

Construction Specification for Topsoil/Growing Medium

City of Vaughan, Urban Design, Planning and Growth Management

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

The General requirements, definitions, supplementary general conditions, definitions, bid form, instruction to bidders, bid policies, special provisions, the Agreement and the contract drawings shall form part of this specification in the same manner as if they were recited in full herewith.

Refer to other specifications associated with these documents to determine their effect upon the work of this Section.

1.2 SCOPE OF WORK

This specification shall apply to all areas in the contract regardless of whether topsoil has been stockpiled by others for the Contractor's use, or the Contractor spreads and fine-grades topsoil from stockpiles prepared by his own forces.

- 1) Requirement for reuse of existing site topsoil as growing medium
- 2) Mixing and testing of topsoil, course sand and compost components to design 3 types of growing medium as applicable for the following applications:
 - **TYPE 1** Standard Mix, for seeding, sodding, trees planted in turf and typical boulevards.
 - **TYPE 2** Planting Bed Mix , for planting beds of shrubs and perennials / grasses
 - **TYPE 3** Urban Boulevard Mix, for trees planted in hardscaped boulevards.
- 3) Installation of topsoil
- 4) Compacting and grading of topsoil
- 5) Adding organic matter to the surface of topsoil.

1.3 REFERENCES

Refer to the following standards, specifications, or publications:

- 1) ASTM International (formerly American Society of Testing Materials):
ASTM D422 (hydrometer test)
ASTM F1632 (pipette test)
- 2) Agriculture and Agri-Food Canada. 1998. The Canadian System of Soil Classification, 3rd edition, 1998
- 3) The Canadian System of Soil Classification – Soil Classification Working Group, Research Branch, Agriculture and Agri-Food Canada, Publication 1646.
- 4) Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). 2016. Accredited Soil Testing Laboratories in Ontario. <http://www.omafra.gov.on.ca/english/crops/resource/soillabs.htm>
- 5) Toronto and Region Conservation. 2012. Preserving and Restoring Healthy Soil: Best Practices for Urban Construction. Prepared by the Sustainable Technologies Evaluation Program (STEP). June

21, 2012. Toronto, ON. http://www.sustainabletechnologies.ca/wp/wp-content/uploads/2013/02/TRCA_2012_Preserving-and-Restoring-Healthy-Soil_Full-Report-REDUCED.pdf

- 6) Toronto and Region Conservation. 2012, Compost amended planting soil specifications, prepared by the Sustainable Technologies Evaluation Program
- 7) City of Toronto Construction Specification for Growing Medium, Engineering & Construction Services Division, April 2014
- 8) Region of York Designed Soil Specification: Appendix C- Region of York Specifications Contract Items (Draft)

1.4 DEFINITION

A-Horizon: The top layer of a soil profile; usually contains humus or organic matter.

Amendment: Material added to a Base Topsoil to produce Planting Soil. Amendments include but are not limited to compost (organic), fertilizer, biological and pH adjustors.

Base Topsoil: Topsoil that has been harvested from the project or other site that is known to have, or can be modified or amended to have a soil texture classification that is suitable to the type of plants to be installed, as specified by the landscape designer and determined through laboratory testing of sand-, silt- and clay-sized particle composition, and contains a minimum of 2.0% organic matter by dry weight.

Compost: Compost is stabilized humus that is a solid, mature product produced by an aerobic composting process.

Cone Penetration Test: An in-situ test of soil compaction that uses a cone penetrometer to measure the maximum resistance to pushing the instrument's metal conical tip into a thoroughly wetted soil profile at a constant rate.

Cone Penetrometer: An instrument used for in-situ testing of soil compaction that uses a load cell or strain gauge coupled with an analog dial or pressure transducer to measure the maximum resistance to pushing a metal cone of standard dimension and slope into a thoroughly wetted soil profile at a constant rate.

CSSS: Canadian System of Soil Classification

Existing soil: Mineral soil that exists at the location of proposed plantings after the majority of the construction within and around the planting site is completed and just prior to the start of work to prepare for planting.

Fertilizer: Amendment used for the purpose of adjusting soil nutrient composition and balance.

Field Capacity: The maximum amount of water that a soil can hold by capillary action before the water is drawn away by gravity, measured as percent soil volume.

Fine Grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes, drag rakes or other suitable devices.

Finished Grade: The surface or elevation of Planting Soil after consolidation, fine grading and settlement.

Graded Subsoil: Soil where the A horizon has been stripped and relocated; Cuts and fills deeper than 30

centimeters.

Overly Compacted Soil: Soil where the measured cone penetration test resistance value is greater than the root limiting threshold that corresponds to its texture classification.

Owner's Representative: The person or entity, appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.

Peds: Peds are aggregates of soil particles formed through pedogenic processes

Planting Soil: Mixtures of topsoil, sand, compost and potentially other soil conditioning amendments that are produced off-site and imported or produced on-site through placement of a Base Topsoil layer and in-situ incorporation of an amendment layer, or through volumetric mixing.

Scarify: Loosening of graded soil (i.e., subgrade) or existing subsoil to reduce compaction and improve infiltration and moisture retention prior to placement of topsoil or Planting Soil, through soil fracturing, soil ripping or soil trenching.

Subgrade: Surface or elevation of subsoil remaining after completion of excavation work, or top surface of a fill or backfill, before placing Base Topsoil or Planting Soil.

Topsoil: Naturally produced soil from the A horizon that has not been graded or intentionally compacted.

Undisturbed Soil: Soils with the original A horizon intact that have not been graded or compacted. Soils that have been farmed, subjected to fire or logged but not graded, and natural forested land are considered to be undisturbed.

USDA: US Department of Agriculture

1.5 DESIGN AND SUBMISSION REQUIREMENTS

- 1) **Checklist :** Where required in this Specifications submit samples and testing results of topsoil components for City of Vaughan approval a minimum 8 weeks prior to the installation of topsoil/growing medium. For checklist form see Contractors submittal checklist form at the end of the Specification section. This list is not intended to replace or modify the detailed description of the requirements below.
- 2) **Samples:** Samples must be clearly labelled with identifying characteristics including, but not limited to, the type of material, source and stockpile location, and manufacturer contact information. Samples shall be reviewed by the project contract administrator for appearance only. The Contractor is solely responsible for ensuring that the materials comply with specifications and requirements. Identify the final designed soil with percentage of each components.
- 3) **Certificates:** Submit quality assurance certification for approval that topsoil and topsoil components meet all environmental standards of the Province of Ontario and the City of Vaughan. Certificate shall indicate that the components are within the required maximum allowable levels of biological, metal and chemical contaminants.
- 4) **Product Data:** Submit product data and literature to the contract administrator for City of Vaughan review and approval for in minimum of 8 weeks prior to the planned installation of topsoil. Product data must include the literature for coarse sand, aggregate, pine bark, compost and yard waste compost.

