Construction Specification for Growing Medium

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TS 5.10.01 SCOPE

This specification describes the requirements for the following:

1) Requirements for reuse of existing site soil as growing medium.

2) Mixing and testing of topsoil, coarse sand and compost components to create several different types of growing medium, applicable for the following applications:

   - Type 1 – Standard Mix, for seeding, sodding and trees planted in turf
   - Type 2 – Planting Bed Mix, for planting of shrubs and perennials
   - Type 3 – Boulevard Mix, for trees planted in hardscaped boulevards
   - Type 4 – Bioretention mix, for bioretention and rain gardens requiring high infiltration or pre-treatment.

3) Installation of growing medium.

4) Compacting and grading of growing medium.

5) Adding organic material to the surface layer of growing medium.

TS 5.10.02 REFERENCES

This specification refers to the following standards, specifications or publications:

City of Toronto Standard Specifications

TS 853	Construction Specification for Soil Cells

American Society of Testing and Materials

C33/C33M	Standard Specification for Concrete Aggregates
D422-63(2007)e1	Standard Test Method for Particle-Size Analysis of Soils
D2434	Standard Test Method for Permeability of Granular Soils (Constant Head)
D6913/D6913M	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
D7503	Standard Test Method for Measuring the Exchange Complex and Cation Exchange Capacity of Inorganic Fine-Grained Soils
F1632	Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes
F1647	Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes
F1815	Standard Test Methods for Saturated Hydraulic Conductivity, Water Retention, Porosity, and Bulk Density of Athletic Field Rootzones

American Society of Agricultural Engineers

EP542	Procedures for Using and Reporting Data with the Soil Cone Penetrometer.

Canadian Council of Ministers of the Environment

Guidelines for Compost Quality (PN 1340) 2005

Compost Quality Alliance

TMECC Test Method for the Examination of Composting and Compost

Ontario Ministry of the Environment

Guideline for the Production of Compost in Ontario, Companion to the Ontario Quality Standards (July 2012)

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011)

TS 5.10.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

CSSS means Canadian System of Soil Classification

USDA means US Department of Agriculture

Agricultural Soil means manipulated and managed soils for the purposes of maximizing plant growth.

Continuous Soil Trench (CST) means a structure designed and built to contain an adequate volume of continuous growing media to support tree growth to maturity under a paved boulevard.

Scarification means the breaking down of a hydrophobic layer to increase infiltration rate (not advisable however sometimes necessary in compacted uncovered soils.

Soil Fracture means breaking of soil via mechanical or erosive processes.

Soil Ped means soil peds are soil aggregates built over time via natural processes – air, water, microorganisms – that give the soil its structure.

Stormwater Tree Trench (STT) means a continuous soil trench that is designed to capture, infiltrate and filter stormwater runoff from a drainage area beyond the footprint of the trench.

Till means generally, this is the mechanical process by which soil is broken up. Various means can be used to till ranging from hand equipment such as a spade/rake to intensive mechanized equipment. The term is used here to refer to the process of loosening the surface of the native soil so that it mixes with the growing medium.

Topsoil means topsoil is a nutrient-rich layer of soil that is naturally occurring and characterized by a high concentration of organic matter and microorganisms. Topsoil, sand and compost are the components of growing medium.

Tree Protection Zone (TPZ) means an area around a protected tree, the size of which relates to the diameter of the tree trunk. Protection is governed by the City's tree-related bylaws. For more information, refer to www.toronto.ca/services-payments/building-construction/tree-ravine-protection-permits/tree-protection/

Turf means turf, also known as sod, is grassy mat held together by its roots and a thin layer of soil.

TS 5.10.04 DESIGN AND SUBMISSION REQUIREMENTS

TS 5.10.04.01 Submittals

TS 5.10.04.01.01 Checklist

For checklist form, see *Contractors Submittal Checklist* form, at the end of this specification section. This list is a summary of the requirements and is not intended to supplant or modify the detailed descriptions of the requirements below. Note that many of the submittals must be provided a minimum of eight weeks before the installation of growing medium.

TS 5.10.04.01.02 Certificates

Submit certification to the Contract Administrator for approval that all growing medium components and the growing medium meet all environmental standards of the Province of Ontario and the City of Toronto. Certificate shall state that all materials are within the required maximum levels of all biological, metal and chemical contaminants.

TS 5.10.04.01.03 Product Data

Submit manufacturer product data and literature to the Contract Administrator for approval for coarse sand, aggregate, pine bark compost and yard waste compost. Provide submittal as part of the submittal of components for the growing medium prior to the submission of the growing medium.

Submit the manufacturer’s particle size analysis, pH and the manufacturer’s Fines Modulus Index for coarse sand. Provide manufacturer's identification and location for each coarse 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 herein.

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 45 days prior to installation.

The compost analysis shall include:

Table 1: Compost analysis

Parameter	Testing Method
pH	TMECC 4.11A
soluble salt (mmhos/cm)	TMECC 4.10-A
% moisture	
% dry weight organic matter	TMECC 5.07-A
carbon: nitrogen	(C:N) ratio
particle size % passing 50 mm and 10 mm	TMECC 2.02-B
Solvita maturity index	Solvita
physical contaminants (% dry weight)	TMECC 3.08-A

Submit testing for chemical and biological contaminants and pathogens as required by local government regulations.

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

TS 5.10.04.01.04 Material Source Locations

Submit locations of topsoil and growing medium material sources to the Contract Administrator. 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 (if applicable).

TS 5.10.04.01.05 Samples

Submit samples of each product and material where required by the specification to the Contract Administrator for approval. Label samples to indicate product, specification number, characteristics, and locations in the Work. Samples shall be reviewed for appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Delivered materials shall closely match the samples.

For in-situ soils, a minimum of three samples shall be analyzed if less than 600 m^3 of soil is installed. If more than 600 m^3 is installed a minimum of one test will be taken for each 200 m^3 above 600 m^3.

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

Samples should be labeled to include the location of the source of the material.

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 45 days prior to installation. Contract administrators may request three (3) test results for final mix designs if deemed necessary.

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 test(s); Suggested acceptable ranges of the test data for the types of plants to be planted; preference given to laboratories that can provide this range information.
9) Recommendations for amendments to bring the growing medium to within these acceptable ranges; Note: This direction does not guarantee subsequent testing will yield results within ranges. This does not necessarily require retest prior to approval.
10) Soil testing parameters should reflect parameters identified within specifications.

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.

TS 5.10.04.01.06 Testing Reports

Submit soil test analysis report to the Contract Administrator for approval for each sample of topsoil and growing medium from an approved soil-testing laboratory, as below:

The testing laboratory shall be approved by the City in advance. All soil and growing medium tests shall be conducted by soil laboratories accredited by The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), except as noted below. Current listing of accredited laboratories can be found at www.omafra.gov.on.ca/english/crops/resource/soillabs.htm. Submit the name of the soil lab for approval prior to starting the testing process. Preference given to laboratories that can provide acceptable test data ranges for the types of plants being planted.

All tests shall be performed in accordance with the current testing standards and protocols of the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

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

Note: Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Particle size analysis and growing medium to include sand sieve analysis, and shall be according to ASTM D6913/D6913M, (PSD of soil by sieve analysis), ASTM D422 (hydrometer test) or ASTM F1632 (pipette test) or equivalent.

Chemical analysis including the following:

1) pH
2) Plant available nutrient levels by parts per million including:
    - Phosphorus
    - Potassium
    - Magnesium
    - Calcium

For chemical analysis of Phosphorus, use the Olsen method for alkaline and calcareous soils. Use the Bray or Mehlich I or III method for acidic to slightly alkaline and non-calcareous soils.

Nutrient test shall include the testing laboratory recommendations for supplemental additions to the growing medium:

1) Soluble salt by electrical conductivity of a 1:2 soil water sample measured in mmhos/cm;
2) Cation Exchange Capacity (CEC) measured in meq/100g (ASTM D7503, Cation Exchange Capacity);
3) Percent Organic Matter by dry weight as determined by ignition (Ash Burn Test or Walkley/Black Test, ASTM F1647); and
4) Carbon to Nitrogen (C:N) ratio.

For Type 3 – Boulevard Mix, Type 4 – Bioretention Mix, and for soils used in green infrastructure applications Infiltration/Permeability/Hydraulic Conductivity testing shall be done using ASTM D2434 or ASTM F1815. Testing methodology utilized shall reflect desired, in-situ compaction levels.

Report suitability of topsoil or growing medium for growth of applicable planting material. Soil analysis tests shall include recommendations for normal ranges of soil chemical attributes for the type of plants included in the project in the same units as the test data.

The City may request additional growing medium test on different mix component ratios in order to attain results that more closely meet the mix requirements.

Laboratory comments or recommendations regarding amendment requirements or procedures shall not be interpreted to prescribe or dictate procedures or quantities of soil materials for the work of this Contract. Final approval of soil amendment procedures shall be approved by the Contract Administrator.

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.

TS 5.10.04.01.07 In-Situ Compaction Testing

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

1) Installed growing medium shall be tested in-situ with a cone penetrometer and a soil moisture meter.

    a) Testing shall be arranged for and paid for by the Contractor.
    b) Acceptable procedures for performing and interpreting the results of cone penetration tests on soils using a mechanical or electronic static cone penetrometer are provided in the American Society of Agricultural Engineers' Standard EP542.
    c) Cone penetration tests shall be performed after wetting and allowing a min. of one week settling. Penetration resistance shall be to the full depth of the installed soil profile or 750 mm, whichever is less, when the soil profile is thoroughly wetted and confirmed by in-situ measurements using a soil moisture meter and the following acceptable ranges:

Soil texture	Soil moisture
sand, loamy sand, sandy loam	12–18%
loam, sandy clay, sandy clay loam	27–36%
clay loam, silt loam	31–36%
silty clay, silty clay loam	38–41%

d) One test shall be performed every 25 m² of growing medium surface area. The City may request additional testing locations.

2) 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.

3) Submit the compaction log to the City at the end of installation period. The compaction log shall be kept current and available at the site for review at all times.

TS 5.10.04.02 Sequencing and Scheduling

Prepare a detailed schedule of the installation of growing medium for coordination with other trades, and submit to the City for approval prior to the start of the project.

Sequence delivery and installation of growing medium so that it can be adequately protected from other work at the site.

Schedule all sub-surface utility installation so that it is completed prior to delivery and installation of growing medium.

TS 5.10.04.03 Delivery, Storage and Handling

Do not mix, deliver or place growing medium in frozen, wet, or muddy weather conditions.

Where construction sequencing requires work during cold weather, protect sub grades and bulk materials from freezing using covers or heated tenting as needed. Sub grades that are sufficiently well drained to preclude the buildup of ice may be installed and built upon during freezing weather provided the surface is cleared of snow and any ice bound material.

Harvest topsoil and prepare growing medium ahead of the scheduled work during periods of warm weather.

Stockpiles should not exceed a height of 1.4 m.

Protect stockpiles of topsoil and growing medium from freezing and saturation. Remove topsoil from within the interior of the stockpile where topsoil and growing medium are not frozen. At the end of each day cover the exposed working face of the stockpile sufficient to keep from freezing.

