

1. GENERAL

1.1 RELATED WORK

- .1 Section 31 24 13 – Roadway Excavation, Embankment and Compaction.
- .2 Section 32 91 00 – Topsoil, Seeding and Sodding.

1.2 REFERENCE STANDARDS

- .1 All the work of this section shall be carried out in accordance with the Canadian Nursery Landscape Association's "Canadian Standards for Nursery Stock" latest edition thereof except where otherwise specified.

1.3 SOURCE QUALITY ASSURANCE

- .1 Obtain approval from the Engineer of plant material at the source prior to digging. All plant material must be hardy to Zone 2A, and the source of the plant material must be grown in Zones 2A, 2B or 3A of the Canadian Hardiness Map (1981-2010). Plants grown outside of these Zones must be approved by the Engineer.
- .2 Imported plant material must be accompanied with the necessary permits and import licenses. Conform to federal and provincial regulations.
- .3 All plant material shall meet Horticultural Standards of Canadian Nursery Trades Association regarding grading, quality, and nomenclature.
- .4 Supply nursery grown plants true to type, structurally sound, well-balanced, healthy, vigorous, of normal growth habits, densely foliated when in leaf with healthy, well-developed strong fibrous root systems.
- .5 Supply plants of first grade quality, free of disease, insect infestation, insect eggs, physical injury, rodent damage, sun scald, frost cracks, and other abrasions or scars to bark.

1.4 SCHEDULING

- .1 Obtain approval from the Engineer of the schedule, seven (7) days in advance of the shipment of the plant material.
- .2 Schedule to include:
 - .1 Date for the selection of plant material or representative sample at the source by the Engineer.
 - .2 Shipping dates.
 - .3 Arrival dates on Site.
 - .4 Planting dates.

1.5 PRODUCT DATA

- .1 Provide product data for:
 - .1 Fertilizer.

- .2 Anti-desiccant.
- .3 Guying assembly including collar, guying rope, and anchors.
- .4 Mulch.

1.6 MEASUREMENTS FOR PAYMENT

- .1 The unit prices within the Bid Forms will be full compensation to the Contractor for all work completed or for goods and services furnished by it and shall include the supply of all supervision and labour, equipment and tools, materials, mobilization and demobilization, quality control testing, and the performance of all tasks and activities incidental to the Work.
- .2 Tree, shrubs, and perennials will be measured in units installed. The unit price provided shall include all costs associated with the supply, delivery, storage and protection, pre-planting operations, excavation and preparation for planting, watering, fertilizing, tree supports/guying, tree anchors, maintenance during the warranty and maintenance period, and all other tasks related to, or incidental to, the supply and placement of the trees, shrubs, or perennials. The unit price shall also include all costs associated with the removal and disposal of surplus material (including surplus material generated to facilitate placement of the tree, shrub, or perennial item).
- .3 Mulch will be measured in square metres of mulch placed at the required thickness, as specified within the Bid Forms. The unit price shall include all costs associated with the supply, placement, preparation work, maintenance, and all other tasks related to, or incidental to, the supply and placement of the mulch.

2. PRODUCTS

2.1 PLANT CHARACTERISTICS

- .1 All plants shall be true to form and growth habit typical of their species.
- .2 Trees shall be straight according to their natural habit of growth. Double leaders are not acceptable.
- .3 Clump or multi-stem trees shall have three or more main stems originating from a common base at the ground line.
- .4 Shrubs shall have a natural form, typical of genus, species and variety, with a minimum of four canes.
- .5 Vines shall have at least four runners, each with minimum length of 300mm
- .6 Ground covers shall have healthy tops, size proportionate to root requirements, and be typical of species and variety.
- .7 Herbaceous plants shall have healthy crowns, size proportionate to root requirements, typical of species and variety, not less than two years old and twice transplanted.
- .8 Plants that have been injected with growth hormones are not acceptable.

- .9 Plant material is to be inspected by the Engineer on Site prior to planting.