Submit the manufacturer's particle size analysis, pH and the manufacturer's Fines modulus Index for coarse sand. Contractor to provide the identification of the manufacturer and location for each of the

course sand source.

Submit the manufacturer's pine bark compost and yard waste compost analysis for approval. Chemical and physical testing shall be conducted by soil laboratories accredited by the Compost Quality Alliance (CQA) utilizing test methods specified in The Test Methods for Examination of Composting and Compost (TMECC) except as specified.

The compost analysis shall include:

Compost Analysis

Shall include all parameters tested to comply with mandatory standards for compost quality in Ontario (OMOECC 2012), and Canada (CFIA 1997), as well as quality parameters recommended under the Compost Council of Canada's Compost Quality Alliance (CQA) certification program (A&L Canada Laboratories 2004) which are:

- Concentrations of 11 regulated metals (Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium and Zinc);
- Biological contaminants
- Pathogens (Temperature and pathogen tests)
- Bulk density, compacted to between 75 and 85% maximum dry density, reported in kilograms per cubic yard (kg/yd³) or grams per cubic centimetre (g/cm³);

Parameter	Testing Method
pH	TMECC 4.11 A , CCREF & USDA 2001 (by saturated paste method)
% dry weight organic matter	TMECC 5.07 A CCREF & USDA 2001; or ASTM D2974 method
soluble salt (mmhos/cm)	TMECC 4.10 A (by saturated paste method)
carbon:nitrogen	(C:N) ratio
Particle size % passing 50mm and 10mm	TMECC 2.02 B
Solvita maturity index	Solvita
Physical contaminants (%dry weight)	TMECC 3.08 A
%moisture content	Reported as % saturation

Submit testing for chemical and biological contaminants and pathogens as required by local government regulations. Compost samples submitted for laboratory testing shall be collected by the supplier from the finished product in accordance with procedures described in Ontario Quality Standards, Feedstock and Compost Sampling (OMOECC 2012).

Certified reports shall be from samples taken within four months of the date of the sample submission.

5) Material Source Locations:

Submit locations of topsoil and growing medium material sources Topsoil shall be insitu material on site or supplied by the developer. The City shall have the right to reject any material source. Submit the name, address and telephone number of the source contact, and the location of the soil source including directions to the specific field location on the property. Include a list of all crops grown on the soil, and any herbicides and pesticides applied, over the previous three years.

6) Soil Sampling and Analysis

Undisturbed site topsoil or harvested (i.e., stripped) topsoil stored in stockpiles must be assessed by an approved Professional Geotechnical engineer to determine if the existing topsoil can be re-used in accordance with Ontario Regulation 153/04 Records of Site Condition (OMOECC, 2011b), or as modified based on proposed Ontario Excess Soils policies (OMOECC DRAFT 2017). At a minimum, topsoil deemed suitable for re-use should be sampled and laboratory tested as described below for base topsoil. By comparing test results to project specifications for base topsoil and planting soil it may be found that the harvested topsoil may be used without amendment as planting soil or base topsoil if the base topsoil meet the proposed topsoil standards, or it shall be amended with coarse sand, compost and potentially other soil conditioning amendments as required to meet the standards for **Type 1, 2 & 3** growing medium/topsoil usage.

Testing of all materials to be used to produce the topsoil / or the planting soil product itself shall be performed in accordance with the current testing standards and protocols and conducted by The Ontario Ministry, Food and Rural Affairs (OMAFRA). Current listing of accredited laboratories may be obtained on the web at www.omafra.gov.on.ca/english/crops/resource/soillabs.htm. Submit the name of the testing lab prior to starting the testing process. Geotechnical engineering testing labs shall not be used for this purpose.

All testing shall be performed in accordance with the current testing standards and protocols of the OMAFRA.

The soil laboratory should be notified that the intended use of the topsoil or the materials used to produce the topsoil are for the planting soil for landscaping/horticultural purposes.

The testing must identify if the following are present in harmful levels; atrazene, salts, pre-emergent herbicides growth inhibitors or soil sterilants and heavy metals.

Topsoil samples should be collected as per ASTM D6640-01 Standard Practice for Collection and Handling of Soils Obtained in Core Barrel Samplers for Environmental Investigations.

Samples of base topsoil submitted for soil laboratory testing shall be taken from composite samples that are homogenized mixtures of material collected at regular depth intervals through the full depth of the stockpile or undisturbed soil 'A' horizon. Use the table below to determine the number of samples to submit for testing based on the estimated stockpile volume and proposed procedures for Ontario's excess soil re-use regulation (OMOECC DRAFT 2017). Identify the soil samples with source location and date prior to delivery to the testing laboratory.

Stockpile Volume (m³)	Number of Samples	Stockpile Volume (m³)	Number of Samples
<130	3	2050 – 2200	18
130 – 220	4	2200 – 2350	19
220 – 320	5	2350 – 2500	20
320 – 430	6	2500 – 2700	21
430 – 550	7	2700 – 2900	22
550 – 670	8	2900 – 3100	23
670 – 800	9	3100 – 3300	24
800 – 950	10	3300 – 3500	25
950 – 1100	11	3500 – 3700	26
1100 – 1250	12	3700 – 3900	27
1250 – 1400	13	3900 – 4100	28
1400 – 1550	14	4100 – 4300	29
1550 – 1700	15	4300 – 4500	30
1700 – 1850	16	4500 – 4700	31
1850 – 2050	17	4700 – 5000	32
>5000		32 + (volume – 5000) / 300	

Submit duplicate samples for each of: topsoil, coarse sand, aggregate, pine bark compost, yard waste compost and growing medium.

Samples of each material shall be submitted at the same time as the product data and testing data of that material. Samples and analysis of topsoil, and growing medium must be submitted within 4 weeks of sampling.