Protect stockpiles from rain and washing that can separate fines and coarse material, and from wind erosion Cover stockpiles with plastic sheeting at the end of each workday and ensure covering is secured in case of windy conditions. When possible, uncover stockpiles daily during warm dry conditions, to ensure breathability.

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 the growing medium. Soil blowing equipment shall not be permitted to move growing medium.

TS 5.10.04.04 Site Conditions

It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to report any circumstances that will negatively impact drainage. Do not proceed with the work until unsatisfactory conditions have been corrected.

TS 5.10.04.04.01 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.

For any continuous soil trench or stormwater tree trench, rely only on utility information that has been obtained and described to Quality Level A as defined by the American Society of Civil Engineers standard ASCE 38-02, including certification by a civil engineer, licensed in the province of Ontario.

TS 5.10.04.04.02 Waterproofing

Perform work in a manner, which will avoid damage to waterproofing membrane, protection board or other structural sealing materials.

TS 5.10.04.04.03 Coordination

Coordinate work with that of other trades affecting or affected by work of this section and cooperate to assure the steady progress of work.

TS 5.10.04.04.04 Safety

The Contactor shall be responsible for pedestrian and vehicular safety and control all movement within and around the work site. Provide the necessary barriers, warning devices and ground personnel needed to give safety, warning and protection to persons and vehicular traffic within the area of work including the Contractor's equipment and temporary storage within the public right-of- way. Provide any additional items required by the City.

TS 5.10.04.04.05 Damage

During site preparation, growing medium installation and protection, the Contractor shall be responsible for all damage to existing features above and below ground incurred as a result of work operations. Repairs or replacements or both shall be made to the satisfaction of the Contract Administrator.

Protect all installed material from compaction, contamination and erosion. Install fences; utilize mulch, mats and geo-fabrics over the surface of the soil as required. In the event that any soil becomes compacted, contaminated or eroded, repair the damage by removing and reinstalling the compacted material according to TS 5.10.07.11, herein.

TS 5.10.05 MATERIALS

TS 5.10.05.01 Topsoil Component

Topsoil shall be naturally occurring soil, harvested from the O or A horizon of the soil profile, suitable for the germination of seeds and the support of vegetative growth, and meet the following requirements:

Soil particle size distribution	
Sand (0.05 – 2 mm)	20 – 70%
Silt (0.002 – 0.05)	*Total SSC will sum 100%*
Clay (<0.002 mm)	15 – 30%
Chemical analysis	pH: 5.5 – 7.8(1)
Plant Available Nutrient Levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Soluble salt	< 0.50 mmhos/cm
Sodium Adsorption Ratio	<15
Cation Exchange Capacity (CEC)	> 20 meq/100g
Percent organic matter	2.5 – 5%

Notes: Specifiers should note that the pH maximum of 7.8 will be acceptable for most trees and other plants in the Toronto area. However, if the design team specifies pH sensitive trees or plants, the pH maximum should be lowered to an appropriate level for those plants. Note that lower pH growing medium will cost more due to the lack of availability of lower pH components. Coordinate the specification with the design team regarding plant species requirements.

Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Topsoil shall retain a significant portion of the soil's ped structure when stockpiled at the supplier's yard. 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.

The Contract Administrator shall evaluate the presence of peds by visual examination of the sample submitted. The addition of coarse sands and organic amendments may reduce the presence of peds.

Topsoil shall not be screened through sieves or screens smaller than 50 mm to avoid eliminating soil peds.

Topsoil shall not contain materials and contaminants at levels that would be detrimental to plant growth; or impair drainage, installation or maintenance of the resulting growing medium; or adversely impact its intended use including containing the following

- Refuse; roots; construction debris; wood or sticks larger than 25 mm in diameter; brush; clumps of root mats of plants and toxic materials
- Lumps of clay or subsoil larger than 50 mm
- Stones larger than 75 mm
- Deleterious substances; plant or soil pests; undesirable grasses including crabgrass or couch grass, noxious or weeds or weed seeds.

The City shall determine if the quantities of any of these materials is sufficient to cause rejection of the topsoil. The aggregate of all the above materials shall not exceed 5 per cent of the total soil volume as assessed by visual inspection.

Topsoil shall be in according to Toronto Municipal Code Chapter 489, Grass and Weeds. The contractor shall be responsible for removing all weeds that germinate during the plant maintenance period.

Topsoil shall be harvested from approved source locations that comply with all regulations governing the removal of topsoil.

Topsoil may be purchased from a source of collected topsoil from development sites provided the sources of the topsoil stockpile is of similar textures and meets the requirements of this specification.

Topsoil shall not be a soil mix including any combination of sand, fertilizer, or organic matter or compost added to mineral soil in order to meet the texture, chemical or organic requirements for topsoil. The organic matter content of the soil shall be residue of long term, natural soil building processes and not from added organic matter or compost.

Submit source location and a list of all crops grown on the soil and any herbicides and pesticides applied over the previous three years, if applicable.

Submit duplicate 4 L samples (total 8 L) from each topsoil source with soil testing results. The sample shall be a mixture of the random samples taken around the source field or stockpile. The delivered sample shall represent the soil ped content in the stockpile.

TS 5.10.05.02 Coarse Sand Component

Coarse sand shall be clean, sharp, mineral sand, and meet the following requirements:

Coarse concrete sand, ASTM C33 with a Fines Modulus Index between 2.5 and 3.5

Table 3: Physical analysis

Sieve size (mm)	Per cent passing
9.5	100
4.75	95 – 100
2.36	80 – 100
1.18	50 – 85
0.60	25 – 65
0.30	5 – 30
0.15	0 – 10
0.075	≤ 3

Note: Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Chemical analysis shall be as follows:
1) pH <8.6
2) Soluble Salt < 0.5 mmhos/cm
3) Percent Organic Matter < 0.5%
4) Local sources preferred

Coarse sand shall not contain toxic substance at levels harmful to plant growth.