2.2 PLANT MEASUREMENT

- .1 Plants will be measured in the units of caliper, height, or spread called for on the Drawings.
- .2 Caliper, measured on deciduous trees only, shall mean trunk diameter measured 350mm above grade at which the tree originally stood at its source.
- .3 Height will be measured from grade at which plant originally stood at its source to top of main body of plant, not to the top of the long leader.
- .4 Spread is lateral diameter of main body of plant at its widest natural dimension, not from branch up to branch tip

2.3 BARE ROOT PLANTS

- .1 Bare root plants must be of specified size when in a dormant state. Roots must be pruned to remove damaged portions.

2.4 CONTAINER GROWN PLANTS

- .1 Grown in containers for minimum of three (3) months.
- .2 Have an established root system which will "hold" soil when removed from container.
- .3 All plants shall be hardened off, dormant, and have sound buds set intact prior to planting.
- .4 Container size must be in proportion to plant size.
- .5 Root bound plants are not acceptable.
- .6 Supply shrubs to the following minimum standards:
 - .1 Deciduous shrubs: #2 container class.
 - .2 Coniferous shrubs: #2 container class
 - .3 Native deciduous trees for reclaiming native areas: #10 container class
 - .4 Native coniferous trees for reclaiming native areas: 0.75m height
 - .5 Native deciduous shrubs for reclaiming native areas: #1 container class
 - .6 Native coniferous shrubs for reclaiming native areas: #1 container class

2.5 COLLECTED STOCK

- .1 When collecting stock utilizing a tree spade, the size of the tree spade shall be 100mm in diameter for every 10mm of tree caliper (e.g. a 150mm caliper tree requires a 1500mm tree spade).

2.6 BALLED AND BURLAPPED PLANTS

.1 Ball sizes for nursery trees:

.1 Supply nursery grown plants with minimum size balls as follows:

Deciduous	Caliper (mm)	Ball Diameter (mm)
	20*	400
	25*	450
	30*	500
	35*	600
	50	700
	60	800
	70	900
	80	1000
	90	1100
	100	1100
	125	1200
	150	1300
	175	1400
	200	1600

*Note minimum caliper of deciduous trees is 50mm.

Coniferous	Height (mm)	Ball Diameter (mm)
	1000	350
	1250	400
	1500	500
	1750	600
	2000	900
	2500	1000
	3000	1200
	3500	1400
	4000	1650

*Note minim height of coniferous trees is 2500mm

- .2 Adjust ball size according to growth habits of plants.
- .3 Ball size shall be sufficiently large to contain at least 75% of fibrous root system with a ball depth not less than 50% of ball diameter.
- .4 Soil balls shall be secured with burlap, heavy twine and rope, or burlap, wire baskets and rope.

- .2 Supply single burlap on root balls less than 500mm in diameter; double burlap on balls from 500mm to 600mm in diameter; double burlap and drumlace with 6mm rope at 200mm spacing on root balls 600mm and larger in diameter.

2.7 WATER

- .1 Free of impurities, minerals or chemicals which may be detrimental to plant growth.

2.8 GUYING ROPE/WIRE

- .1 Polypropylene: 6mm (1/4") to 12mm (1/2")
- .2 Wire: 3mm to 4mm malleable galvanized steel.

2.9 ANCHORS

- .1 Tree anchors shall be "Land Anchor" with 300mm ardox spikes or approved equal.
- .2 Steel Stakes to be T-rail stakes, 610mm long, primed with one coat black zinc rich paint to CGSB-GP-181b.
- .3 Ground Anchors to be 100mm diameter steel disc, underground screw-in type.
- .4 Duckbill Model 68 DTS Tree Support Kits.
- .5 T-Rail Steel Posts to be 2440mm, primed with one brush coat black zinc rich paint to CGSB 1-GP-181b.

2.10 TURNBUCKLES

- .1 Factory galvanized, 150mm eyes and 10mm diameter threaded opening for tightening.

2.11 GUYING COLLAR & TREE RINGS

- .1 Fabricated from 3mm to 4mm galvanized wire encased in two-ply reinforced 13mm diameter nylon reinforced rubber garden hose or equivalent.