Each test report shall be marked with the following information:

- 1) Date issued.
- 2) Project Title and names of Contractor and material supplier.
- 3) Name of material and reference number from TS 5.10.05, herein, identifying the type of material.
- 4) Date, place, and time of sampling.
- 5) Location of material source.
- 6) Testing laboratory name, address, and telephone number, and name(s), as applicable, of each field and laboratory inspector.
- 7) Type(s) of test.
- 8) Results of tests.
- 9) Suggested acceptable ranges of the test data for the types of plants to be planted.
- 10) Recommendations for amendments to bring the growing medium to within these acceptable ranges.

Samples of growing medium shall be submitted no less than 14 Days after the approval of the mix components.

Do not submit samples of growing medium for approval until all mix component testing has been reviewed and approved by the Contract Administrator.

Particle size distribution analysis for all topsoil and growing **medium** including the following gradient of mineral content:

Table 2: Particle size distribution

CSSS/USDA designation	Size (mm)
gravel	2 – 75
total sand	0.05 – 2
very coarse sand	1 – 2
coarse sand	0.5 – 1
medium sand	0.25 – 0.5
fine sand	0.1 – 0.25
very fine sand	0.05 – 0.1
silt	0.002 – 0.05
clay	< 0.002

Particle size distribution analysis for all topsoil and growing **medium** including the following gradient of mineral content: The method of testing shall be according to ASTM D422 (Hydrometer test) or ASTM F1632 (pipette test)

The City reserves the right to require additional soil analysis at any time such additional samples of materials are deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform and pay for additional testing as requested by the Contract Administrator at no extra cost to the City.

Contractor to arrange for testing at start of project. All testing shall be at the expense of the Contractor.

Chemical analysis should include the following:

- 1) pH
- 2) Nutrient levels by ppm (parts per million)
 - Phosphorous
 - Potassium
 - Magnesium
 - Calcium
 - Nutrient test shall include any supplemental addition to the growing medium recommended by the testing laboratory.
- 3) Soluble salt by electrical conductivity of a 1:2 soil water sample measured in milliohms per centimeter.
- 4) Cation Exchange Capacity (CEC)
- 5) Percent Organic Matter by dry weight as determined by ignition (Ash Burn Test or Walkley/Black Test, ASTM F1647)
- 6) Carbon to Nitrogen (C:N) ration
- 7) Physical analysis of designed soil shall provide bulk density and water permeability with the sample compacted to 80% and 85% maximum dry density (Proctor density). (ASTM D698-91).
- 8) The City may request additional growing medium test as required.
- 9) Final approval of soil amendment procedures shall be approved by the Contract Administrator.
- 10) If required, the City requires the right for additional soil analysis for verification of conformance to specification requirements. Contractor is responsible to furnish samples and pay for the additional testing at no extra cost to the City.
- 11) All testing shall be at the expense of the contractor and should be arranged at the start of project.

7) **Laboratory analysis of Coarse Sand shall include:**

- Clean, washed, sand, free of toxic materials:
- pH;
- Particle size distribution, by sieve analysis with results reported as percent passing the following sieve sizes:
 - 3/8 inch (9.5 mm)
 - No 4 (4.75 mm)
 - No 8 (2.36 mm)
 - No 16(1.18 mm)
 - No 30 (.60 mm)
 - No 50 (.30 mm)
 - No 100 (.15 mm)
 - No 200 (.075 mm)

The Owner's Representative reserves the right to evaluate and reject all sources of materials and products selected by the Contractor.

8) **In-Situ Compaction Testing**

Submit results of all compaction testing required by the specifications to the City for approval.

- Installed growing medium shall be tested in-situ with a cone penetrometer and a soil moisture meter.
- All testing shall be arranged for and paid for by the Contractor.

- The cone penetrometer testing can be arranged through a local arborist, using a product such as the Soil Compaction Tester as manufactured by Dickey-John, and distributed by Ben Meadows www.benmeadows.com, or approved equal.
- Penetration resistance shall be to the full depth of the installed soil profile or 750 mm, whichever is less.
- One test shall be performed once every 25 m² of growing medium surface area. The City may request additional testing locations as required.
- Contractor to maintain a record log of all compaction testing for submission and approval. The record log shall include the date, location, depth and pressure reading of each test. Test location data shall be plotted on a site plan.
- Submit the compaction log to the City at the end of installation period. The compaction log shall be kept current and available on site for review.

9) Sequencing and Scheduling

Installation of topsoil/growing medium for coordination with other trades and scheduled accordingly, submit a schedule to the City for approval prior to the start of the project.

Schedule the installation of growing medium after the area is no longer required for use by other trades and work or protect the growing medium from compaction and contamination.

Ensure all utility installations have been completed prior to topsoil installation.

10) Delivery, Storage and Handling

Growing medium shall not be delivered, mixed or installed in frozen, wet or muddy weather condition

Where it is necessary to work during cold weather condition, protect sub grades and growing medium/ topsoil from freezing by using covers. Ensure the stockpile is stored in a well-drained area and protect from ice build-up and saturation.

Topsoil stripping sand preparation of growing medium/ designed topsoil shall be scheduled during favorable warm weather.

Protect topsoil/ growing medium from rain and washing that can separate fines and course material.

Cover topsoil with plastic cover at the end of each work day.

Protect growing medium stockpiles from contamination by chemicals, dust and debris that may be detrimental to plants or drainage.

Do not use delivery or installation methods that overly mix pulverize the growing medium. Soil blowing equipment and soil slinger equipment shall not be permitted to move growing medium.

11) Site Conditions

It is the Contractor's responsibility to assess all surface and sub surface site conditions, report any drainage or saturation issues to the Contract Administrator immediately upon noticing such issues. Do not install topsoil/ growing medium when unsatisfactory site condition is encountered. Proceeding with the work without the authorization of Contract Administrator constitutes the acceptance of existing or corrected site conditions.

12) Utilities

Determine location of all utilities including vaults, conduits, pipes and wires adjacent to, below or within the areas of work. Perform all work in a manner, which will avoid damage to any utility. Hand excavate or hydro-vac near any utility.

13) Soil Compaction Requirements

The degree to which graded subsoil and installed Planting Soil in landscape construction areas has been compacted through site construction and Planting Soil installation work shall be evaluated by

performing Cone Penetration Tests using a soil moisture meter and mechanical static cone penetrometer, electronic static cone penetrometer or dynamic cone penetrometer.

- Testing shall be arranged for and paid for by the Contractor.
- The cone penetrometer testing can be arranged through a local arborist, using a product such as the Soil Compaction Tester as manufactured by Dickey-John, and distributed by Ben Meadows www.benmeadows.com, or approved equal.
- Penetration resistance shall be to the full depth of the installed soil profile or 750 mm, whichever is less.
- One test shall be performed once every 25 m² of growing medium surface area. The City may request additional testing locations as required.
- Maintain a record log of all compaction testing for submission and approval. The record log shall include the date, location, depth and pressure reading of each test. Test location data shall be plotted on a site plan.
- Submit the compaction log to the City at the end of installation period. The compaction log shall be kept current and available on site for review.

14) Coordination

Contractor to coordinate work with that of other trades to ensure that the progress of construction continues unimpeded.

15) Delivery, Storage and Handling

- Growing medium shall not be delivered, mixed or installed in frozen, wet or muddy weather conditions.
- If the construction should continue during cold weather, protect sub grades topsoil from freezing. Utilize covers or as needed heating tents. Subgrades should be sufficiently well - drained and the surface be cleared of snow and ice.
- Harvested topsoil from on-site or imported topsoil/ growing medium should be protected from freezing and saturation. The topsoil piles must be covered after each workday from freezing.
- Protect topsoil / growing medium stockpiles from rain and washing at the end of each workday.
- Protect topsoil / growing medium stockpiles from chemical contamination and dust and debris.
- Do not use delivery or installation methods that excessively pulverize the growing medium. Soil blowing equipment and soil slinger shall not be used to move growing medium.

16) Utilities

Determine location of all utilities including vaults, conduits, pipes and wires adjacent to, below or within the areas of work. Perform all work in a manner, which will avoid damage to any utility. Hand excavate near any utility.

17) Waterproofing

Topsoil placement and spread above slab should be performed in such a manner, which will avoid damage to waterproofing membrane, protection board or other structural sealing materials.

18) Depth Requirements

The depth of installed Planting Soil shall be evaluated to determine if it meets specification by digging test holes or using a soil core sampler or auger to determine the depth to which it extends, measuring depth to the nearest centimeter. When using a core sampler, it is important to consider the degree to which the soil core was compressed by the sampling method by measuring the core length and comparing it to the borehole depth.

Soil depths may vary depending on proposed planting material and location. Generally, tree soil in covered trenches must have an average of 1m depth of available soil; tree soil in open planters must have an average of 1.2m depth of available soil; shrubs and groundcover soil shall be determined per project.

Street trees should have minimum 16 m³ of soil volume per tree with a direct access to an additional 14 m³ for a total soil volume of 30 m³.

PART 2 – PRODUCTS

1.6 GROWING MEDIUM / TOPSOIL COMPONENTS

Contractor to provide certification that all growing medium components and the growing medium meet all environmental standards.

1) TOPSOIL COMPONENT

Topsoil used in the designed soil shall be high-quality, naturally-occurring fertile sandy loam, loam or sandy clay loam, harvested from O or A horizon of the soil profile, suitable for the germination of seeds and support of vegetation growth as described in The Canadian System of Soil Classification.

Soil Particle size distribution

Sand (0.05-2 mm)	40 – 65%
Clay (<0.002 mm)	7 – 23%
Silt	5-50%
Gravel (2-75mm)	< 5%
Chemical analysis	pH: 5.5 – 7.8

Nutrient levels (ppm)

Phosphorus	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Sodium Absorption ratio	<15
Soluble salt	< 0.50 mmhos/cm
Cation Exchange Capacity (CEC)	< 20 meq/100g
Percent organic matter	2.5 – 7%

- Topsoil shall retain a good portion of the naturally occurring heterogenous structure including soils peds, loose soil when stockpiled at the source. At least 25 per cent of the soil volume shall be soil peds larger than 25 mm in diameter. (Peds are defined as the clumps of soil naturally aggregated during the soil building process, by clays and soil biology). Peds of any size are permissible. Topsoil shall not be screened to avoid excessively homogenizing soil structure.
- Mixing of sand, organic matter and other components assembled to meet the required topsoil standard shall not be substituted for naturally occurring topsoil through, decomposition and weathering and other soil building process.

- Peds are to be assessed through visual examination process for both size and quantity, the City reserve the right to determine if the topsoil have adequate peds.
- Topsoil shall be screened through sieves or screens smaller than 50mm to avoid removing the required soil peds.
- Topsoil shall be entirely free of all contaminants, woods, sticks and stones larger than 25mm, and deleterious materials such as litter, construction materials, toxic material, stones greater than 50 millimetres in diameter, wood materials greater than 25 millimetres in diameter, soil pests, subsoil, lumps of clay or subsoil larger than 50mm or stones larger than 75mm and any other contaminants.
- Free of plant materials including crabgrass or couch grass, noxious or weeds or weed seeds, tubers, roots, rhizomes, sod/sod spoils are not acceptable in the topsoil.
- The City reserve the right to reject the topsoil if the specified quantities of any soil component is insufficient.
- Contractor shall be responsible for removing all weeds that germinate during the maintenance period of the contract.
- Topsoil shall be harvested from approved source locations that comply with all regulations governing the removal of topsoil.
- Topsoil may be obtained from a source of collected topsoil from development sites provided the sources of the topsoil stock pile is of similar textures and meets the requirements of this specification.
- Submit source location and a list of all crops grown on the subject soil including any records of herbicide, pesticide application within the previous 3 years.
- Submit duplicate 2L samples (total 4L) from each topsoil source with topsoil testing results. The sample shall be taken from different areas of the topsoil source field or stockpile. The submitted sample shall include the soil ped content in the sample. Test results shall be submitted to the contract administrator a minimum of 10 working days prior to the planned installation of the planting soil.

2) COURSE SAND COMPONENT

Course sand shall be clean, sharp, coarse grade silica sand with a Fines Modulus Index (FM) of 2.8 to 3.2, and/or a D90/D10 gradation index of less than 8 and free of toxic materials at levels harmful to plant growth. Physical analysis shall be as follows.

Physical Analysis

Sieve size (mm)	Percent Passing
9.5	100
4.75	90 – 100
2.36	80 – 100
1.18	50 – 85
0.60	25 – 85
0.30	5 – 30
0.15	0 – 10
0.075	≤ 3

Chemical Analysis shall be as follows

a) pH < 7.0

b) Soluble Salt < 0.5 mmhos/cm

c) Percent Organic Matter < 0.5%.

