1.0 DESIGN REQUIREMENTS

1.1 All Division 32 Technical Guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications.

1.2 All landscape work must conform to requirements and specifications in the current editions of the Canadian Landscape Standard and Master Municipal Construction Documents (MMCD) unless otherwise specified in the contents of UBC's Technical Guidelines.

1.3 Landscape work must reference all relevant sections of the Technical Guidelines.

1.4 Landscapes must be designed to recognize the limited maintenance resources available to maintain the campus landscape in an institutional context.

1.5 Place trees at distances from building that when mature, do not provide a route for squirrels and racoons to access buildings.

1.6 Provide a 12” (30cm) gravel/drain rock strip at the base of buildings where planting or lawn areas are adjacent to buildings. Separate aggregate border from planting or lawn area with aluminum edge restraint.

1.7 All landscape, area and exterior lighting designs shall be reviewed by UBC Building Operations Electrical Support before Tender Drawings are complete.

1.8 All planters and planting areas above ground level must be easily accessible to gardeners, have an available water source, and allow for the safe and easy delivery and removal of organic matter and other debris.

Planters or planting areas raised 3m (10’) or more from adjacent finished grade must have built in fall arrest anchors.

1.9 Both soft and hard landscapes must be designed to accommodate the loading and movement of heavy equipment in and around buildings for window washing and cladding repair.

.1 Movement of a ‘manlift’ around the building for window washing must be coordinated with the Project Architect, UBC Custodial Services, and/or Municipal Services as appropriate.

.2 Contractors must take precautions to protect all surfaces, structures, landscapes, utilities, etc. adjacent to and/or subject to impact from the work being performed.

.3 Contractors must provide protection to buildings, trees, lawns, walkways, pathway lights, streets, roads, underground irrigation systems, services, etc. from loss or damage resulting from the work. The Contractor will be responsible for the repair (or costs of repairs) to any damage caused as a result of the work performed by them.

.4 Coordinate as early as possible in the conceptual and design development phases with relevant UBC Facilities staff.

1.10 All level crosswalks, curb ramps at roads, driveways, tops of steps, and pedestrian ramps to include cast in place tactile warning tiles. 60cm long x width of crosswalk or walking surface of ramp or steps. See UBC Campus Plan Design Guidelines.

1.11 No new water features that are recirculating, depend on mechanical equipment to operate, or require potable water to operate are permitted to be built. Passive rainwater management features are permitted.

1.12 Any damage to existing hard and softscape outside the Limit of Work of a project must be restored to pre-existing condition or better if the damage was caused by project construction.

1.13 It is recommended that Project Managers request acceptance of new landscapes by Municipal Services during the growing season. Projects not achieving Final Completion of all deficiencies before November 15th should be maintained by the Contractor until May 15th the following year in order to avoid adverse seasonal conditions not conducive to the establishment of the landscape.

*****END OF SECTION*****

1.0 DESIGN REQUIREMENTS

1.1 UBC practices Integrated Pest Management in compliance with UP7 Pest Control Policy https://universitycounsel.ubc.ca/policies/pest-control-policy/. Pests will be controlled whenever possible through integrated pest management (a combination of cultural and biological techniques and selective chemical methods). Pesticides may be used on University land sites and buildings by employees of the University or contractors to the University provided all Federal and Provincial procedures for safety, environmental protection and information are followed. All relevant federal Ministry of Agriculture and British Columbia Ministry of Water, Land and Air Protection regulations are followed.

1.2 Landscape plantings and hardscapes must be designed to minimize the need for toxic pesticides and herbicides. Design strategies must include:

.1 Selecting pest and disease resistant trees and plant material.

.2 Selecting hardy, vigorous, drought tolerant plants that can resist being overwhelmed by weed growth.

.3 Consider providing a continuous cover of evergreen groundcovers to shade the soil surface and inhibit weed development before shrubs and trees have had enough time to grow and provide cover over bare ground.

.4 Specifying growing media and container and field-grown plant material that are guaranteed free of pernicious weeds and seeds as per Canadian Landscape Standard, and Canadian Nursery Stock Standard.

.5 Specifying organic mulches that are guaranteed free of weeds and seeds.

.6 Specifying resin bonded permeable jointing material in paving joints to inhibit organic residues and weed growth in paving joints. Polymeric sand is not sufficient.

.7 Placing trees at distances from building that when mature, do not provide a route for squirrels and racoons to access buildings.

*****END OF SECTION*****

1.0 DESIGN REQUIREMENTS

1.1 The principals of CPTED should be consider and reviewed at each stage of the project from pre-design through to occupancy, with reference to the extensive literature on this subject.