Submit duplicate 1 L (total 2 L) samples with manufacturer's literature and material testing certification that the product meets the above requirements.

TS 5.10.05.03 Organic Component

Compost shall be a stable, humus-like material produced from aerobic decomposition, composted and cured until the maturity status complies with indices specified below. 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.
- Untreated shredded wood / wood chips.

Compost shall not contain weeds or debris such as sharp objects, plastics, trace elements and foreign matter in excess of that 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.

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 to the Contract Administrator:

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

Testing: Compost shall be tested every 4000 m^3 of material intended for use in growing medium. The results of compost analysis shall be provided by the compost supplier for approval. Compost should meet the following criteria as reported by the following laboratory tests:

Physical analysis

Particle size yard waste compost	95% pass through 50 mm screen
	25% pass through 10 mm screen
Particle size pine bark compost	95% pass through 20 mm screen
	25% pass through 6 mm screen

Chemical analysis

Parameter	**Range**
pH yard waste compost	5.0 – 8.0
pH pine bark compost	4.0 – 6.5
soluble salt	< 3.5 mhos/cm
% moisture	35 – 55%
% organic matter	25 – 55%
Solvita maturity index	Solvita
C:N ratio	15:1 – 25:1 (for Yard Waste only)

Note: Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Physical contaminants (including man-made inerts) < 1 per cent dry weight basis

Metal content shall comply with 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).

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

Submit duplicate 1 L samples (total 2 L) with manufacturer's literature and material testing certification that the product meets the requirements.

TS 5.10.05.04 Existing Site Soil as 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.

Soils that would not be suitable include: subsoils, soils with high clay or silt content, with very high or low pH, contaminated with chemicals and/or salt, or which have been mixed with gravels or unshrinkable fills.

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

Soil particle size distribution	
Sand (0.05 – 2 mm)	20 – 70%
Silt (0.002 – 0.05)	*Total SSC will sum 100%*
Clay (<0.002 mm)	15 – 30%
Gravel (2 – 75 mm)	< 5%
Chemical analysis	pH: 5.5 – 7.8
Plant Available Nutrient Levels (ppm)	*If not balanced follow lab recommendations for fertilizer application subsequent to installation*
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Soluble salt	< 2 mmhos/cm
Percent organic matter	2.5 – 5%
Infiltration/Permeability/Hydraulic Conductivity	50 –75 mm/hr at 85% Proctor density

Submit duplicate 4 L samples (total 8 L) with material testing certification that the product meets the requirements.

Submit the agricultural soil scientist report for approval. The report shall describe the extent and depth of the soil to be reused, and the soil quality relative to the required parameters. It is understood that obtaining accurate soil information in urban areas is difficult if there is paving over the soil. A preliminary soil report shall be submitted a minimum of eight weeks prior to the installation of the soil. Once the soil has been made accessible by the construction, the soil shall be reevaluated and a final report submitted. Urban Forestry may alter the approval or make additional requirements based on the final soils report.

The depth of the existing topsoil should be checked throughout the site and documented prior to harvesting from the site to help guide soil replacement depths.

1) Topsoil salvage limits shall be to a depth of one metre or as specified in the Contract Documents.
2) Document the plant communities with which the topsoil is associated.
3) Proceed from higher to lower topographic areas when stripping topsoil.
4) Remove topsoil as late as possible in the construction sequence.
5) Any objects or debris, such as segments of concrete, asphalt, brick or unshrinkable fill, or soil mixed with gravel, dust or other debris, shall be removed, and the soil volume replaced with new topsoil mixed into the existing soil, to the satisfaction of the Contract Administrator.

Existing site soil to be reused shall be excavated to break up compaction and reinstalled at the compaction required for growing medium.

Do not screen topsoil prior to stockpiling. The excavated topsoil should be placed into stockpiles at locations designated on the construction drawings. Stockpiles should be treated with temporary soil stabilization and erosion control measures. Do not cover stockpiles with plastic or other non-breathable materials.

Stockpiles should not exceed 1.4 m in height.

Excavation, moving, stockpiling and installation of existing site soil shall utilize means and methods that preserve soil peds. Large soil peds up to 200 mm in any dimension are acceptable.

Yard waste compost shall be loosely incorporated into the soil at the time of installation at a rate of 20 per cent by volume.

Cover the stockpile with yard waste compost of sufficient volume to roughly equal 20 per cent of the stockpile volume. Using the bucket of a backhoe, drag the pile to approximately one-third its height. Working from the bottom, turn the pile over once. Place in the installation location following the requirements for growing medium.

Fertilizer may be added to the soil if required to meet the chemical requirements of growing medium.

Soil shall not be contaminated with toxic chemicals harmful to humans or plants at levels exceeding provincial or federal limits.

TS 5.10.05.05 Type 1 – Standard Mix

For sodding, 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:

Soil particle size distribution	
Total sand (0.05 – 2 mm)	50 – 75%
Silt	20 – 40% *(Total SSC will sum 100%)*
Clay	5 – 20%
Gravel (2 – 75 mm)	>/+/< 5%
Chemical analysis (1)	pH: 6.0 – 7.8 (1)
Plant Available Nutrient Levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm
Percent organic matter (dry weight)	4 – 6%
Infiltration/Permeability/Hydraulic Conductivity	50 –75 mm/hr at 85% Proctor density

Notes: [1] Specifiers should note that the pH maximum of 7.8 will be acceptable for most trees and other plants in the Toronto area. However, if the design team specifies pH sensitive trees or plants, the pH maximum should be lowered to an appropriate level for those plants. Note that lower pH growing medium will cost more due to the lack of availability of lower pH components. Coordinate the specification with the design team regarding plant species requirements.