- The presence of limestone, shale and/or slate particles in the sand mixture, sharp objects, will result in the rejection of the sand.
- Course sand shall not contain toxic substance at level harmful to plant growth.
- Submit duplicate 2L (total 4L) samples with manufacturer's literature and material testing certification that the sand meets the Contract requirements shall be provided to the contract administrator a minimum of 10 Working Days prior to the planned installation of the planting soil.

3) COMPOST COMPONENT

Compost shall be stable, humus-like material produced from the aerobic decomposition of organic feedstocks, composted and cured until maturity. Compost shall be certified to comply with mandatory Ontario Compost Quality Standards for Category 'AA' or 'A' Compost for concentrations of the 11 regulated metals, pathogens, foreign matter, maturity and labelling (OMOECC 2012) and Canadian Food and Inspection Agency (CFIA) regulations T-4-93 (CFIA 1997a) and T-4-120 (CFIA 1997b). Compost shall also be certified to meet quality parameters recommended under the Compost Council of Canada's Compost Quality Alliance (CQA) certification program (A&L Canada Laboratories 2004) through testing by an accredited soil laboratory (OMAFRA 2016):

Parameter	Acceptable Range
Arsenic:	≤ 13 mg/kg dry weight
Cadmium:	≤ 20 mg/kg dry weight
Chromium:	≤ 210 mg/kg dry weight
Cobalt:	≤ 34 mg/kg dry weight
Copper:	≤ 400 mg/kg dry weight
Lead:	≤ 150 mg/kg dry weight
Mercury:	≤ 0.8 mg/kg dry weight
Molybdenum:	≤ 5 mg/kg dry weight
Nickel:	≤ 62 mg/kg dry weight
Selenium:	≤ 2 mg/kg dry weight
Zinc:	≤ 700 mg/kg dry weight
Pathogens;	meets OMOECC requirements (OMOECC 2012)
Compost Maturity;	meets OMOECC requirements (OMOECC 2012)
Foreign Matter:	<1.0% by dry weight foreign matter >3 mm, <0.5% plastic by dry weight; no foreign matter >25 mm per 500 mL; no sharp foreign matter that could cause harm to humans or animals.
pH:	5.5 to 8.5
Soluble Salts (Electrical Conductivity):	<5.0 mS/cm (A&L Canada Laboratories 2004)
Moisture Content:	<50% (A&L Canada Laboratories 2004)
Organic Matter:	>30% by dry weight
Carbon to Nitrogen Ratio:	12 to 22 (A&L Canada Laboratories 2004)
Particle Size:	<12.7 mm (1/2")
Sodium, Percent Saturation:	<2% (A&L Canada Laboratories 2004)

Except as specified herein, Compost shall be according to the requirements for Category A Compost as defined in the Guidelines for Compost Quality.

- Yard waste compost feedstock shall be yard waste trimmings or source-separated municipal solid waste or both.
- Pine bark compost feedstock shall be 98 per cent pine trees with less than 10 per cent combined pine wood fiber and sawdust content.

Compost shall be free of debris such as sharp objects, plastics, contaminants and foreign matter more than what is defined for Category A Compost. Total of all stones, recognizable branches, wood chips and roots larger than 25 mm in diameter shall be less than 5 per cent by volume.

Contractor shall submit to the Owner’s Representative a 4L sample, with laboratory testing results or quality assurance documentation certifying that the material or product meets the requirements.

Compost shall be aged enough to exhibit a dark brown color, approximately Munsell colour 7.5 R; Value 3 or lower; Chroma 2 or lower.

Compost shall have moisture content between 35 and 55 per cent when blended or applied.

Compost shall be composted long enough to exhibit a dark brown color, approximately Munsell colour 7.5 R; Value 3 or lower; Chroma 2 or lower. Color shall be determined by visual comparison of the sample to the Munsell Soil Color Chart, most current edition.

Compost shall have a strong aerobic (sweet) odor. Compost lacking a strong aerobic odor or which has an anaerobic (sour) or a strong pine or alcohol odor shall be rejected. Odor may be determined during the submittal sample review and at the time of any inspections of materials by the Contract Administrator by observation of the inspector.

Certification: provide the following documentation:

- A statement that the compost meets all health and safety regulations.
- Feedstock type and percentage in the final compost product.

Testing: Compost shall have one (1) composite sample tested from each 100 cubic metres of material intended for use in growing medium. The results of compost analysis shall be provided by the Compost supplier for approval. Compost shall meet the following criteria as reported by the following laboratory test.

Physical Analysis

Particle size yard waste compost	95% pass through 50mm screen
	25% pass through 10mm screen
Particle size pine bark compost	95% pass through 50mm screen
	25% pass through 10mm screen

Chemical Analysis

Parameter	Range
pH yard waste compost	5.0 – 7.8
pH yard waste compost	4.0 – 5.0
soluble salt (mmhos/cm)	<3.5 mmhos/cm

%organic matter	35% – 55%
Solvita maturity index	Solvita
%moisture content	35% – 55%
C:N ratio	15:1 – 25:1 (for Yard Waste only)
Physical contaminants (including man-made inerts)	<1 % dry weight basis

Metal content in compost shall comply with Interim Guidelines for the Production and use of Aerobic Compost in Ontario except for copper and zinc, which must comply with Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act Table 3 (medium to fine textured soils).

Reduction of Pathogen shall meet Section 6.0 of Interim Guidelines for the Production and Use of Aerobic Compost in Ontario.