1.2 Project design features that address CPTED issues should be flagged for consideration in the plan reviews by the Emergency Services Committee, including representatives of Campus Planning & Development, Heath Safety and Environment, Campus Security, RCMP, fire, ambulance and UEL and by Advisory Design Review Panel with a CPTEC specialist from Richmond Police.

1.3 On complex, large projects, consideration should be given to including a CPTED consultant to the Project Team.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the quality and scope of landscape maintenance services required during the project maintenance period prior to acceptance of maintenance responsibility by UBC Facilities. Work includes pest, weed and disease control, cultivation, mulching, lawn cutting, warranty and replacement of plant material, stakes, guywires, manual watering, irrigation adjustment and winterizing, etc.

1.2 Related Work

.1 Section 32 00 13 Integrated Pest Management
.2 Section 32 01 93.01 Tree and Shrub Preservation
.3 Section 32 93 05 Relocation of Existing Plant Material
.4 Section 32 80 00 Irrigation
.5 Section 32 91 00 Planting Preparation
.6 Section 32 93 00 Plants
.7 Section 32 92 00 Seeded Lawn and Meadows
.8 Section 32 92 23 Sodding

1.3 Workmanship

.1 All work shall conform to the standards and practices outlined in the Canadian Landscape Standard – current edition; to be executed by skilled tradespersons well equipped and adequately supervised, and performed in accordance with these Standards.

1.4 Record of Maintenance Operations

.1 Work Schedule: At Substantial Completion, the Project Manager to provide Municipal Services with a schedule outlining the tasks to be undertaken through the maintenance period. These shall include as a minimum: fall/spring clean-up, fertilizer application, mulch application, irrigation, garbage clean-up, pruning, turf top-dressing and aeration.

1.5 Scope of Work

.1 Provide all equipment, material and labour for work specified.

1.6 Duration and Warranty

.1 The landscape maintenance period shall begin at Substantial Completion of the landscape for a period of not less than 60 days and until all deficiencies identified by the Project Landscape Architect and Municipal Services have been addressed. Municipal Services Landscape Architect must be provided with written notice that the landscape is Substantially Complete.

.2 The Contractor shall be responsible for the maintenance of all project landscape areas including in areas outside the project area that have been damaged by project construction, pedestrian or vehicular traffic, or have been inaccessible to Municipal Services during project construction.

.3 The warranty on plants and trees will be for one (1) full year commencing from the end of the date of Substantial Completion of the landscape work.

.4 The Project manager must schedule an end-of-warranty inspection that includes the Project Manager, the Project Landscape Architect, the landscape contractor, and a representative from Municipal Services (contact Landscape Architect, UBC Municipal Services). Provide at

least forty-eight (48) hours notice.

1.7 Notification

.1 Notify the Project Landscape Architect and UBC Municipal Services Head Landscape Technologist if any disease or insect problems arise during the maintenance period.

.2 Any pest control measures to be implemented by the Contractor shall be reviewed and approved in writing by UBC Municipal Service prior to their use. Provide the Project Landscape Architect and UBC Municipal Services with a minimum 72-hour notification in writing prior to application of chemical vegetation controls. Follow all municipal, provincial and federal regulations if pesticides are used.

.3 Notify both the Project Landscape Architect and UBC Municipal Services of any physical changes and/or discrepancies which may affect the implementation of the contract as specified herein or which may endanger the public.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Materials

.1 The Contractor shall provide all materials, labour and equipment necessary to perform the operations as specified herein and as required to provide the optimum environment for the establishment of the landscape.

.2 Mulch: If provided during the maintenance period shall conform with requirements in Section 32 93 00 Plants.

2.2 General

.1 The Contractor shall maintain the project free from any defect resulting from work done or material supplied by the Contractor. The Contractor shall, to the satisfaction of the Project Landscape Architect and UBC Municipal Services, rectify any defect that exists within the Maintenance Period.

.2 The Contractor shall be responsible for regular examination of the site during the term of the Contract and shall adjust the work schedule to suit site conditions.

2.3 Maintenance of Lawn and Meadow Areas

.1 The Contractor shall be responsible for the maintenance of all project lawn and meadow areas including any outside the project area that have been damaged by project construction or pedestrian or vehicular traffic. Maintenance of lawn or meadow areas shall include all measures necessary to maintain and protect lawn or meadows in a vigorous, healthy, normal growing condition.

.2 Begin maintenance immediately after Substantial Completion of the landscape for not less than 60 days and as long as needed to establish lawn.

.3 All mowed lawn areas shall be cut to maintain a maximum height of 3-1/2" (90mm). Not more than 1/3 of the blade shall be cut at any one mowing. Meadow areas shall be cut once or twice per season as appropriate to desired appearance and weed suppression.

