|  |  |  |
| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 5, 2007 | Minor revisions by Legal Services. |
| 3 | November 13, 2009 | Modified ‘Related Section’ |
| 4 | March 15, 2011 | Minor changes from Legal |
| 5 | June 5, 2012 | Addition of References and Replacement Parts sections on this page |
| 6 | June 29, 2012 | Reformatted to Remove White Space |
| 7 | August 7, 2013 | New Format |
| 8 | February 11, 2015 | With Comments from Forestry |
| 9 | April 2, 2015 | AAM addressed Legal Comments-1st Review |
| 10 | June 16, 2015 | AAM addressed Legal Comments-2nd Review |
| **11** | **September 10, 2015** | **Updated, Finalized Specification – Reference eDOCS #5972159 v4 (AAM)** |
| 12 | February 21, 2017 | Addition of Subsection 1.4 which highlights Contractor responsibilities under the Ontario Underground Infrastructure Notification System Act, 2012. Updated standard references. (AV) |
| 13 | April 26, 2018 | Removed reference to anti-desiccant throughout  2.6-2.9 Added requirement for engineered growing media  2.4 Removed manufacturers and products  2.5.1 Removed manufacturers and products  2.10.6.3 Removed manufacturers and products  (BM) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Work Includes:

### The complete planting and maintenance of plantings as shown or specified in the Contract Documents including:

#### Supplying, placing and improving the planting soil mixture.

#### Supplying and installing trees, shrubs, and ground covers complete with all related components and accessories.

#### Supplying, storing in cold storage and installing seedlings complete with all related components and accessories.

## Related Sections

### *[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

### *Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

### *Contractor is responsible for coordination of the Work.*

### *This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

### *[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### *[List Sections specifying related requirements.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

### Ontario Underground Infrastructure Notification System Act, 2012

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

### The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

### All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.*]

### .2 Payment will be full compensation for all labour, equipment and materials for the appropriate permanent and temporary works required to perform the Work of this Section.

## Qualifications of Contractor

### Experienced, qualified personnel under the direction and supervision of a foreperson with at least five years of horticultural and planting experience will carry out planting and related Work.

### The Work of this Section will be carried out while the Contractor’s foreperson is on Site and directly supervising the planting operations.

## References

### Canadian Nursery Trades Association: Canadian Standards for Nursery Stock, 8th Edition (2006).

### ASTM

#### F1632-03(2010), Standard Test Method for particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes.

#### D422-63(2007) Standard Test Method for Particle-Size Analysis of Soils

### American National Standards Institute (ANSI) - ANSI A300 Standards, Parts 1 – 10 (Tree Care Industry Association Inc.).

#### A300 (Part 1) 2008 Pruning

#### A300 (Part 6) 2012 Transplanting (includes Planting)

#### Z60.1, (2014) Nursery Stock

### Hortus Third, Liberty Hyde Bailey, Hortorium, 1976.

### Ontario Underground Infrastructure Notification System Act, 2012

### Ontario Provincial Standard Specification, Construction.

#### OPSS.MUNI 801 (Nov 2019), The Protection of Trees.

## Definitions

### Measurement:

#### In size grading, caliper is used for deciduous trees and height is used for coniferous trees.

##### Take the trunk caliper 150 mm above the ground level (up to and including 100 mm caliper size) and 300 mm above the ground level for larger diameter trees.

#### Measure the size of container-grown stock by the height and width of plant.

#### Measure herbaceous stock by pot size, not top growth.

## Locates

### The Contractor shall comply with the Ontario Underground Infrastructure Notification System Act, 2012 and ensure Ontario One Call is contacted for locates of underground infrastructure for any such work. For underground work the Contractor shall be deemed “Excavator” under the Act. No excavation work is allowed to proceed until all underground locate work has been completed in accordance with the Ontario Underground Infrastructure Notification System Act, 2012.

## Submittals

### Shop Drawings:

#### Layout Plan for Barrier Fencing.

#### Subsoil Drainage Plan for planting pits and beds.

#### Replacement Planting Plan that includes the following, at a minimum:

##### Location on planting plan

##### Description of plant species

##### Quantity

##### Date of replanting

### Information Submittals:

#### The Contractor shall provide the source and availability of all plant material specified on the Plant List(s) to the Consultant, four weeks prior to commencing the planting work.

#### *[Designer Note: Planting Lists to be included with Contract Documents and appropriately referenced in 1.7.2.1]*

#### The Contractor will provide a detailed planting schedule for all plant material specified on the Plant List(s) to the Consultant, four weeks prior to commencing the planting work.

#### Product labels/data sheets on manufactured Products specified in the Contract Documents.

#### *[Designer note-Insert description of the required maintenance activities and activity frequency].*

#### *[Designer Note: Insert description of the watering program context and frequency to maintain the required moisture conditions for optimum growth]*

#### Soil percolation test results.

#### Topsoil test results and fertilizer recommendations for planting soil.

#### Special guarantee or warranty.

### Submit two (2) samples of planting bed mulch, trunk protection devices, and accessories for tree-staking/guying for approval by the Consultant prior to initiating planting.

#### Retain approved samples at the Site in a readily available location.

#### Products used shall conform to samples approved by the Consultant.

## Delivery, Storage and Handling

### All planting Work shall be carried out by personnel who are qualified, skilled and experienced in the various aspects of tree and shrub planting, transplanting and maintenance. The Contractor shall ensure consistent and continuous operations once planting commences.

### The Contractor will arrange for the inspection of all plant material outlined in the Plant List(s) at its source with the Consultant. Acceptance of the plant material at its source does not prevent rejection of the plant material upon delivery to the Site or during the planting operations.

### Delivery of plant material will be coordinated with planting operations in order to minimize time lapse between digging and replanting of the plant material.

### If conditions preclude the immediate use of container grown trees and shrubs, the trees and shrubs shall be stored in a sheltered area protected from the sun and wind. The root systems shall be kept in a moist state at all times.

### All plant material supplied and planted under this Contract shall be protected from damage in accordance with OPSS.MUNI 801 during construction operations. Plant material damaged by the Contractor’s operations will be replaced at the Contractor’s own expense.

### Inspect all plant material upon delivery to the Site prior to unloading. A copy of the delivery receipt will be provided at the time of delivery. Material which does not meet the requirements of the Contract Documents shall be removed from the Site immediately and replacements shipped to the Site within 2 Working Days.

### Inspect all plant material again prior to planting. Material which does not meet the requirements of the Specifications shall be removed from the Site immediately and replacements shipped to the Site within 2 Working Days.

### Plant Material:

#### Plants will be contained as specified in the Plant List(s) and shall meet the minimum height and caliper dimension requirements.

#### Plants will contain a tag from the nursery identifying the nursery, botanical description, container size, and plant height/spread/caliper.

#### Transport plants specified as Balled & Burlapped (B&B)/Wire Basket (W.B.) with solid root balls wrapped with 150 gram Hessian burlap. Securely bind burlapped rootballs with twine, natural fibre cord, or wire for shipment and handling. Drum-lace balls with a diameter of 800 mm or more.

#### Transport plants with frozen balls only when they are complete with the root system intact.

#### Transport plants with branches tied in order to prevent damage and pad the trunks in order to avoid abrasion from equipment during transport. Avoid binding plant material with rope or wire that would damage bark, break branches or destroy the natural shape of the plant.

#### Transport plants in enclosed vehicles or covered by tarps. Do not permit plants to be desiccated by wind. Plants arriving at the Site in unprotected transport will **not** be accepted.

#### Prevent the drying out of roots, root balls, trunks, branches and leaves of plants from the time of removal at the place of origin until they are planted.

#### Balled and burlapped, wire basket and container grown plant material shall not be stored on the Site unless the rootball or container is protected from the sun and wind and kept moist.

#### While temporarily stored at the Site, plant material should be placed in the shade where possible, and soil, dampened straw or similar material should be placed around the root ball and kept moist at all times.