2.12 TREE WRAPPING

- .1 New, clean, plain burlap strips minimum 2.5kg/m² mass and 150mm wide, or approved equivalent.

2.13 TRUNK PROTECTION

- .1 Wire mesh: galvanized, electrically welded 1.4mm wire with 25mm x 25mm mesh and fastener.
- .2 Plastic: perforated spiraled strip or "tubex".

2.14 MULCH

- .1 Bark chips: varying in size from 25mm to 100mm in diameter, consisting of a mixture of coniferous and deciduous material.
- .2 Wood chips: varying in size from 50mm to 100mm and 5mm to 20mm thick.
- .3 Shredded wood: varying in size from 25mm to 200mm in length.
- .4 Peat moss shall be decomposed plant material, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron, with minimum of 60% organic matter by mass, and pH value between 5.5 and 7.0.

2.15 FERTILIZER

- .1 Do not fertilize trees in the first year after planting, before June 15, or after October 1.

- .2 Complete, commercial fertilizers, containing not less than 60% urea-formaldehyde by weight and have a minimum of 50% of elements derived from organic sources.
- .3 Quantities are based on the following minimum rates:
 - .1 20-20-20 @ 1 kg/25 L of water or 14-14-14 Ozmokote @ 15kg/1.0m² of shrub area.
 - .2 10-6-4 @ 1.5kg/2.5 cm caliper tree in the second year of planting.
 - .3 Apply water after fertilizing to ensure penetration of fertilizer when required.

2.16 ANTI-DESICCANT

- .1 Wax-like emulsion.

2.17 FLAGGING TAPE

- .1 25mm wide fluorescent, yellow in color, plastic survey tape.

2.18 WEED CONTROL

- .1 Pre-emergent weed control products shall be certified as safe for use around trees and shrubs. Proposed product to be approved by the Engineer prior to application.

3. EXECUTION

3.1 DELIVERY, STORAGE, AND PROTECTION

- .1 Protect plant material from frost, excessive heat, wind, and sun during delivery.
- .2 Immediately store and protect plant material which will not be installed within one (1) day after arrival at the Site in a storage location approved by the Engineer.
- .3 Protect plant material from damage during transportation:
 - .1 When the delivery distance is within 5km of the project limits use a tree spade, operated at a maximum speed of 50km/h.
 - .2 When the delivery distance is 5-30km, or the vehicle speed is less than 80km/h, tie tarpaulins around the plants or over the vehicle box.
 - .3 When the delivery distance exceeds 30km or the vehicle travels at speeds over 80km/h, use an enclosed vehicle.
- .4 Protect stored plant material from frost, wind, and sun and as follows:
 - .1 For bare root plant material, preserve moisture around roots by heeling-in or burying the roots in sand, topsoil, or sawdust and watering to the full depth of the root zone.
 - .2 For pots and containers, maintain the moisture level in the containers. Heel-in fibre pots.
 - .3 For balled and burlapped, and wire basket root balls, place to protect the branches from damage. Maintain the moisture level in the root zones.

- .5 Dispose of and replace damaged plants supplied by the Contractor at no extra cost to the Owner. During the maintenance and warranty period, replace plants found dead or not in healthy, satisfactory growing condition, or which do not meet specified requirements in a timely manner. Replacement plants shall be supplied and planted in accordance with the Drawings and Specifications.