.4 Equipment shall be sharp, level and prevent burning or gouging of lawn.

.5 All clippings and debris shall be removed at the time of mowing, and disposed of off-site. This includes but is not limited to wet or dry grass clippings on bollards, lamp posts, concrete walls, curbs and steps, sidewalks and other paved areas, signs, sign posts, benches, tree trunks and stakes, shrub planting, etc.

.6 The Contractor shall monitor the lawn or meadow areas that are not in a healthy growing condition and reseed them as soon as conditions are favourable. Areas showing shrinkage due to lack of watering shall be top dressed and seeded with the original mix.

.7 Regular and adequate watering shall be provided in order to promote healthy lawn or meadow growth. In the event of watering restrictions which prohibit the use of the automatic irrigation system or in areas which lack an automatic irrigation system, manual watering shall be performed in quantities and at intervals required to promote healthy, vigorous grass or meadow growth.

.8 Do not use line trimmers around trees and shrubs. Sprinkler heads shall be trimmed to clear as often as necessary to keep them operating properly. Hard surface areas adjacent to the lawns shall be swept and cleaned after each operation.

.9 Rolling shall be carried out when required to remove any minor depressions or irregularities.

2.4 Maintenance of Plants and Planted Areas

.1 The Contractor shall be responsible for the maintenance of all plants, planted areas and trees including any outside the project area that have been damaged by project construction or pedestrian or vehicular traffic. Maintain plants in a vigorous, healthy, normal growing condition, providing an appearance characteristic of their species and appropriate to their surroundings. Such maintenance shall include but not be limited to general cultivation, weed, pest and disease control, mulching, moisture conservation and watering, fertilizing, plant protection, pruning, and general clean-up.

.2 Begin maintenance immediately after Substantial Completion of the landscape for not less than 60 days and as long as needed to establish the planted areas.

.3 All plant material shall be alive and in a healthy growing condition at the end of the maintenance period. Plant material which is not in such a condition shall be removed from the site and replaced before project Final Completion.

.4 Remove and replace dead plants and plants not in healthy growing condition upon notification. Make replacements in same manner as specified for original plantings and within 10 days of written request from Project Landscape Architect or UBC Municipal Services, weather and conditions permitting.

.5 For maintenance contracts two months or greater, it shall be the responsibility of the Contractor to maintain an adequate level of soil fertility through the regular application of mulches, suitable fertilizers, and the control of soil acidity where required. Lime shall be applied to plant areas where acidity is inappropriately excessive (i.e., below pH 4.5). For lawns, 23-3-23 spring and summer feeder. For shrubs and trees, 8-12-10. No lime shall be applied where specific planting requires an acid condition such as Ericaceous shrubs, rhododendrons and other acid liking broadleaf evergreens.

.6 For maintenance contracts two months or greater, the Contractor shall apply, slow-release fertilizers to all plants (as described above) once per year. Apply fertilizer to plants once in early spring, after danger of frost has past, and not later than June 30, at manufacturer's suggested rate or as required to promote health growth. Fertilizer shall be slow release, sulphur coated urea base, such as Agrico-Evergro Total (23-3-23) or approved equal.

.7 Regular and adequate watering shall be provided in order to promote healthy plant growth. In

the event of watering restrictions which prohibit the use of the automatic irrigation system or in areas which lack an automatic irrigation system, manual watering shall be performed in quantities and at intervals required to promote healthy, vigorous plant growth. Planted areas shall be watered at frequencies required to replace moisture at the root zone. Reform damaged watering saucers at the base of all trees.

.8 Replace or respread damaged, missing or disturbed mulch. Remove dead, broken or hazardous branches from plant material.

.9 All trees shall be protected against wind and snow damage by adequate staking, guying, tying or wrapping as conditions require. Guys, wire ties and stakes shall be examined at frequent intervals, and adjustments or renewals made to prevent abrasions or other damage to plants. Keep tree supports in proper repair and adjustment. Remove tree supports and level watering saucers at the end of the one-year warranty period.

.10 Any plants maintained as hedges must be level and not parallel with the ground.

2.5 Weed Control

.1 The Contractor shall be responsible for detection, recognition and timely control of plant pests and diseases. The Contractor shall have an up-to-date knowledge of the most effective, non-toxic, organic insecticides, miticides and fungicides, together with the ability to diagnose ailments. Obtain written approval from UBC Municipal Services prior to their application.