#### Plants with broken or abraded trunks or branches, or with broken cracked root balls, or plants that are desiccated, will be rejected upon arrival at the Site.

#### Plant material deemed unacceptable shall be removed immediately from the Site by the Contractor.

### Bare-root (B.R.) seedlings will be moved while dormant with the major portion of the fibrous root system intact. B.R. seedlings shall be kept in a plastic lined paper bag in cold storage kept at a temperature of 1degree Celsius. Seedlings shall be shipped to the Site on the scheduled day of planting in sealed plastic lined paper bags. Only deliver a sufficient quantity of seedlings that can be installed within one Working Day. Keep remaining seedlings in cold storage until its scheduled planting day. On planting day, the Contractor shall store the seedlings in a suitable location in the shade under a silvitarp and ensure that adequate moisture is provided to maintain the seedlings in a healthy, vigorous growing condition.

### Deliver planting materials in standard containers. Containers will be marked identifying the contents of container, weight, analysis, and name of the manufacturer.

### Store and protect fertilizer, bonemeal, limestone, mulch and similar products to prevent damage from moisture.

## Scheduling and Sequencing

### The Contractor will provide to the Consultant a detailed schedule outlining the proposed planting sequence.

### Plant Deliveries: Provide written notice to the Consultant a minimum of 5 Working Days in advance of each delivery date.

### Planting Season: Conduct planting during times of the year that are normal for such work as determined by accepted local practice.

#### Installation of bare-root trees and shrubs shall be carried out from the time that the ground is frost free to May 14; and from October 15 until the ground is frozen.

#### Installation of B&B/W.B. and container grown plant material shall be carried out from the time the ground is frost free to June 30.

### Plant trees and shrubs after the installation of all hard structures and surfaces and upon the establishment of final grades. All planting work shall be completed prior to initiating the seeding work. Plant materials shall be installed within a period of time that will allow for the seeding of lawns and grasses during a spring or fall time of year.

### The location of all plant material shall be staked out on the ground for review by the Consultant. Excavation may commence following the Consultant’s inspection and approval of staking.

## Environmental Requirements

### Execute the work of this Section under weather conditions and in a suitable growth season for each specified material, and as approved by the Consultant.

# PRODUCTS

## Plant Material

### All plant material shall be nursery grown and shall meet the specifications as set out in the latest Guide Specifications for Nursery Stock prepared by the Canadian Nursery Trades Association (C.N.T.A.) for size, height, spread, grading quality and method of cultivation.

### Caliper Tree Planting Stock

#### Information concerning the geographical origin of seed or cuttings used to produce the caliper trees for this Contract shall be made available to the Consultant upon request. If, in the sole opinion of the Consultant, the plant material is of an origin unsuitable climatically to the Regional area, it will be refused.

#### All caliper trees for this Contract shall have been grown for a minimum period of two (2) growing seasons at a nursery located within Canadian Plant Hardiness Zones 4b, 5a, 5b or 6a. The Contractor shall provide written documentation confirming that this requirement has been satisfied. If, in the sole opinion of the Consultant, the documentation does not satisfy this condition, the plant material will be refused.

#### Nomenclature (Names of Plants): In accordance with “Hortus Third” and conforming to the International Code of Nomenclature of Cultivated Plants and the latest edition of Standardized Plant Names.

### Plants: No.1 grade, nursery-grown in fertile soil, with ample spacing, regular cultivation, weed and pest control, required moisture, and pruning.

### Balled and Burlapped, Wire Basket and container grown plant material shall be dug and potted in accordance with the latest edition of ANSI Z60.1 (2014) Nursery Stock.

### Plant List(s): All plant lists are outlined on the Contract Drawings. *[Consultant to ensure that plant lists have been included in the Contract Drawings]*

### Provide the quantity, size, genus, species, and variety of trees, shrubs, ground covers and seedlings indicated in the Contract Documents.

## Caliper Trees

### Form and Vigour

#### All caliper trees shall be nursery stock conforming to the 8th Edition of the Canadian Standards for Nursery Stock as published by the Canadian Nursery Landscape Association, unless specified otherwise in the Contract Documents.

#### All caliper trees shall be true to type, structurally sound with no evidence of dead branches, sun scald, frost cracks, abraded or broken bark, included bark, and shall be free of insect or disease infestation. All caliper trees shall have a full, well-developed crown with one distinctive vertical leader and a root system typical of the species, free of girdling roots. All parts of the plant shall be moist and show active green cambium when cut and show vigorous growth for a minimum of the last two growing seasons.

#### All caliper trees shall meet the requirements of these Specifications at the time of planting and the warranty inspections. Caliper trees that do not meet the requirements of these Specifications shall be replaced by the Contractor at its own expense.

### Stock Type and Size

#### Unless otherwise stated by the Region:

##### All caliper trees shall be wire basket stock;

##### All deciduous caliper trees shall be a minimum of 50 millimetres in caliper, measured at 15 centimetres above the root collar;

##### All deciduous caliper trees shall have a minimum of 150 centimetres of clear stem, measured above the root collar; and

##### All deciduous caliper trees shall have a minimum of 10 scaffold branches in the crown.

##### All coniferous caliper trees shall be a minimum of 150 centimetres in height, measured from the top of the root ball to the base of the leader.

##### All caliper trees shall have the root collar at the surface of the root ball.

##### All caliper trees shall have the stem centred in the root ball.

##### All caliper trees shall have a root ball that is firm and intact and free of cracks.

### Minimum Root Ball Diameter and Height

#### The minimum acceptable root ball diameter for caliper (wire basket) deciduous trees shall be:

##### 60 centimetres for 40 millimetre caliper trees

##### 70 centimetres for 50 millimetre caliper trees

##### 70 centimetres for 60 millimetre caliper trees

##### 80 centimetres for 70 millimetre caliper trees

##### 100 centimetres for 100 millimetre caliper trees

##### 150 centimetres for 150 millimetre caliper trees

#### The minimum acceptable root ball height for caliper (wire basket) deciduous trees shall be:

##### 40 centimetres for 40 millimetre caliper trees

##### 40 centimetres for 50 millimetre caliper trees

##### 40 centimetres for 60 millimetre caliper trees

##### 50 centimetres for 70 millimetre caliper trees

##### 50 centimetres for 100 millimetre caliper trees

##### 80 centimetres for 150 millimetre caliper trees

#### The height of the root ball shall be measured from bottom of the root ball to the root collar.

#### The minimum acceptable root ball diameter for caliper (wire basket) coniferous trees shall be:

##### 45 centimetres for 100 centimetre height trees

##### 50 centimetres for 125 centimetre height trees

##### 60 centimetres for 150 centimetre height trees

##### 70 centimetres for 175 centimetre height trees

##### 80 centimetres for 200 centimetre height trees

##### 90 centimetres for 225 centimetre height trees

#### The minimum acceptable root ball height for caliper (wire basket) coniferous trees shall be:

##### 40 centimetres for 100 centimetre height trees

##### 40 centimetres for 125 centimetre height trees

##### 40 centimetres for 150 centimetre height trees

##### 40 centimetres for 175 centimetre height trees

##### 50 centimetres for 200 centimetre height trees

##### 50 centimetres for 225 centimetre height trees

#### The height of the root ball shall be measured from bottom of the root ball to the root collar.

#### All caliper (wire basket) trees shall be dug such that the root collar is clearly visible prior to placing the root ball in the wire basket.

#### Burlap and twine shall be biodegradable. Synthetic burlap and twine are not acceptable.

#### Each tree, shrub, ground cover and seedling specimen shall be labelled with a securely attached waterproof tag bearing a legible designation of the botanical and common name.

#### Replacement trees, shrubs, ground covers and seedlings: Same species, size, and quality as specified for the plant being replaced.

#### Conformity to Species and Variety:

##### The botanical nomenclature used for species and cultivars of caliper trees shall conform to the publication Hortus Third, 1976.

##### All caliper trees shall conform to the species and/or varieties named in the Bid Form. No substitutions will be accepted without the prior written approval of the Consultant. The Contractor shall not be entitled to any increase in the Contract Price in the event that a species substitution is approved by the Consultant, and may be required to provide a credit should the Consultant deem, in its sole discretion, that the substituted species is of a lesser quality than that specified in the Contract.

##### No additional cost will be entertained for substituted plant material.

## Seedlings

### Seedlings will be a minimum of two years old and shall meet the height requirements outlined in the Seedling Plant List on the Drawings. Deliver seedlings in 150 mm diameter pots showing the following information:

#### Botanical name

#### Height

#### Age

#### Source

### The seedlings will be sourced from local nurseries no more than one hardiness zone difference from the hardiness zone of the Site.

## Staking

### Ties shall be made from rubber hose, not plastic hose, having an outside diameter of 2.5 centimetres.

## Tree Guards

### Tree guards shall be ArborGard + AG9-4 Tree Trunk Protector or an approved equivalent.

## Submission of Product/Component Samples and Testing Requirements

### The Contractor shall complete product and mix testing and submit product samples and testing results in accordance with the following:

#### Where required in this Section, submit samples and testing results of all engineered growing media components to the Region for approval, a minimum of 10 Working Days prior to planned installation of the engineered growing media and a maximum of 30 working days after the Contract has been awarded.

#### All samples shall be clearly labelled with relevant 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 Region for appearance only. The Contractor is solely responsible for ensuring that materials comply with all other specifications and requirements. Engineered growing media samples shall be labelled with the percentage of each component material.

#### Manufacturer Product data and literature describing all engineered growing media components, and certificates indicating that the materials meet the requirements of the Specification Section, shall accompany all sample submissions and shall be submitted to the Region for review a minimum of 10 Working Days prior to planned installation of the engineered growing media.

#### All samples of the engineered growing media components shall be submitted for review and acceptance at the same time, in clearly labelled packaging.

#### The Region may reject any engineered growing media components or engineered growing media, at its sole discretion. No rejected materials shall be installed or used in the manufacture of the engineered growing media. Delivered materials shall match the samples provided to, and approved by, the Region.

#### All components and the engineered growing media shall be submitted for testing to a testing laboratory accredited by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

#### All testing shall be at the expense of the Contractor.

#### All test reports shall have been completed in the last 4 months.

### Topsoil

#### The topsoil test analysis report shall provide, at a minimum, the following information:

##### pH;

##### Percentage of organic matter by ‘Walkley-Black’ or ‘Loss on Ignition’ method;

##### Particle size analysis compared to the United States Department of Agriculture (USDA) Soil Classification System per ASTM D422 (hydrometer test) or ASTM F1632 (pipette test), and tested by passing the topsoil through a ¼ inch sleeve to enable the passage of larger organic matter materials;

##### Soluble salt by electrical conductivity of a 1:2 soil water sample measured in milliohms per centimeter;

##### Cation Exchange Capacity (CEC); and

##### Recommendations to improve fertility and promote growth of the topsoil, if required.

### Coarse Sand

#### The coarse sand test analysis report shall provide, at a minimum, the following information:

##### Particle size analysis;

##### pH;

##### Percent organic matter by dry weight; and

##### Fineness Modulus Index (FM) and/or D90/D10 Gradation Index.

### Compost and High-Lignin Organic Matter

#### The Compost and high-lignin organic matter test analysis report shall provide, at a minimum, the following information:

##### pH;

##### Salinity;

##### Total organic nitrogen;

##### Carbon : Nitrogen (C:N) ratio ;

##### Solvita® Compost Maturity Index ;

##### Moisture;

##### Sodium (Na);

##### Phosphorus (P);

##### Potassium (K);

##### Calcium (Ca); and

##### Magnesium (Mg).

### Engineered Growing Media

#### The engineered growing media test analysis report shall provide, at a minimum, the following information:

##### pH;

##### Percentage of organic matter by dry weight;

##### Chemical levels of the following, in ppm, at a minimum:

###### Nitrate

###### Ammonium

###### Phosphorus (P)

###### Potassium (K)

###### Calcium (Ca)

###### Sulfur (S)

###### Magnesium (Mg)

###### Manganese (Mn)

###### Chlorine (Cl)

###### Copper (Cu)

###### Iron (Fe)

###### Nickel (Ni)

###### Zinc (Zn)

###### Boron (B)

##### Particle size analysis compared to the United States Department of Agriculture (USDA) Soil Classification System per ASTM D422 [Consultant to amend with replacement standard in place of the withdrawn standard ASTM D422] (hydrometer test) or ASTM F1632 (pipette test), and tested by passing the topsoil through a ¼ inch sleeve to enable the passage of larger organic matter materials;

##### Soluble salt by electrical conductivity of a 1:2 soil water sample measured in milliohms per centimetre;

##### Cation Exchange Capacity (CEC);

##### Recommendations to improve fertility and promote growth of the engineered growing media material, if required;

##### Physical analysis of the engineered growing media shall provide bulk density and water permeability with the sample compacted to between 80% and 85% maximum dry density (Proctor).

#### The Region may require additional testing of the engineered growing media components or engineered growing media at any time that such samples are deemed necessary to verify conformance to specification requirements.

#### All testing shall be at the expense of the Contractor.

## Engineered Growing Media Soil Components

### The Contractor shall only use the components specified in this specification to manufacture the engineered growing media.

#### Topsoil (Imported)

##### The topsoil used to manufacture the engineered growing media shall conform to the following:

###### Topsoil used in the engineered growing media shall be high-quality, naturally-occurring fertile sandy loam, loam or sandy clay loam, as described in The Canadian System of Soil Classification;

###### Topsoil shall consist of a minimum of 7% to a maximum of20% clay, a minimum of 3% to a maximum of 7% organic matter (by weight) and less than 8% combined gravel content;

###### Topsoil pH shall range between a minimum of 6.0 and a maximum of 7.8;

###### Topsoil cation exchange capacity shall range between 1-10 meg/100g

###### Topsoil salinity shall not exceed 1.5 mmhos/cm at 25°C;

###### Topsoil shall be free of all contaminants and deleterious materials such as litter, construction materials, stones greater than 50 mm in diameter, wood materials greater than 25 mm in diameter, plant or soil pests, subsoil, or any other contaminants that may damage or otherwise impair plants or plant growth;

###### Plant material, including noxious weeds and/or their seeds, tubers, rhizomes, sod, crabgrass, couchgrass, or roots shall not be acceptable in the planting soils;

###### A mix of sand, fertilizers, organic matter and/or other component parts assembled to meet the structural, chemical and other requirements of topsoil, shall not be substituted for naturally-occurring topsoil that has developed through weathering, decomposition and other natural soil building processes;

###### Topsoil shall maintain a naturally-occurring heterogeneous structure, including loose soil, soil peds (clods or clumps) and void space;

###### Topsoil shall not be screened to avoid excessively homogenizing soil structure; and

###### The topsoil source location shall be submitted to the Region for approval, along with an outline of all crops grown on the topsoil, and all herbicides and pesticides applied within the previous three years.

##### Two duplicate, 2 litre samples of topsoil comprised of random samples from each topsoil source shall be submitted by the Contractor for laboratory testing within 5 Working Days of field sampling.

##### Two duplicate, 2 litre samples of topsoil comprised of random samples from each topsoil source and the soil laboratory test results shall be submitted by the Contractor to the Region a minimum of 10 Working Days prior to the planned installation of the engineered growing media.