Submit duplicate 2 L (total 4 L) samples with manufacturer's literature and material testing certification that the product meets the requirements

4) AGED PINE BARK COMPOST COMPONENT OR CEDAR BARK MULCH(For Urban Boulevard Mix)

Compost shall be stable, humus-like material produced from the aerobic decomposition of organic feedstocks, composted and cured until maturity. Compost shall be certified to comply with mandatory Ontario Compost Quality Standards for Category 'AA' or 'A' Compost for concentrations of the 11 regulated metals, pathogens, foreign matter, maturity and labelling (OMOECC 2012) and Canadian Food and Inspection Agency (CFIA) regulations T-4-93 (CFIA 1997a) and T-4-120 (CFIA 1997b). Compost shall also be certified to meet quality parameters recommended under the Compost Council of Canada's Compost Quality Alliance (CQA) certification program (A&L Canada Laboratories 2004) through testing by an accredited soil laboratory (OMAFRA 2016):

Aged pine bark substrate to be used to manufacture the designed soil shall confirm to the all the testing parameters as stipulated in the Compost Component Section (3) except for the items specified below:

- Aged Pine Bark/Cedar Bark Substrate matter shall consist of composted pine, spruce, fir or other conifer bark with a dark brown colour.
- pH shall range between 4.5 and 6.5.
- Wood fibre content shall not exceed 10%. The remainder shall consist of bark or other specified materials.
- Submit duplicate 2 L (total 4 L) of Aged Pine Bark/Cedar Bark Substrate with manufacturer's literature and material testing certification stating that the Aged Pine Bark Substrate meets the Contract requirements shall be provided to the contract administrator a minimum of 10 Working Days prior to the planned installation of the designed soil.

Chemical Additives

Chemical additives to modify soil fertility shall not be used in the construction of the designed soil. Hydrated lime shall not be used to stabilize designed soils or promote soil aggregation. Soils treated this way shall not be used for planting trees. If designed soils are treated with hydrated lime they shall be removed and replaced with suitable un-limed soils.

Due to the difficulty of permanently altering soil pH levels, chemical additives to alter pH shall only be used if approved, in advance, by the contract administrator.

EXISTING SITE TOPSOIL AS A GROWING MEDIUM

Existing site soil for seeding, sodding and tree planting may be used as growing medium at sites where the existing soil has been analyzed by an agricultural soil scientist and determined to be suitable for its intended purpose. The City may approve the use of existing soils and may require additional amendments for the soil where recommended by the soil report.

The following are requirements for existing site soil to be used as growing medium.

Soil particle size Distribution	Range
Sand (0.05-2mm)	40 – 65%
Clay (<0.002mm)	15 – 23%
Gravel (2 – 75mm)	<5%
Chemical analysis *	pH 5.5 – 7.5%
Nutrient levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	<5000
Magnesium	100 – 300
Soluble salt	< 2.0 mmhos/cm
%moisture content	35% – 55%
Cation Exchange Capacity (CEC)	>10 meq/100g
Percent organic matter	2.5-5%
Infiltration/ Permeability/ Hydraulic Conductivity	50 – 75 mm/hr at 8% Proctor density

Existing Topsoil shall not be screened through sieves or screens smaller than 50 mm (2”) to avoid eliminating peds.

Existing Topsoil shall not contain materials and contaminants at levels that would be harmful to specified plants, impair drainage, installation or maintenance of the resulting Planting Soil; or adversely impact its intended use including the following:

1. Refuse, stones, wood or debris larger than 50 mm (2”) in diameter;
2. Deleterious substances, plant or soil pests, invasive species, noxious weeds or their seeds.

The Contractor shall submit to the City or the City’s Representative duplicate 2L (Total 4 L) sample with laboratory testing results or quality assurance document certifying that the material or product meets the project specification requirements.

The Owner’s Representative shall determine at their discretion if the quantity of any of these materials is sufficient to cause rejection of the Base Topsoil.

PART 3 – TYPES OF SOIL MIX

TYPE 1 – STANDARD MIX

The Type 1 Standard Mix shall be applicable to all areas of sodding and trees planted in turf, a mixture of topsoil, coarse sand and compost components mixed in the appropriate proportions, such that the growing medium shall meet the following parameters:

Parameter	Range
Total sand (0.05-2mm)	50 – 60%
Silt	20 – 40%
Chemical analysis *	pH 6.0 – 7.5%
Nutrient levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	<5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm
%moisture content	35% – 55%
Percent organic matter	2-5%
Infiltration/ Permeability/ Hydraulic Conductivity	50 – 75 mm/hr at 8% Proctor density

* Specifiers should note that the pH maximum of 7.5 will be acceptable for most trees and other plants in the City of Vaughan. It is recommended that the pH maximum should be lower for the sensitive trees or plants.

The Owner's Representative shall determine at their discretion if the quantity of any of these materials is sufficient to cause rejection of the Planting Soil.

The sequence of mixing shall be as follows

- The growing medium shall be mixed using loader bucket to preserve maximum soil peds in the growing medium.
- Mix the coarse sand and compost together separately.
- Spread a layer of topsoil in 300mm layer and place the required amount of coarse sand and compost mx on top of this layer.
- Push the topsoil, coarse sand and compost into a pile and mix the pile with a bucket and repeat as necessary before delivery to the project site. Do not over mix.
- A soil slinger truck or soil blower shall not to be used, with the exception of inaccessible locations approved by the City or the contract administrator. If the soil slinger is used, it shall be run on a slow speed to preserve soil peds.

Consolidate placed Planting Soil to 75 to 85% maximum dry density by tamping or rolling or until it is firm to footprints, to achieve a final installed depth that is within +/- 5 cm of the specified depth.

Submit duplicate 2L (total 4L) samples with material testing certification that the product meets the requirements.

Planting Soil should be wetted after installation prior to compaction testing and proceeding with remaining planting tasks.

Complete compaction testing of installed Planting Soil within two days of a heavy rain or when the full depth of material has been thoroughly wetted (i.e. at or near field capacity), to determine if parameters are within acceptable ranges.

If measured values for compaction for the landscaped area type are acceptable, contact the City or City's Representative for approval to proceed with the remainder of the planting tasks.

TYPE 2 – PLANTING BED MIX

The Type 2 Planting Mix shall be applicable to all areas horticultural planting beds of shrubs and perennials, a mixture of topsoil, course sand and compost to the following proportion:

Plant Bed Mix ratio	
Topsoil	50%
Course Sand	20%
Pine Bark Compost	30%

The growing medium shall meet the following parameters:

Chemical analysis *	pH 6.0 – 7.8% *
Nutrient levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	<5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm
%moisture content	35% – 55%
Percent organic matter	>5%
Infiltration/ Permeability/ Hydraulic Conductivity	50 – 75 mm/hr at 8% Proctor density

* Specifiers should note that the pH maximum of 7.8 will be acceptable for most trees and other plants in the City of Vaughan. It is recommended that the pH maximum should be lower for the sensitive trees or plants.