[2] Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Type 1 Mix does not necessarily require the above coarse sand or organic amendment depending on existing texture and chemical properties. Type 1 Mix reflects test results by weight and not component composition by volume as in Type 2 and 3.

Mix the growing medium with a loader bucket to preserve topsoil peds using the following method:

- Mix the coarse sand and compost together separately;

- Spread a layer of topsoil approximately 300 mm thick and apply the required proportions of coarse sand/compost mix over the topsoil;

- Push the topsoil, coarse sand and compost into a pile and then drag out into a layer mixing the soil with the bucket. Repeat the mixing action a second time to gain an approximate mixture of the material. Do not over mix;

This method assumes that there is additional mixing of the materials as it is moved to the final stockpile, placed into delivery trucks, deposited at the project site, and spread into the installation location.

This method assumes that soil will not be installed using soil blower equipment. If a soil slinger is used for installation, the belt speed should be minimized to reduce velocity such that the soil drops off the belt – water-falling, forming a pile underneath. The soil is not to be projected over a horizontal distance.

Submit duplicate 4 L samples (total 8 L) with material testing certification that the product meets the requirements.

TS 5.10.05.06 Type 2 – Planting Bed Mix

For horticultural beds of shrubs and perennials, a mixture of topsoil, coarse sand and compost mixed to the following proportions, by volume:

Topsoil	50%
Coarse sand	20%
Organic components	30%

The growing medium shall meet the following parameters:

Chemical analysis (1)	pH: 6.0 – 7.8 (1)
Plant Available Nutrient Levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm
Percent organic matter (dry weight)	4-6%
Infiltration/Permeability/Hydraulic Conductivity	50 –75 mm/hr at 85% Proctor density

Notes: [1] Specifiers should note that the pH maximum of 7.8 will be acceptable for most plants in the Toronto area. However, if the design team specifies pH sensitive trees or plants, the pH maximum should be lowered to an appropriate level for those plants. Note that lower pH growing medium will cost more due to the lack of availability of lower pH components. Coordinate the specification with the design team regarding plant species requirements.

[2] Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

Submit duplicate 4L samples (total 8 L) with material testing certification that the product meets the requirements.

TS 5.10.05.07 Type 3 – Boulevard Mix

For tree planting in hardscape boulevards, a mixture of topsoil, coarse sand and compost mixed to the following proportions, by volume:

Topsoil	40 – 45%
Coarse sand	40 – 50%
Organic components	12 – 15%

The growing medium shall meet the following parameters:

Soil particle size distribution	
Medium to coarse sand (0.25 – 2 mm) plus gravel (2 – 5 mm)	> 45%
Total combined silt and clay	18 – 40%
Gravel (2 – 75 mm)	> 5%
Chemical analysis (1)	pH: 6.0 – 7.8(1)
Plant Available Nutrient Levels (ppm)	
Phosphorous	10 – 60
Potassium	80 – 250
Calcium	< 5000
Magnesium	100 – 300
Soluble salt	< 1.5 mmhos/cm
Percent organic matter	2.5 – 5%
Infiltration/Permeability/Hydraulic Conductivity	50 –75 mm/hr at 85% Proctor density

Notes: [1] Specifiers should note that the pH maximum of 7.8 will be acceptable for most trees and other plants in the Toronto area. However, if the design team specifies pH sensitive trees or plants, the pH maximum should be lowered to an appropriate level for those plants. Note that lower pH growing medium will cost more due to the lack of availability of lower pH components. Coordinate the specification with the design team regarding plant species requirements.

[2] Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

All testing must reflect specified parameters, that is to say sand + gravel and silt + clay where each must be tested together and reported accordingly. For example, sand + gravel =73%, silt + clay = 17%.

Mix the growing medium with a loader bucket to preserve topsoil peds using the following method:

1) Mix the coarse sand and compost together separately;

2) Spread a layer of topsoil approximately 300 mm thick and apply the required proportions of coarse sand/compost mix over the topsoil; and

3) Push the topsoil, coarse sand and compost into a pile and then drag out into a layer mixing the soil with the bucket. Repeat the mixing action a second time to gain an approximate mixture of the material. Do not over mix.

This method assumes that there is additional mixing of the materials as it is moved to the final stockpile, placed into delivery trucks, deposited at the project site, and spread into the installation location.

This method assumes that soil will not be installed using a soil blower. If a soil slinger is used for installation, the belt speed should be minimized to reduce velocity such that the soil drops off the belt–water-falling, forming a pile underneath. The soil is not to be projected over a horizontal distance.

Submit duplicate 4L samples (total 8 L) with material testing certification that the product meets the requirements.

TS 5.10.05.08 Type 4 – Bioretention mix

For bioretention and rain gardens requiring high infiltration or pre-treatment mix to the following proportions, by volume:

Topsoil	2 parts topsoil
Coarse sand	3 parts sand
Organic components	1 part organic soil components (leaf and yard waste compost and/or pine bark fines)

The growing medium shall meet the following parameters:

Media specification	**Site-specific goal**	
	**Infiltration ****Above mix proportions may need to be adjusted to accommodate a greater proportion of sand.*	**Treatment**
Soil particle size distribution		
Sand (0.05 – 2 mm.)	75-90%	65-75%
Silt (0.002 - 0.05 mm)	7-22%	13-30%
Clay (< 0.002 mm)	3-15%	3-15%
Gravel (2.0 – 64 mm.)	less than or equal to 10%	
Chemical analysis	pH: 6.0 – 8.0	
Plant Available Nutrient Levels (ppm)		
Phosphorous	10 – 40	
Potassium	80 – 250	
Calcium	< 5000	
Magnesium	100 – 300	
Percent organic matter	3-10%	
Hydraulic conductivity, saturated, sample compacted to 75-85% maximum dry density.	0.0021-0.0083 cm/s (75-300 mm/h)	6.9 x 10-4 -0.0021 cm/s (25-75 mm/ h)
Cation exchange capacity	> 10 meq/100 g	> 10 meq/100 g

Notes: [1] The component mix above is generated from the Sustainable Technologies Evaluation Program (STEP) for filter media: wiki.sustainabletechnologies.ca/wiki/Bioretention:_Filter_media

[2] The media specifications above are generated from the CSA W-200-18 Design of Bioretention Systems.

[3] Contractors should note that where test results fall outside of specified ranges, the Contract Administrator will examine the extent of variance, as well as any recommendations from the testing laboratory, and determine whether the soil will be accepted, amended or rejected.

TS 5.10.05.09 Soil Amendments

Chemicals and other materials designed to increase soil fertility as recommended in soil testing report. All products shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations. All products shall be freshly manufactured and dated for the season in which the products are to be used.

Fertilizer for planting shall be organic fertilizer, as defined under the *Fertilizers Act*. Submit manufacturer's product literature.

Fertilizer selections shall be based on the recommendations of the soil test.

TS 5.10.06 EQUIPMENT – Not Used

TS 5.10.07 EXECUTION

TS 5.10.07.01 Site Examination

Examine the surface grades and soil conditions for any circumstances that might be detrimental to soil drainage, such as uneven sub grades and waterproofing that may hold or pond water, deposits of construction-related waste or soil contamination, storage of material or equipment, soil compaction or poor drainage. Confirm that all utility work and installation of planter drainage has been completed and tested. Examine the grading, verify all elevations.

Confirm that all other work in the area of growing medium installation is completed. Notify the Contract Administrator in writing of any unsatisfactory conditions.

TS 5.10.07.02 Coordination with Project Work

The Contractor shall coordinate with all other trades that may impact the completion of the soil installation work. Protect installed growing medium from compaction by other trades.

TS 5.10.07.03 Grade and Elevation Control

Provide grade and elevation control during installation of growing medium. Utilize grade stakes, surveying equipment and other means and methods to assure that grades and contours are as specified on the Contract Drawings.

Maintain grade stakes until the grades have been viewed by the Contract Administrator.

TS 5.10.07.04 Site Preparation

In areas not above structure, excavate to the proposed sub grade. Maintain all required angles of repose of the adjacent materials as shown on the Contract Drawings or as required to support adjacent materials or structures. Do not over excavate compacted subgrades of adjacent pavement or structures. Remove all construction debris and material.

Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade or toward the subsurface drain lines as shown on the Contract Drawings.

Do not proceed with the installation of growing medium, until all subsurface utility work in the area has been completed.

Do not begin growing medium installation until all subsurface drainage, and irrigation main lines shown on the Contract Drawings are viewed and approved by the City.

Protect adjacent walls, walks and utilities from damage or staining by the soil. Use 12 mm plywood or plastic sheeting or both to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.

1) Clean up any soil or other materials spilled on any paved surface, including at the end of each working day.

2) Any damage to the paving or architectural work shall be repaired by the Contractor at no extra cost the City.

TS 5.10.07.05 Growing Medium Installation

For installation of soil in soil cells, see TS 853.

Prior to installing any growing medium, the Contract Administrator shall approve the condition of the subgrade and the previously installed sub grade preparation and the installation of subsurface drainage material.

In areas of soil installation above existing subsoil, till the growing medium into the bottom layer of subsoil.

1) Loosen or till the subsoil of the subgrade to a depth of 50 to 75 mm with a backhoe or other suitable device.

2) Spread a layer of the specified growing medium 50 to 75 mm deep over the subgrade.

3) Soil slingers may be used for growing medium delivery/installation; however, the belt speed shall be minimized to reduce velocity such that the soil drops off the belt—water-falling, forming a pile underneath. The soil is not to be projected over a horizontal distance. If access is limited, the growing medium shall be transported in lifts from the delivery pile to the soil installation location by means causing the least amount of disturbance / compaction, for example transport by front-end loader. Growing medium shall not be installed using soil blower equipment.

4) Till the native soil to loosen it. A best practice is to use a manual rake to till the excavation and prepare it for growing medium installation. Take care not to over-till as this causes clumping, compaction, and detrimentally affects soil biota, such as earthworms and fungal hyphae. Then, thoroughly till a thin lift of the growing medium and the subgrade together.

5) Protect the tilled area from traffic. Do not allow the tilled sub grade to become compacted or wet.

Immediately install the remaining growing medium in 300 to 400 mm lifts to the required depths. Work outward from the installed growing medium such that equipment does not have to pass over the installed soil.

The depths and grades shown on the drawings are the final grades after settlement and shrinkage of the organic material. The Contractor shall install growing medium to a level of at least 50 mm above the finished grades as specified in the Contract Drawings to anticipate this reduction of growing medium volume depending on the typical settling properties of the specified growing medium.

Avoid compacting the growing medium as much effort and cost is needed to rectify such damage.

Utilize 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.

When any equipment passes over previously prepared subgrade or installed soil it shall reverse out of the soil area over the same path dragging the teeth of the bucket over the tracks to break surface compaction created by the equipment.