### Coarse Sand

#### Coarse sand used to manufacture the engineered growing media shall conform to the following:

##### Sand used in the engineered growing media shall be clean, sharp, coarse grade silica sand with a Fineness Modulus Index (FM) of between 2.8 to 3.2, and/or a D90/D10 gradation index of less than 8;

##### The presence of limestone, shale and/or slate particles in the sand mixture will result in the rejection of the sand;

##### Sand shall consist of less than 0.5% organic matter (by dry weight);

##### pH of sand shall be less than 7.0; and

##### Calcium Carbonate shall range between 0% - 5%

#### Two duplicate, 2 litre samples of sand comprised of random samples from each sand source shall be submitted by the Contractor for laboratory testing within 5 Working Days of field sampling.

#### Two duplicate, 2 litre samples of sand comprised of random samples from each sand source and the soil laboratory test results shall be submitted by the Contractor to the Region a minimum of 10 Working Days prior to the planned installation of the engineered growing media.

### High-lignin Organic Matter

#### High-lignin organic matter used to manufacture the engineered growing media shall conform to the following:

##### High-lignin organic matter shall consist of composted pine, spruce, fir or other conifer bark with a dark brown colour. Rice hulls, coconut husks or other plant materials with hard fibrous structures are also acceptable;

##### 95% of the total weight of the high lignin organic matter shall be less than 15 mm in particle size;

##### pH shall not exceed 6.5;

##### Wood fibre content shall not exceed 10%. The remainder shall consist of bark or other specified materials; and

##### Two duplicate, 2 litre samples of sand comprised of random samples from each sand source shall be submitted by the contractor for laboratory testing within 5 Working Days of field sampling.

#### Two duplicate, 2 litre samples of high-lignin organic matter comprised of random samples from each high-lignin organic matter source shall be submitted by the Contractor for laboratory testing within 5 Working Days of field sampling.

#### Two duplicate, 2 litre samples of high-lignin organic matter comprised of random samples from each high-lignin organic matter source and the soil laboratory test results shall be submitted by the Contractor to the Region a minimum of 10 Working Days prior to the planned installation of the engineered growing media.

### Organic Matter (Compost)

#### Organic matter (compost) used to manufacture, or as a surface amendment for, the engineered growing media shall conform to the following:

##### Blended organic material composted for a minimum of 6 months, and free of toxic and non-organic matter, in a stable, humus-like state and produced from aerobic decomposition;

##### Except as specified herein, compost shall conform to standards of Category ‘A’ compost as outlined in the Canadian Council of Ministers of the Environment Guidelines for Compost Quality, PN1340 (2005) and Guideline for the Production Compost in Ontario (2012);

##### Acceptable organic matter shall exhibit a dark brown colour. Light brown organic matter shall be rejected;

##### Organic matter shall have a strong aerobic (sweet) odour. Organic matter with an anaerobic (sour) odour shall be rejected;

##### Organic matter shall not be over- or under-composted, and shall have a Solvita® Compost Maturity Index of between 7 or 8; and

##### Organic matter pH shall range between 5.0 and 7.0.

#### Two duplicate, 2 litre samples of organic matter comprised of random samples from each organic matter source shall be submitted by the Contractor for laboratory testing within 5 Working Days of field sampling.

#### Two duplicate, 2 litre samples of organic matter comprised of random samples from each organic matter source and the soil laboratory test results shall be submitted by the Contractor to the Region a minimum of 10 Working Days prior to the planned installation of the engineered growing media.

## Preparation of Engineered Growing Media

### The Contractor shall prepare the engineered growing media in accordance with the following specifications:

### Engineered Growing Media

#### The engineered growing media shall be prepared using the following proportions of the engineered growing media components by volume:

##### High-lignin organic matter – 10% +/-2%

##### Coarse sand – 45% +/-10%

##### Topsoil (imported) 45% +/- 10%

#### The engineered growing media shall also contain the following component:

##### Organic matter (compost) – shall be tilled in after the installation of the engineered growing media

#### The engineered growing media component mixture of sand, topsoil and high-lignin organic matter shall be adjusted such that the engineered growing media drains at a rate of between 50-75 mm per hour when installed and compacted to between 75% and 80% of maximum dry density (Proctor).

#### The engineered growing media shall consist of no more than 80% sand.

#### The pH of the engineered growing media shall range between 5.5 and 7.5.

#### Two duplicate, 2 litre samples of the engineered growing media comprised of random samples shall be submitted by the contractor for laboratory testing within 5 Working Days of field sampling.

#### Two duplicate, 2 litre samples of the engineered growing media comprised of random samples and the soil laboratory test results shall be submitted by the contractor to the Region a minimum of 10 Working Days prior to the planned installation of the engineered growing media.

### Engineered Growing Media Manufacture

#### The engineered growing media shall be manufactured and stored in accordance with the following:

##### Engineered growing media components shall not be blended until all individual components are approved by the Region;

##### Engineered growing media shall be mixed with a front end loader bucket. Soil blending machines shall not be used, and assembled planting soil shall not be screened;

##### Sand and required high-lignin organic matter materials shall be mixed prior to the addition of topsoil. The mixture of sand and organic matter shall be spread on 300 mm of topsoil, and the two materials shall be loosely mixed together. Care shall be taken to avoid over-mixing and disturbing soil peds and the homogenizing soil structure.

##### While soil peds are a critical component of good soil structure, an excessive amount of soil peds and oversized soil clumps shall not be permitted. The maximum soil ped inclusion in the engineered growing media shall be:

###### Unlimited for soil peds less than 25 mm in diameter;

###### 15% of the total soil mix for soil peds between 25 mm to 75 mm in diameter;

###### 5% for soil peds between 75 mm to 150 mm in diameter; and

###### Less than 2% for soil peds greater than 150 mm in diameter.

### Chemical Additives

#### Chemical additives to modify soil fertility shall not be used in the construction of the engineered growing media.

#### Hydrated lime shall not be used to stabilize engineered growing media or promote soil aggregation. Soils treated this way shall not be used for planting trees. If the engineered growing media is treated with hydrated lime, it shall be removed and replaced with suitable un-limed soils.

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

## Installation of Engineered Growing Media

### The Contractor shall install engineered growing media in accordance with the following specifications:

### Site Preparation and Grading

#### The Contractor shall verify that all existing grades and elevations are correct and in accordance with the specifications. If any deficiencies occur, the Region shall be notified, and the deficiencies shall be rectified as required prior to installation of the engineered growing media.

### Placement of Engineered Growing Media

#### Engineered growing media shall only be installed during periods when mix and subgrade soils are friable.

#### Engineered growing media shall not be installed when saturated, frozen or excessively dry.

#### Engineered growing media shall be installed as soon as the subgrade preparation is completed.

#### Tracked or large-tired equipment shall be used to install the engineered growing media, and repeated passes over areas of soil installation shall be avoided to the greatest extent possible. Where possible, cranes or conveyors shall be used to deliver engineered growing media from stockpiles to the installation area. Soil blowers and soil pumps shall not be used to install the engineered growing media.

#### Engineered growing media shall be installed in lifts as specified below:

##### Finished subgrade soil shall be scarified using a toothbar attachment on an excavator, or other Region-approved equivalent equipment, to a depth of 100mm or greater, prior to the installation of the first lift of the engineered growing media. Scarification will improve the transition between soil types, facilitate movement of water and nutrients, and improve root penetration into lower soil profiles.

##### The first lift of the engineered growing media shall be placed to a depth of between 25 mm to 50 mm. The first lift shall be tilled into subgrade soil using a toothbar attachment on an excavator, or other Region-approved equivalent equipment, in order to provide a gradual transition between the engineered growing media and the subgrade soil.

##### Remaining engineered growing media shall be installed in multiple lifts of between 150 mm to 300 mm. A minimum of 2 lifts are required.

##### Lifts and compaction shall be repeated until the soil depth, including any organic material which has been added, meets the requirements of the final grading.

##### The engineered growing media shall be compacted to between 75% and 80% of maximum dry density (Proctor).

##### Installation of the engineered growing media shall be suspended if the engineered growing media becomes overly saturated, overly dry, or frozen. The engineered growing media shall not be placed on wet or frozen subgrade soil.