3.2 PRE-PLANTING OPERATIONS

- .1 Verify all underground utility locations as per GC 40.
- .2 Ensure the plant material is acceptable to the Engineer.
- .3 Apply anti-desiccants to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

3.3 EXCAVATION AND PREPARATION FOR PLANTING

- .1 Establishment of the sub-grade for planting beds is specified Section 31 24 13 – Roadway Excavation, Embankment and Compaction.
- .2 Preparation of the planting soil is specified in Section 32 91 00 – Topsoil, Seeding and Sodding.
- .3 Stake out the locations of planting holes and obtain approval from the Engineer prior to excavating.
- .4 Prepare the planting hole as follows:
 - .1 Depth of the hole to be equal to the height of the root ball. The minimum depth of the hole is to be 400mm.
 - .2 The hole width is to be twice the root ball diameter.
- .5 For shrubs and perennials, prepare the planting bed as follows:
 - .1 Excavate the area of the planting bed to a depth of 450mm for perennial beds, and 650mm for shrub beds.
 - .2 Backfill with topsoil or soil mix and hand tamp firmly in layers not to exceed 150mm to ensure no settling, to a minimum compressed thickness of 100mm above finished grade.
- .6 Remove subsoil, rocks, roots, debris, and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
- .7 Remove water which enters excavations prior to planting. Notify the Engineer if the water source is groundwater.

3.4 PLANTING

- .1 Install when ground is frost free.
- .2 Hedge plants shall be spaced 1.0m apart.

- .3 Place the plant plumb in the centre of the bed or pit, and at the same depth as previously grown at source, and face to give the best appearance. Lift the plant by the root ball only.
- .4 Remove containers from container grown plants. Ensure that soil ball remains intact. Biodegradable containers may be planted only if approved by the Owner.
- .5 Remove the root ball support material as follows:
 - .1 Wire baskets and burlap container.
 - .1 Remove the bottom rings before placing the tree in the hole.
 - .2 Place the tree at the proper height and remove the remaining rings.
 - .3 Remove the accessible burlap.
 - .2 Fibre pots.
 - .1 Place in the hole to the proper height.
 - .2 Perforate the pot.
 - .3 Remove the top 100mm of the pot
- .3 Place plant in bottom of pit on a minimum bed of 150mm firmly tamped topsoil or soil mix. Form soil in concave manner in center of excavation for balled or burlapped plants and container grown plants and in convex manner in center of excavation for bare root plants. Spread roots of bare root plants to their approximate natural position, prune broken or damaged roots.
- .4 Bare root ball preparation.
 - .1 Remove all the damaged tissue, taking care not to damage the remaining root material, and leaving a clean cut surface.
 - .2 Place in the hole on a firm base to the proper elevation.
- .5 Tree spade.
 - .1 Prepare the planting area, which is to be twice the root ball diameter.
 - .2 Remove the soil plug using the same tree spade used to relocate the tree.
 - .3 Place the tree to grade.
- .6 Backfill the pit with topsoil or soil mix and hand tamp firmly in layers not to exceed 150mm to ensure no settling. Cut twine and fold burlap back before placing final layer of soil. Fill with water, allowing soil to settle around roots or soil ball. After water has been absorbed, fill to grade with soil, formed in concave manner. Fill with water and allow to be absorbed.

3.5 TREE VAULTS

- .1 Excavate and backfill around perimeter of the tree vault.
- .2 Obtain the Engineer's approval before installing the tree vault.
- .3 Place topsoil, free of subsoil, rocks, roots, debris and toxic material, in the tree vault.
- .4 Prepare planting soil as specified in Standard Drawing 9-304.
- .5 Place the tree deep enough in the vault to ensure that the mulch is slightly below the hard surface, to allow for proper watering.

3.6 FERTILIZING

- .1 Before June 15 and after October 01.
- .2 Fertilizer to be applied to trees in the second year of growth with a slow release fertilizer 30-10-7.
- .3 Phosphorous, potassium and complete fertilizers to be placed in holes and drilled or punched in the soil or injected into the soil in a solution under pressure.
- .4 Liquid fertilize shrubs with a mixture of 20-20-20 at 1kg to 250 litres of water or Ozmocote 14-14-14 at 14 grams per shrub.
- .5 Apply water after fertilizing to ensure penetration of the fertilizer when required

3.7 SITE WORK AFTER PLANTING

- .1 Backfill the hole with topsoil in 150mm lifts. Soil is to be hand tamped only.
- .2 Construct a 100mm to 150mm high water reservoir berm at the outside edge of the prepared root zone.