Coordinate the installation of water harvesting system and drain lines within the growing medium.

TS 5.10.07.06 Growing Medium Compaction

Provide adequate equipment to achieve consistent and uniform compaction of the growing medium. Use the smallest equipment that can reasonably perform the task of spreading and compaction.

Maintain moisture conditions within the growing medium during installation to allow for satisfactory compaction. Suspend installation operations if the growing medium becomes wet. Soils are generally identified as wet when soil moisture content exceeds 20 per cent. Moisture contents of 35 to 45 per cent are generally considered to be saturated. Do not place growing medium on wet or frozen sub grade.

Lightly compact each 300 to 400 mm lift to achieve the following test results.

Growing medium compaction shall be tested at each lift using a cone penetrometer to between 70,000 and 140,000 kg/m² when the soil is between 12 and 20 per cent moisture.

Maximum penetration resistance readings that exceed the following values indicate that the soil has been compacted to a degree that limits plant growth and the need to take corrective action to loosen the planting soil through tilling:

- surface resistance for all soil textures 758 kPa
- subsurface resistance for sandy soil textures 1793 kPa
- subsurface resistance for silty soil textures 1793 kPa
- subsurface resistance for silty soil textures 1551 kPa

Compact growing medium under the root balls of all trees to between 200,000 and 250,000 kg/m² when the soil is between 12 and 20 per cent moisture to reduce settlement and provide a stable base for the tree as indicated on the drawings. Take care not to over-compact growing medium during and following the installation process.

At the end of the installation of the growing medium and prior to the installation of additional organic matter and plants, take a minimum of four undisturbed samples from locations selected by the Contract Administrator to determine bulk density. Submit test results for approval.

Confirm that infiltration rate of installed growing medium is 50 to 75 mm/hr.

TS 5.10.07.07 Protection

Protect growing medium from compaction and contamination by dust, debris, and any toxic material harmful to plants or humans after installation. Any area, which becomes compacted, shall be tilled to a depth of 150 mm. Any uneven or settled areas shall be filled and re graded.

Phase the installation of the growing medium such that equipment does not travel over already installed growing medium.

Cover installed growing medium with plywood until construction activity is complete and ready to plant.

Keep newly installed growing medium off-line from irrigation and drainage until planted.

TS 5.10.07.08 Growing Medium Fine Grading

The Contractor Administrator shall view all rough grading prior to the installation of organic matter, fine grading, planting, and mulching.

Set grades at time of installation sufficiently high relative to the type of growing medium and the typical settlement so that the growing medium will be at the correct grade after the 12 month settlement period.

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. Assure that the grading is mounded sufficiently high to accommodate this settlement.

At the end of the Contract Warrantee Period, if grades have settled more than 5 per cent below the grades as specified in the Contract drawings, reset the grades to the final grades shown on the Grading Plan, taking the observed settlement into account Carefully remove and protect the plant material before executing any grading. Additional growing medium shall not be placed on planted soil until plants are carefully removed. The additional depth of growing medium can impede oxygen exchange and suffocate the plants.

Adjust the finish grades to meet field conditions.

Provide for positive drainage from all areas toward the existing inlets, drainage structures and or the edges of planting beds. Adjust grades as directed to reflect actual constructed field conditions of paving, wall and inlet elevations. Notify the Contract Administrator of difficulty achieving positive drainage.

Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the Contract drawings.

Fill all dips and remove any bumps in the overall plane of the slope.

The tolerance for dips and bumps in shrub and ground cover planting areas shall be a 25 mm deviation from the plane in 2000 mm.

Restore all grades after the installation of plants. Remove any excess soil removed during the planting process.

TS 5.10.07.09 Installation of Yard Waste Compost

In all areas of growing medium in open planting beds, after the specified growing medium is installed, and just prior to the installation of tree, shrub or groundcover plantings, spread 100 mm of yard waste compost and till into the top 150 mm of the growing medium. Restore grades after tilling.

TS 5.10.07.10 Clean-up

During installation, keep pavements clean and work area in an orderly condition.

Keep the site clear of trash and debris at all times. Immediately dispose of wrappings or waste materials associated with products necessary for the completion of the work.

All trash and debris shall be kept in a central collection container. Do not bury trash and debris in back-fill.

Once installation is complete, remove any excess soil from pavements or embedded fixtures.

TS 5.10.07.11 Protection during Construction

The Contractor shall protect work and materials from damage including: compaction, contamination, and erosion due to operations by other contractors or trespassers. Maintain protection during installation until acceptance. Treat, repair or replace damaged growing medium installation work immediately.

Till compacted growing medium and replace growing medium that has become contaminated as determined by the Contract Administrator. Growing medium shall be tilled or replaced by the Contractor at no extra cost the City.

TS 5.10.07.12 Repair of Settled Growing Medium

At the end of 12 months following the date of substantial completion of the growing medium installation work, inspect the site and restore any areas where the grades have settled beyond the elevations shown on the drawings by an amount greater than 25 mm.

Settlement of trees below the finished grades shown on the Contract drawings will not be accepted. Where settlement of trees and tree planting areas has occurred, carefully remove and protect the tree and root ball, add the specified growing medium to the final grades shown on the Grading Plan, taking the observed settlement into account, re-plant and re-mulch. Growing medium shall not be placed over a tree's zone of active taper. If the tree was planted too high, that is to say settlement did not proceed as expected over the 12 month settlement period, than the tree must be carefully removed and protected while the grades are re-set.

In shrub planting areas where the settlement is less than 5 per cent below the grades shown on the Contract drawings, remove the mulch, top dress the area with the specified growing medium and re-mulch. All ground cover areas and shrub planting areas where the settlement is greater than 5 per cent below the grades shown on the Contract Drawings, remove the mulch and plants, add the specified growing medium to the final grades shown on the Grading Plan, taking the observed settlement into account, re-plant and re-mulch.

TS 5.10.07.13 Aeration of In-situ Growing Medium around Existing Trees

For instances where compaction of in-situ site soils within the Tree Protection Zone (TPZ) of existing trees exceeds the range specified in TS 5.10.07.06, remediation shall be undertaken to aerate or physically alter soils to provide a more suitable growing condition.

An arborist currently registered with ISA or qualified professional approved by Urban Forestry shall be engaged to determine the most appropriate procedure.

- Core aeration: Pore space in compacted soil may be increased by removing small soil cores to a depth of about 75 mm. This is effective in increasing surface permeability but does not address compaction in deeper soil layers.
- Vertical mulching: Holes 25-50 mm in diameter may be drilled in the compacted soil and filled with perlite, vermiculite, or other amendment material.
- Radial trenching: Trenches 150-200 mm wide and no deeper than the root system or depth of compaction can be dug with trenching equipment. The trenches are dug around the trunk of an existing tree in a bicycle spoke pattern, extending from the trunk and backfilled with a mixture of soil and amendments.
- Air excavation: Alternating pie-shaped wedges of soil around an existing tree can be de-compacted by “tilling” compost into surface soil around roots with an air excavation tool. Air excavation can damage roots if high pressure is used, so soil should be de-compacted in no more than 50 per cent of the root system at a time.

TS 5.10.08 QUALITY ASSURANCE – Not Used

TS 5.10.09 MEASUREMENT FOR PAYMENT

TS 5.10.09.01 Existing Site Soil Mix

Measurement of existing site soil mix shall be measured by volume in cubic metres (m^3).

TS 5.10.09.02 Type 1 – Standard Mix

Type 1 – Standard Mix, 100 mm Thick
Type 1 – Standard Mix, 200 mm Thick
Type 1 – Standard Mix, 300 mm Thick

Measurement of standard mix growing medium shall be measured by area in square metres (m^2).

TS 5.10.09.03 Type 2 – Planting Bed Mix

Type 2 – Planting Bed Mix, 100 mm Thick
Type 2 – Planting Bed Mix, 200 mm Thick
Type 2 – Planting Bed Mix, 300 mm Thick

Measurement of planting bed growing medium shall be measured by area in square metres (m^2).

TS 5.10.09.04 Type 3 – Boulevard Mix

Type 3 – Boulevard Mix, 100 mm Thick
Type 3 – Boulevard Mix, 200 mm Thick
Type 3 – Boulevard Mix, 300 mm Thick

Measurement of boulevard mix growing medium shall be measured by area in square metres (m^2).

TS 5.10.09.05 Type 4 – Bioretention Mix

Type 4 – Bioretention Mix, 300 mm Thick
Type 4 – Bioretention Mix, 600 mm Thick
Type 4 – Bioretention Mix, 1000 mm Thick

Measurement of boulevard mix growing medium shall be measured by area in square metres (m^2).

TS 5.10.10 BASIS OF PAYMENT

Existing Site Soil Mix – Item
Type 1 – Standard Mix, 100 mm Thick – Item
Type 1 – Standard Mix, 200 mm Thick – Item
Type 1 – Standard Mix, 300 mm Thick – Item
Type 2 – Planting Bed Mix, 100 mm Thick – Item
Type 2 – Planting Bed Mix, 200 mm Thick – Item
Type 2 – Planting Bed Mix, 300 mm Thick – Item
Type 3 – Boulevard Mix, 100 mm Thick – Item
Type 3 – Boulevard Mix, 200 mm Thick – Item
Type 3 – Boulevard Mix, 300 mm Thick – Item
Type 4 – Bioretention Mix, 300 mm Thick – Item
Type 4 – Bioretention Mix, 600 mm Thick – Item
Type 4 – Bioretention Mix, 1000 mm Thick – Item

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the work.

Form 1: Contractors submittal checklist

✓	Section #	Item
		Certificates
	TS 5.10.04.01.02	Certification that all growing medium components and the growing medium meet all environmental standards
		Product Data
	TS 5.10.04.01.03	*Product data: Coarse sand*
	TS 5.10.04.01.03	Product data: Pine bark compost
	TS 5.10.04.01.03	Product data: Yard waste compost
		Material Source Locations
	TS 5.10.04.01.04	Location of all topsoil and growing medium components sources
		Samples
	TS 5.10.04.01.05	Duplicate 4L samples: Topsoil / submitted with required testing results
	TS 5.10.04.01.05	Duplicate 1L samples: Coarse sand / submitted with required testing results
	TS 5.10.04.01.05	Duplicate 1L samples: Pine bark compost / submitted with required testing results
	TS 5.10.04.01.05	Duplicate 1L samples: Yard waste compost / submitted with required testing results
	TS 5.10.04.01.05	Duplicate 4L samples: Growing medium / submitted with required testing results
		Testing Reports
	TS 5.10.04.01.06	Particle size analysis: Topsoil including sand fractions
	TS 5.10.04.01.06	Particle size analysis: Growing medium including sand fractions
	TS 5.10.04.01.06	Chemical analysis: Topsoil
	TS 5.10.04.01.06	Chemical analysis: Growing medium with lab recommendations for fertilizer applications and amendments.
	TS 5.10.04.01.07	In-Situ Compaction Testing: Installed growing medium
	TS 5.10.04.01.06	Infiltration Rate Testing: Installed growing medium
		Contractor's Qualifications
	TS 5.10.04.01.08	Documentation of contractor’s qualifications