following the shape of the field, where specified. Make the connections without loss due to recovery maintaining optimum tension. Use a nailing system of slip planes according to the results of calculations.
- .2 The Contractor is to install a sufficient length of net to cover all the surfaces identified in plans. At the top of the rock wall excavated a cable "bank" must be inserted into the top of the widths of the steel net. This cable "bank" will be attached to the cables "anchor" with galvanized steel thimbles and cable clamps as required by the manufacturer or its representative. These cables "anchor" will finally be set for consolidation anchors located at least 1 meter at the top of the metal net.

For connecting thread widths them, use a sewing cable sneak each cell of the metal net. The transverse or longitudinal overlaps can be made. These sewing cables are connected to the support rope with a galvanized steel lug and cable ties as required by the manufacturer.

3.5 IMPLEMENTATION OF MESH (cont'd)

.3 Consolidation Anchors

- .1 Consolidation of anchorages are provided for securing the anchor cables. A consolidation anchor is a crenellated or threaded steel rod retained in a borehole by an expansion shell and then sealed with a cementitious grout which fills the entire annular space between the stem and the borehole wall. The rods must be composed of a 150 grade steel according to ASTM A615 or equivalent approved by the Departmental Representative (chemical composition, strength, elongation and bending diameter). The anchoring rods are to be hot-dip galvanized according to ASTM A767 Class II over the entire length. Consolidation anchors are 25 mm outer diameter solid steel. The minimum length of the rod is 500 mm from the above natural bedrock.
- .2 Installation of anchors consolidation is done after the installation of the metal net.
- .3 Consolidation anchors should be placed on the seam cables. The horizontal spacing is thus dictated by the horizontal distance between the stitching wire, approximately the same width as the width of the thread. Anchors should also allow the net to match the profile of the soil or rock to avoid voids.

3.6 PLACING AND SPREADING OF PLANTING SOIL

- .1 Use topsoil salvaged from landscaping work and topsoil deposited on site from Lot 1 phase to grass surface used at bottom of Gilmour Hill for construction operations.

3.7 SOIL AMENDMENTS

- .1 Apply and thoroughly mix soil amendments into full specified depth of topsoil.

3.8 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
 - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
 - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.9 ACCEPTANCE

- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.10 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION