
PLANTING OF TREES, SHRUBS, AND AQUATICS

1.0 GENERAL

1.1 REFERENCE STANDARDS

- 1.1.1 Canadian Nursery Landscape Association
 - 1. Canadian Standards for Nursery Stock
 - 2. Pruning Guidelines
- 1.1.2 Canadian Landscape Standard, First Edition
 - 1. Section 4: Grading and Drainage
 - 2. Section 6: Growing Medium
- 1.1.3 Canadian National Master Construction Specifications (NMS)

1.2 RELATED SECTIONS

- 1.2.1 07040 Topsoil and Finish Grading

1.3 SUBMITTALS

- 1.3.1 Provide submittals prior to starting any work.
- 1.3.2 Submit the following for Engineer's review and approval as applicable:
 - 1. Copies of all permits and licenses required by regulatory authorities prior to commencement of work.
 - 2. Submit list of all plant nursery sources. Where applicable, provide "Clean Plants Certification Number" of each Clean Plants certified nursery for approval. Submit information minimum two weeks prior to commencement of work.
 - a) Provide quality, size, genus, species, and variety of exterior plants indicated, using ANSI Z60.1 terminology and methods of measurement.
 - 3. Submit documentation detailing installer qualifications.
 - a) Contractor Qualifications: A qualified landscape contractor whose work has resulted in successful establishment of exterior plants and who has a minimum of 5 years of experience.
 - 4. Work schedule; Submit prior to commencement of work. Work schedule to include the following information:
 - a) Date for selection of plant material, representative sample at source by Consultant.
 - b) Quantity and type of plant material.
 - c) Shipping dates.
 - d) Arrival dates on site.
 - e) Planting dates.
 - 5. Submit product data for:
 - a) Fertilizer
 - b) Mycorrhizae
 - c) Anti-desiccant
 - d) Guying assembly including clamps, collar, guying wire, anchors and wire tightener
 - e) Mulch
 - 6. Submit maintenance instructions indicating recommended procedures to be established by Owner for maintenance of plantings after the Contractor's required maintenance period.

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7. Submit a vegetation protection plan for the City and Engineer to review and approve prior to construction.
8. Submit all other required information and documents as requested or specified.

1.4 SUBSTITUTIONS

- 1.4.1 Substitute plants only with prior approval from Engineer.
- 1.4.2 Submit proof that plant species and sizes specified are unobtainable prior to making substitutions.
- 1.4.3 Substitutions shall be of nearest similar species and size specified.
- 1.4.4 Substitution of plants larger than specified shall be permitted with no increase in Contract Price.

1.5 QUALITY ASSURANCE

- 1.5.1 Contractor: experienced and knowledgeable in landscape work of contract.
- 1.5.2 Site Supervisor: competent, experienced and knowledgeable to direct and supervise all staff and work of contract. Supervisor shall possess a Landscape Journeyman Gardener certification or other similar qualification acceptable to Engineer/Consultant.
- 1.5.3 Staffing: experienced, competent and trained landscape personnel who will perform all tasks and services in a knowledgeable and professional manner. Workers shall act safely and professionally at all times while working on site. Contractor shall not assign any worker that the Engineer/Consultant deems incompetent, careless, insubordinate, or otherwise objectionable to work on site.
- 1.5.4 Contractor shall be responsible for ensuring that contract specifications are being adhered to. Failure of the Engineer/Consultant to immediately reject unsatisfactory workmanship or to notify the Contractor of their deviation from the specification shall not relieve the Contractor of their responsibility to repair and/or replace unsatisfactory work.
- 1.5.5 Contractor shall obtain approvals as required by contract for suppliers, sub-contractors, and materials.
- 1.5.6 Contractor shall advise Engineer/Consultant, in writing, of any conditions or defects encountered on site before or during construction upon which the work of this section depends and which may adversely affect its performance.
- 1.5.7 Do not commence work until adverse conditions or defects have been evaluated by the Engineer/Consultant and corrective measures taken.
- 1.5.8 Commencement of work shall imply acceptance of existing conditions and no claims for damages or extras resulting from such conditions or defects will be accepted later, except where such conditions could not have been known prior to commencing work.

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1.6 INSPECTIONS

- 1.6.1 Observation: Engineer will observe trees and shrubs for compliance with requirements for genus, species, variety, size, and quality as follows:
1. Engineer retains right to review trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work.
 2. Remove rejected trees or shrubs immediately from Project site.
 3. Notify Engineer of sources of planting materials seven (7) days in advance of delivery to site.
- 1.6.2 The Engineer will review trees and shrubs at the following stages to verify conformance with specified requirements:
1. Installed trees and shrubs before commencement of maintenance period.
 2. At end of maintenance period.

1.7 WARRANTY

- 1.7.1 End of Warranty inspection conducted by Engineer/City Representative.
- 1.7.2 Engineer/City Representative reserves the right to extend Contractors warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

2.0 PRODUCTS

2.1 PLANT MATERIAL

- 2.1.1 Nursery Grown Plant Material
1. Type of root preparation, sizing, grading and quality; comply with current Canadian Standards for Nursery Stock from Canadian Nursery Landscape Association.
 2. Source of plant material: grown in Zone 3 in accordance with Agriculture Canada Plant Hardiness Zone Map.
 3. Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
 4. Plant material: root pruned regularly, but not later than one growing season prior to arrival on site.
 5. Trees: with straight trunks, well and characteristically branched for species except where specified otherwise.
 6. Trees larger than 200 mm in caliper: half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on site.
 7. Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container gown.
- 2.1.2 Collected Plant Material
1. Maximum 40 mm in caliper, with well-developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.
 2. Collected Plants may only be used when approved in writing by City of Lethbridge.

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- 2.1.3 Riparian / Aquatic Plant Material
1. Material to be planted shall be plugs and pots. Plants shall be live, fresh, healthy, and uninjured at the time of planting.
- 2.1.4 Plants may be transplanted from local wetlands, provided that written documentation from Alberta Environment and Parks (AEP) and/or the City is provided to Engineer/City Representative by the Contractor.
- 2.1.5 Plants shall have 30 cm of green leaf tissue above the root crown.
- 2.1.6 Plugs are to have at least 5 cm root systems.
- 2.1.7 Plants shall be kept continually moist and shaded until they are planted by covering with wet burlap or by other method approved by Engineer/City Representative.
- 2.1.8 Plants shall be stored or bundled in original conditions with manufacturer's seals and labels intact.
- 2.1.9 Any plants that have been permitted to dry out, to become overheated, or for any reason, in the judgment of the Engineer/City Representative, do not clearly show a viable condition shall be rejected for use regardless of previous inspections. The Contractor will remove and replace defective vegetation products at own expense and be responsible for delays and expenses caused by rejection.
- 2.1.10 Should any dispute arise as the quality of fitness of vegetation products, decision rests strictly with the Engineer based upon requirements of the Contract Documents.

2.2 WATER

- 2.2.1 Free of impurities that would inhibit plant growth.

2.3 STAKES

- 2.3.1 Wood pointed one end, 38 x 38 x 2300 mm.

2.4 WIRE TIGHTENER

- 2.4.1 Type 1: galvanized steel, stamped plate type, rod, triangular shape.
- 2.4.2 Type 2: turnbuckle, galvanized steel, 9.5 mm diameter with 270 mm open length.
- 2.4.3 Type 3: Canvas strap, galvanized 30 mm flat head nail.

2.5 GUYING WIRE

- 2.5.1 Type 1: steel, 3 mm wire.

2.6 CLAMPS

- 2.6.1 Crimp type.

2.7 ANCHORS

- 2.7.1 Type 1: 38 x 38 x 460 mm.

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2.7.2 Type 2: 38 x 67 x 600 mm.

2.8 GUYING COLLAR

2.8.1 Tube: plastic, 13 mm diameter, nylon reinforced.

2.9 TRUNK PROTECTION

2.9.1 Rodent Fencing: 19 Gauge Galvanized Wire, with 19 x 19mm (1/2 x 1/2") holes.

2.9.2 Treegator Original Slow Release Watering Bag or approved equal may be approved at City discretion.

2.10 MULCH

2.10.1 Wood chip: varying in size from 50 to 75mm and 5 to 20mm thick, free of bark small branches and leaves.

2.11 FERTILIZER

2.11.1 Synthetic commercial type, ration 5:3:2.

1. For an optimum efficiency of mycorrhizae, the use of organic or slow release fertilizers is recommended.

2.12 ANTI-DESICCANT

2.12.1 Wax-like emulsion.

2.13 FLAGGING TAPE

2.13.1 Fluorescent, orange colour.

2.14 MYCORRHIZAE

2.14.1 Myke Pro Landscape product from Premier Tech Biotechnologies (Premier Tech Agassiz, BC, tel. (604) 345-7744) or an equivalent approved by the consultant must be used.

2.14.2 Store mycorrhizae product in an area to prevent freezing and intense heat.

3.0 EXECUTION

3.1 PRE-PLANTING OPERATIONS

3.1.1 Ensure plant material acceptable to Engineer.

3.1.2 Remove damaged roots and branches from plant material.

3.1.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

3.2 DELIVERY, STORAGE AND PROTECTION

3.2.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

3.2.2 Immediately store and protect plant material which will not be installed within one (1) hour after arrival at site in storage location approved by Engineer.

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- 3.2.3 Protect plant material from damage during transportation:
1. When delivery distance is less than 30 km and vehicle travels at speeds under 80 kph, tie tarpaulins around plants or over vehicle box.
 2. When delivery distance exceeds 30 km or vehicle travels at speeds over 80 kph, use enclosed vehicle.
- 3.2.4 Protect stored plant material from frost, wind and sun as follows:
1. For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil, and watering to full depth or root zone.
 2. For pots and containers, maintain moisture level in containers. (Heel-in and fibre pots)
 3. For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

- 3.3.1 For individual planting holes:
1. Stake out location and obtain approval from Engineer prior to excavating.
 2. Excavate to depth and width as indicated.
 3. Remove subsoil, rocks, roots, debris and toxic material from excavated material that will 3.3.1 be used as planting soil for trees and individual shrubs. Dispose of excess material.
 4. Scarify sides of planting hole.
 5. Remove water which enters excavations prior to planting. Notify Engineer if water source is ground water.

3.4 TREE AND SHRUB PLANTING

- 3.4.1 Planting
1. For bare root stock, place 50 mm backfill soil in bottom of hole. Plant trees and shrubs with roots placed straight out in hole.
 2. For jute burlapped root balls, cut away top 1/3 of wrapping and fold down top 1/3 of wire basket without damaging root ball. Do not pull burlap or rope from under root ball.
 3. For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
 4. Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.
 5. For all plants located in the bio-swale apply mycorrhizae in the planting hole and in contact with the roots as per the manufacturer's specifications and application chart. For balled and burlap trees, apply on the top 2/3 from the base. It is important to apply the recommended amount per plant evenly to cover the whole circumference of the root ball. Product must be in physical contact to the root ball prior to backfilling.
 6. For trees and shrubs:
 - a) Backfill soil in 150 mm lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.
 - b) Form watering saucer as indicated.
 7. For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
 8. Water plant material at time of planting and as needed.
 9. After soil settlement has occurred, fill with soil to finish grade.
 10. Dispose of burlap, wire and container material off site.

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- 3.4.2 Trunk Protection
1. Install trunk protection on deciduous trees as indicated.
 2. Install trunk protection prior to installation of tree supports used.
- 3.4.3 Tree Supports
1. Install tree supports as indicated.
 2. Use single stake tree support for deciduous trees less than 3 m and evergreens less than 2 m.
 - a) Stake trees on prevailing wind side and 250 mm from trunk.
 - b) Drive stake minimum 250 mm into undisturbed soil beneath roots. Ensure stake is secure, vertical and un-split.
 - c) Install 260 mm long canvas strap 1500 mm above grade.
 - d) Wrap strap around tree and overlap strap at nailing point. Nail strap to stake.
 3. Use three (3) guy wires and anchors for deciduous trees greater than 3 m and evergreens greater than 2 m.
 - a) Use type 2 guying wire with clamps for trees less than 75 mm in diameter and type 3 guying wire with clamps for trees greater than 75 mm in diameter.
 - b) Use type "A" anchors for trees less than 75 mm in diameter and type "2" anchors for trees greater than 75 mm in diameter.
 - c) Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and half height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.
 - d) Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.
 - e) Install anchors at equal intervals about tree and away from trunk so that guy wire will form 45, 30 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.
 - f) Attach guy wire to anchors. Tension wire and secure by multi-wraps installing clamps.
 - g) Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.
 - h) Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Engineer.
 - i) Install flagging tape to guys as indicated.
 4. After tree supports have been installed, remove broken branches with clean, sharp tools.
- 3.4.4 Mulching
1. Ensure soil settlement has been corrected prior to mulching.
 2. Spread mulch to a depth of 100mm loosely packed. Expose bottom of trunk area to ground level 100mm around base.
- 3.4.5 Pruning
1. Prune, thin, and shape trees and shrubs according to standard horticultural practice.
 2. Prune trees to retain required height and spread; do not cut tree leaders; remove only injured or dead branches.

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3. Prune shrubs and vines to retain natural character; sizes indicated are sizes after pruning.

3.5 AQUATIC PLANTINGS

- 3.5.1 The total number of plants shall be equally divided between the species of each vegetation community, unless otherwise approved by the Engineer.
- 3.5.2 All vegetation zones (i.e., elevation bands) must be staked-out prior to planting. Field adjustments or field fitting vegetation communities (i.e., adjustment of communities regardless of elevation band and based on current water level conditions) must be approved by the Engineer.
- 3.5.3 All planting shall be done in loose, moist soil.
- 3.5.4 Planting shall be performed as soon as practicable and after May 10th or frost free conditions. Once started, the planting operations shall continue uninterrupted until all areas have been planted, except for periods when the soil is too wet or too dry to continue the operations. If downtime occurs because of soil conditions, planting shall be resumed as soon as the soil is suitable for planting. Planting after July 10th must be approved by the Engineer.
- 3.5.5 Planting shall be done by hand using a dibble, planting spade, or other method approved by the Engineer. The dibble or spade shall be used to create a shallow hole in the moist topsoil for planting. The hole shall be of sufficient depth and width to allow the root to be inserted without breakage or other damage occurring.
- 3.5.6 The plants shall be planted so the leaf bases are at the soil surface. After placement of the plant in the hole, the hole shall be carefully closed around the root by gently applying pressure to the edge of the hole with one's foot/hand or other method approved by the Engineer.
- 3.5.7 Plants that have been judged by The Consultant to be damaged or deemed unsuitable by the Engineer during the planting process shall be replaced at the Contractor's expense.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

- 3.6.1 Trees and Shrubs
 1. Perform following maintenance operations from time of planting to acceptance by Consultant.
 - a) Watering schedule to be provided by the Contractor for the Engineer to review and approve. Late fall watering should ensure saturated soil around plant roots.
 - b) Remove weeds monthly.
 - c) Replace or re-spread damaged, missing or disturbed mulch.
 - d) For non-mulched areas, cultivate as required to keep top layer of soil friable.
 - i. Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Consultant prior to application.
 - ii. Remove dead or broken branches from plant material.
 - iii. Keep trunk protection and guy wires in proper repair and adjustment.

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- iv. Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings. Replacement plants to be installed a minimum of 2 months prior to the maintenance period ending to ensure that the City is receiving healthy plants at the end of the maintenance period.
- v. All trees and shrubs will be maintained by the contractor until the following spring.

3.6.2 Aquatic Plants

- 1. The contractor shall make arrangements and bear all costs of providing adequate water for initial planting and plant maintenance for up to two (2) years. Maintenance may include watering or dewatering of the wetland to ensure optimum growing conditions. Internal wetland water from the existing facilities may be used, if desired by the Contractor. Should external sources of water be used, they must be approved by the Engineer. All offsite runoff must be controlled and approved by the Engineer.
- 2. The contractor shall be responsible for maintaining the plants to ensure optimum growing conditions until accepted by the Engineer, or up to two (2) years.
- 3. In addition to all applicable maintenance requirements and specifications, the Contractor shall be responsible for mowing seeded areas adjacent to Aquatic Plants at least once per month, or as needed, up to six times per year (May through October, inclusive) throughout the maintenance period of two (2) years. The Contractor shall also be responsible for watering seeded areas until establishment has been made to the satisfaction of the Engineer.
- 4. To discourage wildlife from consuming plant and seed material during establishment, wildlife deterrents may be required based on the Engineer's recommendation. Acceptable methods for deterrents include: fencing, aerial wires, streamers, holographic tape, kites, decoys, and/or other Environment Canada and/or Alberta Environment and Parks approved wildlife deterrents.
 - a) Wildlife deterrents shall be maintained for the full duration of the maintenance period.
- 5. The contractor shall minimize use of commercial fertilizer within the collection area of the water body / watercourse.
- 6. Sixty (60) days after the completion of the planting, the Engineer will conduct an inspection to determine if satisfactory vegetation communities have been produced. A satisfactory community is defined as one in that:
 - a) Spacing between plantings averages 50 cm or less;
 - b) The plantings survival averages at least 70%; no areas of greater than 10 continuous square meters (10 m²) with a planting survival rate of less than 50 percent;
 - c) Non-native vegetation does not occupy more than 1 m² as dominant or co-dominant cover by relative percent cover; and
 - d) Noxious or prohibited noxious weeds as described by the Alberta Weed Control Act are not present in quantities greater than reference habitats within the restored areas.
- 7. If satisfactory communities have not been established, another inspection will be made after the Contractor has corrected any deficiencies and has provided the Engineer with written notice that the vegetation is ready for inspection.

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8. The Engineer may conduct spontaneous site inspections at any time throughout the two (2) year maintenance period. If satisfactory communities have not been established, The Engineer will inform the Contractor in writing of any deficiencies. The Contractor will correct any deficiencies and provide the Engineer with written notice that the vegetation is ready for inspection.
9. Prior to expiry of Maintenance Period, an inspection shall be carried out with both the Engineer and Contractor detailing defective or unsatisfactory materials, conditions, and/or workmanship. The inspection must be completed by August 31. Carrying out all work of reinstatement as a result of this inspection is the Contractors responsibility.
10. If the seedling survival averages lower than 80% at the end of the two (2) year maintenance period, an additional one (1) year maintenance period will be applied, to ensure replanting achieves survivability.

3.7 ACCEPTANCE

- 3.7.1 Plant material will be accepted by Engineer 90 days after planting operation is completed provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms.
- 3.7.2 Plant material installed less than 90 days prior to frost will be accepted in following spring, 30 days after start of growing season provided that accepted conditions are fulfilled.

3.8 MAINTENANCE DURING WARRANTY PERIOD

- 3.8.1 Depending on geographical location, consider pruning, hedge trimming, environmental and rodent protection. If required, specify additional requirements including frequency.
- 3.8.2 From time of acceptance by Engineer to end of warranty period, perform following maintenance operations.
 1. Watering schedule to be provided by the Contractor for the Engineer to review and approve. Late fall watering should ensure saturated soil around plant roots.
 2. Reform damaged watering saucers.
 3. Remove weeds monthly.
 4. Replace or re-spread damaged, missing or disturbed mulch.
 5. Where mulch is in place, remove prior to freeze-up and replace in spring after soil thaws and warms up.
 6. For non-mulched areas, cultivate monthly to keep top layer of soil friable.
 7. Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Engineer prior to application.
 8. Apply fertilizer in early spring at rate of 0.025 kg of nitrogen per square meter or at the manufacturers' suggested rate.
 9. Remove dead, broken or hazardous branches from plant material.
 10. Keep trunk protection and tree supports in proper repair and adjustment.
 11. Remove trunk protection, tree supports and level watering saucers at end of warranty period.
 12. Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings (as per minutes of inspection reports) on or before June 30 of each annual maintenance period.

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13. All trees and shrubs will be maintained by the Contractor until the following spring.
14. Submit monthly written reports to Engineer identifying:
 - a) Maintenance report of the work carried out.
 - b) Development and condition of plant material.
 - c) Preventative or corrective measures required which are outside Contractors responsibility.

4.0 MEASUREMENT AND PAYMENT

- 4.1 Payments will be based on unit price bid. Payment shall include the supply and installation of all materials shown on the drawings, and all materials incidental to the completion of the work, and shall include all costs for the maintenance and warranty of the system.
- 4.2 Progress claims submitted by the contractor shall be based on the unit prices submitted or the percentage of work completed in the tender form for the work completed at date of claim and approved by the engineer and owner prior to payment.
- 4.3 No payment shall be made for materials delivered and stored onsite that have not been properly installed and tested.
- 4.4 The unit prices for supply shall include supplying, delivering, loading, unloading and all allowances for handling, storage, breakage and waste. Payment will be made only for material actually installed and tested in the work.

END OF SECTION