The Owner's Representative shall determine at their discretion if the quantity of any of these materials is sufficient to cause rejection of the Planting Soil.

The sequence of mixing shall be as follows

- The growing medium shall be mixed using loader bucket to preserve maximum soil peds in the growing medium.
- Mix the course sand and compost together separately.

- Spread a layer of topsoil in 300mm layer and place the required amount of course sand and compost mx on top of this layer.
- Push the topsoil, course sand and compost into a pile and mix the pile with a bucket and repeat as necessary before delivery to the project site. Do not over mix.
- A soil slinger truck or soil blower shall not to be used, with the exception of inaccessible locations approved by the City or the contract administrator. If the soil slinger is used, it shall be run on a slow speed to preserve soil peds.

Submit duplicate 2L (total 4L) samples with material testing certification that the product meets the requirements.

TYPE 3 – URBAN BOULEVARD MIX

The Type 3 Urban Boulevard mix shall be used for trees planted in hardscape boulevards, soil cells and other application where space is constrained for plant growth, a mixture of topsoil, course sand and pine bark compost to the following proportions, by volume:

Plant Bed Mix ratio	
Topsoil	40 – 45%
Course Sand	40 – 50%
Aged Pine Bark/Cedar Bark Compost	12 – 15%

The growing medium shall meet the following parameters:

Soil particle size Distribution	Range
Medium to course sand (0.25-2mm) Plus gravel (2 -5mm)	>45%
Total combined silt and clay	7-20%
Chemical analysis *	pH 6.0 – 7.8% *
Nutrient levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	<5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm at 25°C
%moisture content	35% – 55%
Percent organic matter	3-7% (by weight)
Infiltration/ Permeability/ Hydraulic Conductivity	50 – 75 mm/hr at 8% Proctor density

* Specifiers should note that the pH maximum of 7.8 will be acceptable for most trees and other plants in the City of Vaughan. It is recommended that the pH maximum should be lower for the sensitive trees or plants.

Local topsoil with clay content between 21% and 25% may be substituted if the following conditions are met:

1. The soil must be amended with sand specified within this Contract; and
2. Once amended with sand the topsoil shall consist of 3% to 7% organic matter (by weight) and less than 8% combined stone and gravel content.
3. Total sand content of the topsoil shall not exceed 60%

The Owner's Representative shall determine at their discretion if the quantity of any of these materials is sufficient to cause rejection of the Planting Soil.

The sequence of mixing shall be as follows

- The growing medium shall be mixed using loader bucket to preserve maximum soil peds in the growing medium.
- Mix the course sand and compost together separately.
- Spread a layer of topsoil in 300mm layer and place the required amount of course sand and compost mx on top of this layer.
- Push the topsoil, course sand and compost into a pile and mix the pile with a bucket and repeat as necessary before delivery to the project site. Do not over mix.
- A soil slinger truck or soil blower shall not to be used, with the exception of inaccessible locations approved by the City or the contract administrator. If the soil slinger is used, it shall be run on a slow speed to preserve soil peds.

Consolidate placed Planting Soil to 75 to 85% maximum dry density by tamping or rolling or until it is firm to footprints, to achieve a final installed depth that is within +/- 5 cm of the specified depth.

Planting Soil should be wetted after installation prior to compaction testing and proceeding with remaining planting tasks.

Complete compaction testing of installed Planting Soil within two days of a heavy rain or when the full depth of material has been thoroughly wetted (i.e. at or near field capacity), to determine if parameters are within acceptable ranges.

If measured values for compaction for the landscaped area type are acceptable, contact the City or City's Representative for approval to proceed with the remainder of the planting tasks.

Submit duplicate 2L (total 4L) samples with material testing certification that the product meets the requirements.

PART 4 – EXECUTION

1.7 EQUIPMENT AND EXECUTION

EQUIPMENT – Not Used

EXECUTION:

PREPARATION OF EXISTING GRADE

1. The Contractor shall not spread topsoil/growing medium when the ground is saturated, standing water, snow, ice, frozen or muddy condition.
2. The Contractor shall examine the prepared sub-grade and shall eliminate all local depressions,

ruts, ridges, lumps, rock exposures, debris, so that a positively drained visually smooth surface is created. Obtain the approval of the sub-grade from the Landscape Architect prior to commencement of spreading of topsoil/growing medium.

3. Verification of fine grading to be completed by a certified OLS (Ontario Land Surveyor).
4. Contractor to provide City with fine grade "as built" as per the following criteria: 5m grid for larger confirm critical slopes on berms, swales, low flow swales and max 4:1 side slopes. All indicated spot elevations on grading and servicing plans; grading break points, high and low points, rim and invert elevations for catch basins, invert elevations for culverts and any additional points as requested by the City or the Contract Administrator and in locations determined by the City. Verify that constructed **rough grades are in accordance with drawings**. If discrepancies are identified, notify the City or its representative and do not commence work until directed by the City or its representative **Correct discrepancies to the approval of the City or the Contract Administrator**.
5. Fine grades which are in contradiction to the contract drawings are to be corrected at the expense of the contractor. Fine grade tolerance shall be 15-30mm and in general conformance with design grades and drainage plans.
6. The contractor should notify the City or the Contract Administrator working on behalf of the City of any subsoil contaminated with oil, gasoline or other contaminants etc.
7. Obtain review and approval from the City or its representative of the fine grading prior to commencing on seeding and sodding and planting. Ensure once topsoil, see and sod is placed the drainage is not restricted from adjacent walkways and other hard surfaces.
8. Scarify the subgrade to a depth of 50mm.
 - Do not scarify subsoil within Tree Protection Zone or Dripline
 - Do not scarify within 0.5m of curbs, walks, driveways and other structures.
 - Do not scarify subsoil within 1m of shallow underground utilities.

1.8 SITE PREPARATION

INSTALLATION, SPREADING, FINEGRADING AND COMPACTION OF GROWING MEDIUM

1. The Contractor shall not spread topsoil when the ground is saturated, standing water, snow, ice, frozen or muddy condition.
2. This specification assumes that initial settlement during the first 12 months after installation will be between 10 and 15 per cent of the installed depth. Please ensure that the grading is mounded sufficiently above the proposed grades to accommodate this settlement. The depths and grades shown on the drawings are the final grades after settlement and shrinkage of the organic material
3. Fine-grade topsoil eliminating rough and low areas to ensure positive drainage and meet the lines and levels indicated. Do all fine-grading with approved equipment being careful not to excessively compact topsoil. Roll topsoil with a light roller. The City shall review and approve all fine grading prior to installation of planting and mulching.
4. Use grading and earth moving equipment that uses low impact tracks that is rated to exert a static force on the ground of no more than 20 kg/m². All equipment used to install soil shall have buckets equipped with teeth to loosen soil compaction.