### Addition of Organic Matter

#### Fill an additional 40 mm of organic matter (compost) into the top layer of the installed engineered growing media to a depth of between 60 mm to 90 mm.

### Fine Grading

#### The engineered growing media shall be fine graded to eliminate rough spots or low areas, and to ensure positive drainage. Trenches shall be prepared by means of cultivation and subsequent raking. Finished surfaces shall be between 50mm to 75 mm higher than the surrounding boulevard to allow for settlement in the first year.

#### All finished grades shall be smooth, uniform and firm against deep foot printing.

## Fertilizer

### Fertilizers: Commercial, complete, of neutral character; in granular, packet, or pellet form, 75% percent of nitrogen shall be slow release form, 50% of the elements of which shall be derived from organic sources.

### The following fertilizer requirements are for tendering purposes only:

#### Trees: 10-6-4 at 1 kg per 25 mm of tree caliper or as outlined in the planting soil analysis fertilizer recommendations.

#### Planting Beds: 12-6-4 at 1 kg per cubic metre of planting soil or as outlined in the planting soil analysis fertilizer recommendations.

#### Seedlings: 10-6-4 at 100 grams per seedling or as outlined in the planting soil analysis fertilizer recommendations.

## Planting Bed Mulch

### Pine Bark Mulch – derived from the bark of pine trees, shredded to a medium grind, maximum 25 mm diameter particle size, free from twigs, leaves, branches, noxious weed seed and foreign material harmful to plant growth and other extraneous material. Pine bark mulch will be used for general planting beds in planting areas 1 through 6.

### Decorative Shredded Cedar Mulch - derived from cedar, shredded to a fine grind, free from twigs, leaves, branches, noxious weed seed and foreign material harmful to plant growth and other extraneous material. Decorative shredded cedar mulch will be used in areas surrounding administration buildings in planting area 7.

### The Contractor shall provide samples of the above and other approved equivalent mulch sources for review and approval by the Consultant prior to delivery of any mulch to the Site.

### The Contractor shall be responsible for the pick-up and delivery of all approved planting bed mulch from the source of supply to the Site.

## Water

### Water will be potable and free of impurities and chlorine that would inhibit germination and growth.

### Water temperature will not be more than 10OC below ambient air temperature.

### The Contractor will be responsible for obtaining water from its own sources. The Contractor will be responsible for obtaining any permits or certificates for water usage.

### Water tanks used for the application of water will be clean and free of any contaminants that will be hazardous to the growth and development of plant material or to the general environment.

### Pumps used for watering plant material will be capable of reaching the limits of the Site. The outlet end of the hose will be 25 mm in diameter with a quick shut-off valve connected to a functioning water injection pipe.

### Watering and Installation of Gator Bags (Deciduous trees)

#### The Contractor shall surface water each tree immediately following planting with 40 litres of water. Water shall be free from any contaminants which could adversely affect the tree’s survival and growth. The Contractor shall not apply fertilizer to any tree without the prior written permission of the Region.

#### The Contractor is responsible for obtaining its own source of water.

#### At the time of planting, the Contractor shall supply and install a new 75 litre TreeGator Watering Bag manufactured by Spectrum Products Inc. or an approved equivalent according the manufacturer’s instructions on each deciduous tree planted.

#### During the warranty period, the Contractor will be responsible for the maintenance of TreeGator watering bags or their approved equivalent. Damaged watering bags shall be replaced by the Contractor within 20 Working Days of written notification from the Region.

## Wooden Survey Stake

### Wood stake measuring 600 mm in length. Colour flagging tape will be used to differentiate between stake markers.

# EXECUTION

## Examination

### Planting work will be carried out in conformance with the best horticultural practices and the standards specified in subsection 1.5 above.

### Ensure that grading and backfilling have been completed in accordance with the Contract Drawings.

### Examine the Site before commencement of the Work, and inform the Consultant if Site conditions will not permit the completion of the Work of this Section as specified in the Contract Documents.

### Keep the Site well drained. Keep landscape excavations dry.

### Do not plant materials until they have been accepted by the Consultant.

### Do not remove labels from plants until they have been inspected and accepted after planting by the Consultant.

### Immediately clean up all soil or debris spilled onto pavement and dispose of deleterious materials off Site.

### Ensure that all barrier fencing is in place in order to protect existing vegetation that is to be retained prior to commencing the cultivation of planting areas.

## Percolation Tests

### Percolation tests shall performed by a licensed engineer according to the method specified in Minimum Property Standards For One and Two-Unit Dwellings, FHA Section 1103 103 in order to determine subsoil drainage in planting areas.

### Test hole depth: 750 mm.

## Transplanting

### Remove existing plantings which are identified for transplant prior to beginning the Work in the area in accordance with standard nursery practices, ANSI A300 (Part 6) and as specified in this Section.

### Lifting of Tree

#### All equipment to be used shall be designed specifically for tree transplanting and shall be clean, sharp, and in proper safe working order.

#### The root ball size shall be a diameter of 30 centimetres for every 2.54 centimetres of trunk diameter measured at 1.37 metres above grade and a depth of 90 centimetres. The trunk shall be centred in the root ball.

#### Prior to lifting the root ball, the roots shall be separated from the surrounding soil. Cuts to roots shall be clean and shall avoid breaking, crushing or tearing the roots. Root balls shall be secured and held firmly in order to prevent the root ball from breaking apart. Burlap and twine, and wire baskets may be required to secure the root ball. Trees shall be lifted by the root ball and not the trunk.

#### Trees shall be immediately moved to, and planted in, their new locations as specified below.

#### The root ball, trunk and crown shall be protected from damage during transplanting.

#### Trees shall be protected from sun and wind during transport.

### Digging and Size of Planting Holes

#### The diameter of the planting hole must be 60 centimetres wider than the diameter of the root ball. The depth of the hole shall result in the top of the root ball being 5 centimetres to 10 centimetres above the surrounding grade. The sides of the planting hole shall be deglazed to allow for optimal root growth. The sides of the planting hole shall be constructed at a shallow angle with the top of the planting hole being wider than the bottom.

#### Adjustments shall be made for the differences in slope of the old and new planting sites. Trees shall be planted at the new location at the same azimuth as in their previous location.

#### The planting hole shall be dug just in advance of lifting the tree. Under no circumstances are planting holes to be left open and unattended.

### Backfilling of Planting Holes

#### Existing soil shall be used to backfill planting holes. Any large soil clods shall be broken apart prior to backfilling. Any large stones or debris contained in the existing soil shall be removed prior to backfilling. Where soil needs to be added, it shall consist of friable natural loam and is to be mixed with the native soil material before backfilling.

#### Trees which have been balled and burlapped for transplanting shall have all wire, rope, burlap and twine removed from the top 1/3 of the root ball.

#### The tree shall be placed in the planting hole such that the stem is in a vertical position prior to backfilling. The root ball shall not be damaged when straightening the tree.

#### Backfill shall be placed in layers approximately 15 centimetres in depth and firmly tamped in place in such a manner that the tree retains its vertical position without support. When the planting hole has been 50% backfilled, 20 litres of water shall be poured in the planting hole and allowed to fully drain before continuing to backfill. Particular care shall be taken to ensure that no air pockets remain under, or around, the root ball and that no damage occurs to the root system.

#### At the time of backfilling, the Contractor shall supply and install Myke Pro Landscape G mycorrhizae inoculants according to the manufacturer’s instructions.

#### At grade, a ridge of soil located at the edge of the planting hole shall be formed to a height of 10 centimetres, to act as a catch basin for any watering and in order to retain mulch. Existing sod removed from the planting hole may be used to create ridge at the edge of the planting hole. Sod must be placed with the above ground grass growth facing down.

#### All excess fill removed from the planting holes and any other debris resulting from the Contractor’s performance of the Work shall be removed and disposed of by the Contractor.