3.8 WATERING

- .1 Add water to the reservoir within two (2) hours of the plants being installed. Minimum amount: 60 litres per metre of root zone diameter.
- .2 Refill voids with topsoil to re-establish grade.
- .3 Add water to maintain the proper moisture level when top the 100mm shows signs of drying.
- .4 Water as required, but at least to the following, minimum schedule: every week for the first month, once per month during summer and three times in the fall to freeze trees and underlying soil in to prevent from drying out. This procedure should be followed throughout the warranty/maintenance period.

3.9 WEED CONTROL

- .1 Pre-emergent to be applied in the spring or fall to weed free shrub beds or tree wells, as per the manufacturer's recommendations.
- .2 Shallow cultivate and weed plant pits and beds when required.

3.10 MULCH

- .1 For trees, place mulch to a depth between 75mm and 125mm within the water reservoir within five (5) Days after planting, to a diameter of 1.0m or the extents of soil disturbed when planting, whichever is greater.

- .2 For planting beds, place mulch to a depth between 75mm and 100mm over the extents of soil disturbed in establishing the planting bed.

3.11 TREE CARE AFTER PLANTING

- .1 Remove only broken and dead branches in accordance with good horticultural practice.

3.12 TREE SUPPORTS/ANCHORS

- .1 Unless otherwise specified by the Engineer or specified within the Bid Forms, tree anchors must be used.
- .2 Use the type specified by the Engineer.
- .3 Use single anchor tree supports for deciduous trees that are **less than 3m** in height and evergreens that are **less than 2m** in height.
 - .1 Place the anchor on the prevailing wind side and drive the anchor spikes into undisturbed soil outside of the prepared root zone.
 - .2 Install a 150mm long guying collar 1.5m above grade.
 - .3 Thread the rope through the guying collar tube and secure firmly to the anchor.
- .4 Use three guy ropes and anchors for deciduous trees that are **3m in height or greater** and evergreens that are **2m in height or greater**.
 - .1 Install guying collars above the branch to prevent slipping at approximately 2/3 height for evergreens and 1/3 height for deciduous trees.
 - .2 Guying collars are to be of sufficient length to encircle the tree and allow a 50mm space for trunk clearance.
 - .3 Install anchors at equal intervals about the tree and away from the trunk so that the guy rope will form 65° angle with the ground. Install the anchor at an angle to achieve resistance for the guy rope.
 - .4 Attach the guy rope to the anchors. Tension the rope to allow slight tree canopy movement.
 - .5 Install flagging tape to the guys as required.
- .5 Place a 2m long stake driven 600mm into the soil outside of the root ball, through the tree well. Use hose and rope to secure the tree to the stakes.
- .6 After the tree supports/anchors have been installed, remove broken branches with clean, sharp tools in accordance with industry accepted horticultural practices.

3.13 PRUNING

- .1 Prune all trees and shrubs in accordance with standard horticultural practice to preserve natural character of plant. Pruning shall be done with clean, sharp tools. As a rule, growth is maximized if pruning is done just before the period of rapid growth, in early spring. Prune at the proper times according to the plant requirements as follows:
 - .1 Shade trees (except Birch and Maple, and Elm) October 15 to April 15
 - .2 Birch and Maple June 15 to July 15
 - .3 Elm October 1 to March 31
 - .4 Fruit bearing trees March 15 to April 15

- .5 Coniferous April 15 to May 15
- .2 Remove superfluous branches, those which run parallel, etc. Do not remove leader. Prune all suckers from the base, trunk and inside crown of tree. All injured tree and shrub roots shall be pruned to make clean ends before planting.
 - .3 Make all cuts without damaging the branch collar. Each cut should be made carefully, at the correct location, leaving a smooth surface with no jagged edges or torn bark. Pruning cuts should be located to leave a wound of the smallest diameter. The correct location to make a cut is beyond the branch collar or shoulder.
 - .4 All injured tree and shrub roots shall be pruned to make clean ends before planting.
 - .5 Prune to remove dead, diseased, injured, broken, rubbing, and crowded limbs. Most routine trimming and removal of weak, diseased, undesirable or dead limbs can be accomplished at any time with little effect on the tree.
 - .6 Remove and dispose of all pruned material daily.

3.14 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform the following maintenance operations from the time of planting to the time of issue of the Construction Completion Certificate.
 - .1 Water to maintain soil moisture conditions for optimum establishment, growth, and health of the plant material without causing erosion. For evergreen plant material, water thoroughly in late fall, prior to freeze-up.
 - .2 Remove weeds monthly.
 - .3 Replace or re-spread damaged, missing, or disturbed mulch.
 - .4 Apply pesticides in accordance with federal, provincial, and municipal regulations as and when required to control insects, fungus, and disease. Obtain product approval from the Engineer prior to application.
 - .1 Public notification of insect and fungus control is required by posting signs forty-eight (48) hours before and after application. Chemicals shall be applied by or under the supervision of licensed applicators. All Federal and Provincial regulations regarding use, transportation and storage of chemicals will be strictly adhered to.
 - .5 Remove dead or broken branches from the plant material in accordance with good horticultural practice.
 - .6 Keep the trunk protection and guy ropes in proper repair and adjustment.
 - .7 Remove and replace dead plants and plants not in a healthy growing condition. Make replacements in the same manner as specified for the original plantings.

3.15 ACCEPTANCE FOR ISSUE OF CONSTRUCTION COMPLETION CERTIFICATE

- .1 Plant material will be accepted the by Engineer ninety (90) days after the planting operation is completed provided that the plant material exhibits a healthy growing condition and is free from disease, insects, and fungal organisms.
- .2 Plant material installed less than ninety (90) days prior to frost will be accepted in following year, after June 30, provided that the acceptance conditions are fulfilled.

3.16 WARRANTY AND MAINTENANCE

- .1 Pursuant to the General Conditions, the warranty period for plant material shall be two (2) years. An end of warranty inspection will be conducted by the Engineer.
- .2 During the warranty period, dead trees will be replaced in a timely manner. Trees requiring replacement from the previous year's installation to be planted by June 15 of the following year. Trees which die through the normal growing season are to be replaced by October 15, of the same year of installation
- .3 If, at end of the initial warranty period, leaf development and growth is not sufficient to ensure future survival, the Engineer reserves the right to extend the Contractor's warranty responsibilities for an additional one (1) year for those plantings. The warranty period will expire at the end of this additional one (1) year.
- .4 From the issue date of the Construction Completion Certificate to end of the two (2) year warranty period, perform following maintenance operations:
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion. For evergreen plant material, water in late fall, prior to freeze-up.
 - .2 Reform damaged watering saucers/reservoirs.
 - .3 Remove weeds monthly. Pre-emergent weed control shall be applied each consecutive year of the warranty period. The final application shall be prior to the expiry of the warranty period.
 - .4 Replace or re-spread damaged, missing, or disturbed mulch.
 - .5 Apply pesticides in accordance with federal, provincial, and municipal regulations as and when required to control insects, fungus, and disease. Obtain product approval from the Engineer prior to application.
 - .6 Remove dead, broken, or hazardous branches from the plant material in accordance with good horticultural practice.
 - .7 Keep the tree supports in proper repair and adjustment.
 - .8 Tree supports become the property of the Owner at end of the warranty period.
 - .9 Remove and replace dead plants and plants not in a healthy growing condition. Make replacements in the same manner as specified for the original plantings.
 - .10 Maintain accessories in proper condition; adjust turnbuckles to keep the tree guys taut and replace ties, flagging, and stakes when required.
 - .11 Straighten plants which lean or sag.
 - .12 Adjust plants which settle or are planted too low.
 - .13 Submit annual written reports after each growing season to the Engineer identifying:
 - .1 Logs of maintenance work carried out, including dates.
 - .2 Development and condition of the plant material.
 - .3 Preventative or corrective measures required which are outside the Contractor's responsibility.

END OF SECTION