5. Place topsoil in uniform layers not exceeding 150mm after City or its representative provided authorization to proceed.
6. For sodded areas, keep topsoil 15mm below finished grades of adjacent walkways and other paved areas to ensure no obstruction to drainage. Provide positive drainage from all areas towards the existing catch basin, drainage structures, swales or as noted on grading plan. If necessary, adjust grades as directed to reflect as built field conditions of paving or other hardscape elements.
7. Ensure that there are no depressions or bumps in the overall plane of the slope. The tolerance for such anomalies shall be 25mm deviation from the plane in 2m.
8. All grading around the planting beds shall be restored after installation of planting.
9. At the end of the planting warrantee period, if grades have settled greater than 5 per cent of the depth below the grades shown on the grading plan, the Contractor is responsible to reset the grades to the final grades to the satisfaction of the City.
10. Adjust the finish grades to meet field conditions as directed at no extra cost to the City.
11. Compact subgrade to 85% Standard Proctor Density or refer to the Specification on Rough Grading and Fine Grading. Use smaller equipment to achieve uniform and consistent compaction. maintain adequate moisture content within the topsoil to allow for satisfactory compaction.
12. Compact growing medium under the root balls of all trees to between 275 and 350 psi when the soil is between 12 and 20 per cent moisture to reduce settlement.
13. Provide test results of the bulk density of the growing medium at the end of the installation for approval by the City.
14. Confirm infiltration rate of the installed topsoil to be between 50-75 mm/hr.
15. Do not place topsoil on wet or frozen subgrade.
16. Do not proceed with the installation of growing medium, until all utility work sub surface drainage, irrigation lines in the area has been completed. Spread topsoil to the following minimum depths after settlement.
 - a) [150] mm for seeded areas
 - b) [150] mm for sodded areas
 - c) [300] mm for storm water management pond
 - d) [500] mm for flower beds
 - e) [500] mm for shrub/evergreen beds
 - f) Depth as specified for above slab condition
 - g) Depth as specified for the Trees
17. Manually spread topsoil/planting soil around trees, shrubs and obstacles.
18. Protect adjacent walkways, hardscapes, structures, utilities from damage and staining by the soil. Use 12mm plywood or plastic covering or both to cover existing concrete or other hard surface, metal and masonry work and other items as directed during the progress of the work.
 - Contractor responsible for the clean-up any soil or soil components spilled on hard surface, including at the end of each working day.
 - Any damage to existing paving or other structures shall be repaired by the Contractor at no expense to the City.

Verification of fine grading to be completed by a certified OLS (Ontario Land Surveyor).

1.9 PROTECTION

1. The Contractor is responsible to protect work and material from damage such as compaction, contamination and erosion due to weather or operation by other contractors. Maintain protection during the installation and construction until acceptance. All deficiencies shall be rectified by the contractor at no extra cost to the City.
2. If soil is contaminated at the time of inspection, the contractor shall replace the topsoil/growing medium at no extra cost to the City.

1.10 CLEAN UP

1. During and at the end of the installation of growing medium/topsoil, keep all hard surface clean to the satisfaction of the City.
2. Clean up all turf area and planting beds after completion of planting work. Sod spoils and mulch shall be removed from turf area and disposed off-site.
3. Do not bury any debris in back fill. All debris and trash shall be disposed off-site.
4. Excess soil from the site shall be removed and disposed off-site

1.11 ACCEPTANCE

1. The Owner's Representative will inspect and determine the acceptance of installed Planting Soil depth, compaction and grading, prior to planting.
2. Where the median measured depth is less than the minimum specified depth, additional Planting Soil that meets project specifications shall be placed and consolidated through tamping or rolling with a lawn roller, and depth testing shall be repeated until it is within an acceptable range.

1.12 MAINTENANCE

1. Over the warranty period for the plantings mow lawns when grass height is above 65 mm to maintain a length between 60 mm to 100mm height.
2. Remove clippings longer than 20 mm in length. Use a mulching mower or allow clippings to decompose in-situ to help maintain Planting Soil organic matter and nutrient content.
3. Top-dress lawn areas with 1 cm of Planting Soil mixed with grass seed during the first growing season to maintain Planting Soil depth or fill in minor surface irregularities and bare areas. Perform topdressing during spring or fall seasons (cool, moist, active growing periods) by spreading Planting Soil using a fertilizer or manure spreader or by hand and core aerating with a hollow-tined aerator equipped with a heavy drag mat or rake to incorporate.
4. For the frequency of watering requirement please refer to planting and sodding specifications.

1.13 BASIS OF PAYMENT

Payment for the contract item Topsoil supply, installation, spreading and fine grading shall be full compensation for all labour, equipment and materials required to do the work, except as otherwise provided in the contract.

1.14 MEASUREMENT OF PAYMENT

Payment for the topsoil installation, spreading and fine grading of Topsoil /Growing medium shall be as per the units and quantity noted in the tender bid form.

1.15 CHECK LIST

Certificates	Item
	Certification that all growing medium components and the growing medium meet all environmental standards
Product Data	
	Product data: Coarse sand
	Product data: Compost
	Product data: Pine bark compost
Material Source Locations	
	Location of all topsoil and growing medium components sources
Samples	
	Duplicate 2L samples: Topsoil / submitted with required testing results
	Duplicate 2L samples: Coarse sand / submitted with required testing results
	Duplicate 2L samples: Pine bark compost / submitted with required testing results
	Duplicate 2L samples: Compost / submitted with required testing results
	Duplicate 2L samples: Growing medium TYPES 1, 2 &3 submitted with required testing results
Testing Reports	
	Particle size analysis: Topsoil including sand fractions
	Particle size analysis: Growing medium including sand fractions
	Chemical analysis: Topsoil
	Chemical analysis: Growing medium with lab recommendations for fertilizer applications and amendments.
	In-Situ Compaction Testing: Installed growing medium
	Infiltration Rate Testing: Installed growing medium

END OF SECTION