### Do not remove container-grown stock from the containers before the time of planting.

### Bare-Root Plants:

#### Dig up with the least possible injury to the fibrous root system.

#### Immediately upon removal of plants from the ground, cover the roots with a thick coating of mud or wrap in wet straw, moss, or other suitable packing material for protection from drying until planted.

#### Plant or heel-in immediately upon relocation of the plants to temporary storage. Open and separate bundles of bare-root plants, and eliminate air pockets among roots as they are covered.

### Replant each temporarily removed tree, shrub, or other plant only after construction activities are completed and all applicable grading and topsoil replacement is completed in its vicinity. Replant trees, shrubs, and other plants in their original locations/positions unless otherwise shown on the Contract Drawings or approved by the Consultant. Plant as specified for new plants.

### Maintain transplanted materials in the same manner as new trees and shrubs.

## Location of Plants

### Distribution of new plant material has been defined within the following planting areas:

#### [       ]

#### [       ]

#### [       ]

#### [       ]

#### [       ]

### Stake the position of plant material and planting beds as shown on the planting plan unless obstructions are encountered, in which case notify the Consultant. The location of trees and planting beds, where indicated on the Contract Drawings, are approximate and may require adjustments in the field due to Site conditions. The staked location of all plant material will be reviewed by the Consultant. Excavation may commence following the Consultant’s inspection and approval of staking.

### Trees and Shrubs:

#### The location of trees and shrubs are defined on the Contract Drawings. Refer to the Tree, Shrub and Ground Cover Plant List for quantities designated by Planting Area.

#### All shrubs will be situated within a common planting bed.

### Seedlings:

#### The location of seedlings has been defined on the Contract Drawings.

#### Refer to the Seedling Plant List for quantities designated by Planting Area.

#### All shrub seedlings will be situated within a common planting bed.

### No planting, except ground cover, shall be located closer than 4.0 metres to pedestrian pathways and structures.

### Request that the Consultant observes and approves the new planting locations, and adjusts as necessary before planting begins.

## Preparation

### Subsoil Drainage: Outline the appropriate drainage requirements for each soil condition encountered during planting operations based on percolation test results.

### Planting Soil: Delay the mixing of fertilizer into planting soil if planting will not follow the preparation of the planting soil within 3 Days.

### Excavation of Planting Beds and Planting Pits:

#### Planting Bed:

##### Excavate planting beds for all shrubs and seedling shrub species to meet the following requirements:

##### Depth:

###### Excavate to a depth of 450 mm.

###### Backfill all planting beds with the planting soil mix prior to initiating the planting operation.

###### Additional depth will be required to accommodate planting pit requirements for trees situated in planting beds.

##### Area:

###### The extent of the planting bed perimeter is to extend 500 mm beyond the root ball of the outer most plant material situated in the planting bed.

#### Planting Pit:

##### Excavate the planting pit for all trees and seedling tree species in order to meet the following requirements:

##### Depth

###### Excavate to a depth equal to the root ball depth or pot depth.

###### Scarify the bottom of the planting pit to a depth of 150 to 250 mm so that water and roots can readily penetrate.

###### Excavate with vertical and scarified sides.

###### Protect the bottom of the planting pit from freezing.

##### Diameter

###### B&B/W.B. Plants: Make the excavation diameter a minimum of 2½ times as wide as the root ball diameter.

###### Container-Grown Plants: Excavate as specified for B&B stock, adjust for the size of the containers width and depth.

###### Bare-Root Plants: Excavate pits to a width to just accommodate the roots fully extended and a depth to allow the uppermost roots to be below the original grade.

#### Soil Preparation Area: cultivate soil to a depth of 300 mm in an area surrounding standalone planting pits equivalent to 2.0 metres beyond the perimeter of shrub species planting beds and five times the rootball diameter of tree species planting pits.

#### Fill excavations with water and allow it to percolate out prior to planting.

### Dispose of excavated material from tree pits and planting beds off Site at no additional cost to the Region.

## Bed Preparation Area

### At the time of planting, the Contractor shall establish a circular bed preparation area extending 35 centimetres from the edge of the planting hole for the entire circumference of the planting hole. Within the bed preparation area all grass shall be removed and the soil cultivated to a depth of a minimum of 15 centimetres to improve future root growth (refer to Standard Drawings NHF-100, NHF-106, NHF-101 and NHF-107).

## Planting Time

### Caliper trees shall be planted between May 1 and June 30. The Consultant may extend or shorten the planting time based on weather conditions.

## Planting

### The diameter of the planting holes shall be 60cm wider than the diameter of the root ball. The depth of the holes shall result in the root collars being at 5 centimetres to 10 centimetres above the surrounding grade after settling (refer to standard drawings NHF-100, NHF-106, NHF-101 and NHF-107) the sides of the planting hole shall be constructed at a shallow angle, with the top of the planting hole being wider than the bottom.

### All planting holes shall be hand dug. Alternate digging methods and/or equipment may be approved, in writing, at the Consultant’s discretion.

### No holes shall be dug unless the trees are present for planting. Under no circumstances are planting holes to be left open overnight.

### Should an existing tree and/or root ball be encountered when digging the planting hole, the Contractor shall remove and dispose of the existing tree and/or root ball including wire basket, burlap and rope. This does not apply to trees or stumps over 70mm in diameter.

### Plant material shall not be placed in the planting pit until all evidence of frost has left the ground.

### Set plants plumb so that they are in the same relationship to the finished grade, after settlement, as they were in the nursery or pot.

### Face plants to provide the best appearance when viewed from prime vantage points and prominent views (that is, sidewalk, building, street etc.), to the acceptance of the Consultant.

### Trees shall be planted at the same azimuth as they were grown in the nursery. For trees selected and tagged in the nursery, a vertical white line at the base of the tree will mark the north side. All trees shall be planted with the vertical white line facing north.

### Perform planting in a continuous operation, completing total areas, including mulching, rather than focusing on completing individual species.

### Plant trees before planting surrounding smaller shrubs and ground covers.

### B&B Plants: Place in the pit by lifting and carrying by its ball (do not lift by the branches or trunk). Lower into the pit and place the root ball on scarified ground. Set straight in the pit centre with the tip of the root ball 25 mm to 50 mm above the adjacent finished grade.

### Bare-Root Plants: Treat roots with a root stimulant prior to installing. Spread the roots and set the stock on a cushion of planting soil mixture. Set straight in the pit centre so that the roots, when fully extended, will not touch the walls of the planting pit and the uppermost root is just below the finished grade. Position the roots to lie in their natural position

### Container-Grown Plants: Carefully remove the container prior to planting, slash the edges of root balls three times from top to bottom a minimum of 13 mm deep (tree, shrub and vines only). Plant as for B & B plants.

## Backfilling of Planting Holes

### Existing soil shall be used to backfill planting holes. Any large soil clods shall be broken apart prior to backfilling. Any large stones or debris contained in the existing soil shall be removed prior to backfilling. Where soil needs to be added, it shall consist of friable natural loam and is to be mixed with the native soil material before backfilling.

### Wire basket stock shall have all wire, rope, burlap and twine removed from the top 1/3 of the root ball. The tree shall be placed in the planting hole such that the stem is in a vertical position prior to backfilling. The root ball shall not be damaged when straightening the tree.

### Backfill shall be placed in layers approximately 15 centimetres in depth and firmly tamped in place in such a manner that the tree retains its vertical position without support. When the planting hole has been 50% backfilled, 20 litres of water shall be placed in the planting hole and allowed to fully drain before continuing to backfill. Particular care shall be taken to ensure that no air pockets remain under, or around, the root ball and that no damage occurs to the root system.

### At the time of backfilling, the Contractor shall supply and install Myke Pro Landscape G mycorrhizae inoculants, or an approved equivalent, according to the manufactures instructions.

### At grade, a ridge of soil located at the edge of the planting hole shall be formed to a height of 10 centimetres, to act as a catch basin for any watering and in order to retain mulch (refer to Standard Drawings NHF-100, NHF-106, NHF-101 and NHF-107). Existing sod removed from the planting hole may be used to create the ridge at the edge of the planting hole. Sod must be inverted such that the above ground grass growth faces down.

### All excess fill removed from the planting holes and any other debris resulting from the Contractor’s performance of the Work shall be removed and disposed of by the Contractor.

## Pruning

### The crown of the tree shall be pruned at the time of planting to remove all dead and damaged branches. All cuts shall be made flush with the branch collar leaving no stubs. Pruning shall be completed according to the ANSI A300 standard. Large wounds produced by any means other than branch pruning will render the tree unacceptable, requiring replacement by the Contractor, at its own expense.

## Staking

### The Contractor shall note that staking and securing of trees is not a typical requirement of the Region. However, should any trees move 10 degrees or more from the vertical plane prior to the expiration of the warranty period, or if a tree has excessive stem movement within the root ball at the time of planting, the Contractor will be required to straighten and stake the trees at its own expense. Straightening and staking shall occur within 20 Days of written notification from the Consultant.

### Where staking is required, caliper trees shall be supported by two wooden stakes driven outside the ball in line with the direction of the prevailing wind. The stakes must be driven a minimum of 70 centimetres below the grade line, leaving a minimum of 5 centimetres between the top of the stakes and the first branch.

### Ties shall be made from rubber hose, not plastic hose, having an outside diameter of 2.5 centimetres. The hose must completely encircle the trunk of the tree to ensure that no wire will come into contact with the bark of the tree. The wire tension must be such that the tree is firmly, but not too tightly, supported, remaining in a vertical position (refer to Standard Drawings NHF-105, NHF-110, NHF-104 and NHF-109). During the warranty period the Contractor will be responsible for the maintenance of stakes and ties. Broken stakes or ties shall be repaired by the Contractor within 20 Working Days of written notification from the Consultant.

### Upon the final warranty inspection, the Contractor will be responsible for the removal and disposal of stakes and ties on all trees.

## Mulching

### At the time of planting, the Contractor shall apply a wood chip or shredded bark mulch, to a depth of 15 centimetres after settling, over the entire planting hole and bed preparation area. A ring of mulch 30 centimetres in depth shall be shaped around the outer edge of the planting hole in order to capture rainfall (refer to Standard Drawings NHF-100, NHF-106, NHF-101 and NHF-107). Mulch shall not be in contact with the stem of the tree. The mulch shall be free of non-organic debris and contaminants which could adversely affect the tree’s survival and growth.

## Tree Wrapping, Tags and Labels

### The Contractor shall remove all tree wrapping and ties at the time of planting. The Contractor shall not remove tags and/or labels.

## Watering and Installation of Gator Bags

### The Contractor shall surface water each tree immediately following planting with 40 litres of water. Water shall be free from any contaminants which could adversely affect the tree’s survival and growth. The Contractor shall not apply fertilizer to any tree without the prior written permission of the Consultant.

### The Contractor is responsible for obtaining its own source of water.

### At the time of planting, the Contractor shall supply and install a new 75 litre TreeGator Watering Bag manufactured by Spectrum Products Inc. or an approved equivalent according the manufactures instructions on each deciduous tree planted.

### During the warranty period the Contractor will be responsible for the maintenance of TreeGator watering bags or their approved equivalent. Damaged watering bags shall be replaced by the Contractor within 20 Working Days of written notification from the Consultant.

## Tree Guards

### The Contractor shall supply and install tree guards around all deciduous trees planted. Tree guards shall be ArborGard + AG9-4 Tree Trunk Protector or an approved equivalent. Tree guards shall be installed flush to the ground following the manufacturer’s instructions (refer to Standard Drawing NHF-100 and NHF-101).

## Warranty Period

### For the purposes of this Section, defects and deficiencies shall include, but not be limited to:

#### Dieback of the original crown, 30% or greater, such that in the sole opinion of the Consultant, the form and vigour of the tree or shrub is no longer of an acceptable standard and/or size as previously specified; or

#### Leaning of a tree or shrub of 10 degrees or more from the vertical plane.

### Year One

#### During August of the first year following planting, or at such other time(s) as the Consultant may deem appropriate, the Consultant may inspect the caliper trees planted to identify those which require replacement under the warranty provisions of the Contract. Following the inspection, the Consultant will supply the Contractor with a written list of those caliper trees requiring replacement under the warranty provisions of the Contract. The Contractor shall replace these trees during the Spring Planting Season (May 1 to June 30) of the following year.

### Year Two

#### During August of the second year following planting, or at such other time(s) as the Consultant may deem appropriate, the Consultant will inspect the caliper trees planted to identify those which require replacement under the warranty provisions of the Contract. Following the inspection, the Consultant will supply the Contractor with a written list of those caliper trees requiring replacement under the warranty provisions. The Contractor shall replace these caliper trees during the Spring Planting Season (May 1 to June 30) of the following year. Trees not identified for replacement in the second year following planting are considered acceptable and the warranty shall expire.

## Replacement Caliper Trees – Additional Warranty

#### Caliper trees planted as warranty replacements shall be guaranteed for the greater of, the remainder of the warranty period, or an additional period of 12 months following the date of planting. At the end of the warranty period, the Consultant will inspect the warranty replacement caliper trees to identify those which require replacement under the warranty provisions of the Contract. Following inspection the Consultant will supply the Contractor with a written list of those caliper trees requiring replacement under the warranty provisions of the Contract. The Contractor shall replace these caliper trees during the Spring Planting Season (May 1 to June 30) of the following year.

#### Warranty replacement caliper trees shall be the same species as the caliper tree originally planted. All warranty replacement caliper trees shall meet the stock and planting specifications noted above.

## Warranty Period Maintenance

#### Watering

##### The Contractor shall water each caliper tree once per week for the months of May to September inclusive for the first three years following planting.

##### The Contractor shall apply 75 litres of water per calliper tree through the filling of a TreeGator Watering Bag. The Contractor will be responsible to ensure that each TreeGator Watering Bag filled, empties within 24 hours of filling. For calliper trees without a TreeGator Watering Bag the Contractor shall apply 75 litres of water through surface application. Water shall be free from any contaminants which could adversely affect tree survival and growth. The Contractor shall not apply fertilizer to any tree without the prior written permission of the Consultant.

##### The Contractor is responsible for obtaining its own source of water.

#### Wrapping of Coniferous Trees

##### During the warranty period, the Contractor shall install and remove burlap on each coniferous tree planted. The burlap shall protect all green foliage and be secured to prevent unwrapping. The burlap shall be installed in such a way as to minimize damage to the tree. The Contractor shall repair any tree damage resulting from the installation of burlap. If in the sole opinion of the Consultant the damage is repairable, the Contractor shall replace the tree at its own expense. Coniferous trees shall be wrapped during the months of December, January, February and March, or at such other times as the Consultant may deem appropriate in its sole discretion. Wrapping shall not be installed prior to November 15 and shall be removed by April 15. The Contractor will be responsible for the maintenance of tree wrapping. Deficient tree wrapping and tree damage shall be repaired or replaced by the Contractor within ten (10) Working Days of written notification from the Consultant.

#### Year One Maintenance

##### In the first year after planting, the Contractor shall provide additional maintenance (as indicated in the following paragraph) to all caliper trees planted.

##### Year one maintenance shall consist of the reapplication of mulch in accordance with the specifications noted above and the application of a granular slow release or water soluble complete fertilizer (N-P-K, 12-14-20) with micronutrients and a salt index of less than 50. Application of fertilizer shall be completed by September 1.

#### End of Warranty Maintenance

##### Following the warranty inspection in the second year after planting, the Contractor shall provide additional maintenance (as indicated in the following paragraph) to all caliper trees planted which have not been identified for replacement.

##### End of warranty maintenance shall consist of pruning in accordance with ANSI A300 standard to remove sucker growth and dead wood, the reapplication of mulch in accordance with the specifications noted above, the application of a granular slow release or water soluble complete fertilizer (N-P-K, 12-14-20) with micronutrients and a salt index of less than 50, the removal of the Tree Gator watering bag, and the removal and disposal of stakes and ties. Application of fertilizer shall be completed by September 1.

##### Removed Tree Gator watering bags are to be returned to the Region at 90 Bales Drive East, Town of East Gwillimbury.

##### There is no separate payment item for the maintenance of caliper trees during and at the end of the warranty period. This work shall be considered to be part of the Contract Work and the Contract unit prices for the supply and installation of the caliper trees shall include the costs for maintaining the trees during and at the end of the warranty period.

### Payment

#### Payment shall be made at the applicable unit price per caliper tree supplied and installed and shall be full compensation for all labour, material and equipment required to complete the work of this Section.

#### Please refer to subsection 1.3 – Measurement and Payment, above.

### Balled and Burlapped (B&B)/Wire Basket (W.B.) Plants:

#### Remove all synthetic material prior to backfilling.

#### Partially backfill the pit to support the plant.

#### Backfill in maximum 150 mm lifts and compact to remove air pockets until the planting pit is 1/3 full.

#### Remove burlap and binding from the sides and top one third of the root ball. Do not pull burlap from under the balls. Remove the wire basket from the entire circumference of W.B. plants.

#### When the excavation is approximately 2/3 full, water thoroughly before placing the remainder of backfill in order to eliminate air pockets. Complete backfilling in 150 mm lifts until the finished grade is achieved.

#### Never cover the top of the rootball with soil.

#### Establish a tree saucer and water as outlined above.

### Bare-Root Plants:

#### Plumb before backfilling and maintain plumb while working the backfill around the roots and placing the layers above the roots.

#### Set the original soil line of the plant 25 mm to 50 mm above the adjacent finished grades. Spread out roots without tangling or turning up to surface. Cut injured roots cleanly; do not break.

#### Carefully work the backfill around the roots by hand to the crown in 150 mm lifts; puddle with water until the backfill layers are completely saturated.

#### Form a berm/saucer above the existing grade, completely around the outer rim of the planting pit.

### Provide an earth saucer at the base of individual trees and shrubs. The diameter of the saucer shall correspond to the planting pit diameter as outlined in the planting detail on the Drawings.

## Guying and Staking

### All trees shall be staked and tied immediately following planting to ensure vertical alignment and plant stability in accordance with the Contract Drawings.

### Staking: Support deciduous trees 40 mm in caliper and less with one stake. For all deciduous trees with a caliper greater than 40 mm use two stakes spaced equally around each tree in line with the tree trunk. Support all coniferous trees up to 1.5 metres in height with 2 stakes spaced equally around each tree in line with the tree trunk. Support all coniferous trees greater than 1.5 metres in height with three stakes spaced equally around each tree.

### Guying: Support all coniferous trees greater than 1.5 metres with one guy wire for each stake.

### Rubber hose shall be used as a cover over the tie to protect the tree bark from damage. The rubber hose shall be cut to a sufficient length to loosely encircle the tree trunk and provide the necessary support.

### Bright red plastic surveyor’s tape will be tied to all guy wires. The tape shall be tied halfway up the length of the wire and shall be clearly visible. Guy wires shall be tightened using galvanized turnbuckles.

### Adjust the tension in guy wires and ties as required during the warranty period.

### Remove stakes and guy wires at the end of the warranty period.

## Tree Guard

### Install around the main stem of the trees with an appropriate tree guard based on the caliper of the tree. Extend the tree guard from the ground line to a height of 600 mm. Install the tree guard immediately after planting.

### Install around the main stem of seedlings with the appropriate tree guard based on the caliper of the seedling. Extend the tree guard from the ground line to a height of 600 mm. Install the tree guard immediately after planting.

### Wire mesh guards shall be cut in lengths sufficient to cover the circumference of the tree trunk, maintaining a minimum 50 mm distance from the tree trunk, as well as providing a minimum 25 mm overlap. Wire mesh guard shall be a minimum of 600 mm in height. Wire mesh guards shall be fastened using a minimum of four hog rings or clips per guard.

### White plastic corrugated pipe will be cut to a minimum 600 mm height and slit once vertically and placed around the tree trunk. Ensure that there is a minimum of 50 mm clearance between the trunk and pipe.

### Before installing the tree guard, spray trunks with a moisture absorbent powder of long residual insecticide to provide protection from borers.

### Ensure that the base of the tree guard rests on the bottom of the ground and is in continuous contact with the ground. Ensure that the tree guard base is covered with 100 mm of mulch.

## Fertilizer

### Add as top dressing depending on the plant size and the manufacturer’s recommendations upon completion of planting operations or during the warranty period.

## Mulch Installation

### Install mulch immediately after planting and prior to the initial watering and placement of tree guards.

### Mulch bed shall be applied in a uniform continuous blanket to the surface area surrounding each individual tree and all shrub planting beds. The depth of mulch will be

#### 100 mm (after settlement). Mulch bed shall not exceed 120 mm in depth (after settlement). Excess mulch shall be removed by the Contractor.

### For all trees, the mulch surface area shall extend over the full extent of the planting pit and the earth berm/saucer and shall include an additional 300 mm radius beyond the circumference of the earth berm/saucer.

### For all shrub planting beds, the mulch surface area shall extend 300 mm beyond the perimeter of the planting bed.

### Keep mulch 150 to 250 mm away from the trunk of all plant material in order to prevent rodent nesting and disease (rot).

### Saturate the planting area with water after placing mulch.

## Watering

### Watering of all plant material will commence immediately following installation. Apply sufficient water to saturate the root zone.

### Initial watering shall be uniformly applied to each individual tree by two injection applications directly into the soil. Both injections shall be located at the outer edge of the planting pit and will penetrate the ground to a depth of 450 mm. The second injection shall be 180 degrees from the initial injection.

### For planting beds, water shall be applied to the entire mulched surface area. Ensure a minimum penetration of 200 mm depth.

### Water shall be uniformly applied to avoid dislocating mulch, soil and plant material.

### Do not overwater or drown plants (upland plant material).

### Keep all plants well watered to ensure a vigorous, healthy growing condition.

### The Contractor shall maintain appropriate hydrological conditions using available water or imported potted water as required in order to maintain the plant material in a vigorous, healthy growing condition.

## Pruning and Repair

### Prune only after planting and in accordance with ANSI Standard A300 (Part 1) Pruning.

### Prune to preserve the natural character of the plant.

### Perform pruning in the presence of the Consultant.

### Remove all dead wood, suckers, and broken or injured branches.

### Do not remove leaders. Do not plant trees without a prominent, vigorous leader.

### Use sharp, clean tools. Make cuts smooth, clean and flush to base members. Leave no stubs.

### Cut back cambium to living tissue where cuts are made, and at bruises, scars and other injuries. Shape wood to prevent the retention of water.

## Weed Control

### Maintain a weed-free condition within the planting areas.

## Protection of Installed Work

### Protect planting areas and plants against damage for the duration of maintenance period.

### Mark the locations of all small plant material with a coloured utility marker to identify the location of plant stock and to prevent accidental cutting during maintenance activities.

## Adjustment and Replacement

### Perform adjustment and replacement Work with materials of the same type and quality as outlined in the Plant List(s) on the Contract Drawings.

### Replacement work shall have a warranty of the same length and with the same conditions as outlined in this Section.

### The date of the renewed warranty will be from the time of Consultant approval of the replacement work.

### The Contractor shall document all replacement materials on the Contract Drawings identifying the plant material location, plant species name, quantity, reason for replacement and date of replacement.

### A copy of documentation with respect to all replacement work carried out shall be provided to the Consultant within 3 weeks of completion of the planting work.

**END OF SECTION**