.2 The Contractor shall be responsible for the regular inspection and removal of weeds from all landscape portions of the project. Chemical pesticides are strongly discouraged from use on the campus except where heavy infestation makes this the only viable option. Obtain written approval from UBC Municipal Services prior to application of toxic chemical pesticides for any extenuating circumstances. Weeding shall be done at a weekly interval during the maintenance period. Any weeds that are identified shall be removed within 1 week of inspection. In no cases shall weeds be allowed to be greater than 50 mm in spread. Weeds must be removed in their entirety, including root systems or any other below-ground parts.

.3 Weeds are defined as undesirable plants and will include all plant species not intentionally planted or seeded, unless mutually agreed upon by the Project Landscape Architect and/or UBC Municipal Services Head Landscape Technologist and Contractor. Weeds will include, but not be limited to such plants as Horsetail, Morning Glory, annual bluegrass, barnyard-grass, chickweed, crabgrass, clover, couch-grass, dandelion, groundsel, horsetail, mallow, morning glory, prickly lettuce, mustards, oxalis, pigweed, pineapple weed, plantain, shepherd's purse, smart weed, snapweed, sow thistle, stork's bill, thistle and will also include invasive, non-native species such as Scotch broom, Himalayan blackberry, and purple loosestrife. Weeds will also be defined as any of the grass seedlings that germinate and develop in the mulched shrub bed areas that are caused by an over-application in the seeding or hydroseeding operation.

.4 The Contractor shall monitor the site for the presence of weeds growing in project hardscape. All weeds in these areas shall be removed once per month.

.5 The type of weeds in an area shall determine the method of treatment. Weed control may consist of, but is not limited to the following:
- .1 hand-pulling, digging, cultivation,
- .2 encouraging the growth of desired plants which can compete with weeds, and
- .3 timing the mowing of grass areas to correspond with the seeding cycle of weeds.

.6 In situations where there is doubt concerning the necessity or effectiveness of a weed control strategy, the decision of the Project Landscape Architect in consultation with UBC Head Landscape Technologist will finalize the best course of action.

2.6 Irrigation

.1 Regulate proper application of water through the irrigation system to ensure healthy plant growth.

.2 Complete blow out and drainage of the irrigation system prior to winter and the complete reinstatement of system operations in the spring.

.3 Damage to the sprinkler heads or other parts of the system resulting from Contractor's operations shall be replaced without charge to UBC.

.4 Failures in the irrigation components due to other causes, such as wear, vandalism, accidents caused by others, etc., shall be reported to the Project Landscape Architect and UBC Municipal Services Landscape Architect.

.5 All irrigation heads shall be kept clear of debris so that good coverage results.

2.7 Litter and Waste Clean-Up

.1 Clean-up of litter and landscape waste shall be considered part of normal maintenance work. Litter shall include, but not be limited to, bottles, cans, plastic, rubber and all paper. Landscape waste shall include, but not be limited to, windfall, prunings, weeds, grass clippings, fallen leaves, stones and surplus or other waste materials as a result of landscape maintenance and construction operations.

.2 All waste shall be gathered and removed from the site at the end of each day's maintenance operations. All litter shall be gathered and removed from the site weekly.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the protection and care of existing trees, shrubs and plantings that have been designated for retention on or adjacent to new building sites and existing landscapes on the UBC Campus.

1.2 Related Work:

.1 Section 32 91 00 Planting Preparation
.2 Section 32 93 00 Plants
.3 Section 32 93 05 Relocation of Existing Plant Material

1.1 Consulting Arborists and UBC Building Operations ISA certified arborist

.1 Where trees, or tree preservation strategies are anticipated as part of a development proposal, an ISC Certified Arborist must be retained as an integral member of the project consultant team. The Consulting Arborist is to advise on specific pre- and post-development strategies, and provide expert analysis, details and/or specifications required to optimize planned tree retention and preservation.

.2 A UBC Municipal Services Arborist Technician will serve as UBC's representative in arboricultural matters and can advise on tree issues with consultants and UBC staff as required.

1.3 Coordination

.1 Coordinate with a UBC Municipal Services Arborist Technician as early as possible in the conceptual and design development phases of a project.

.2 Coordinate with a UBC Municipal Services Arborist Technician throughout construction phases regarding any site changes, potential damages or pruning required to existing trees to be retained.

Coordinate with a UBC Municipal Services Arborist Technician during construction regarding any impacts or potential damages to any existing shrubs or plantings designated for retention.

1.4 Standards

.1 Canadian Landscape Standard - current addition.

1.5 Definitions

.1 The Critical Root Zone of a tree is an arboricultural rule of thumb for establishing minimum area for tree root protection. It is applied in this guideline for determining Tree Protection Zones and location of tree protection fencing (see 2.1.1 and Fig. 1 below).

.2 Tree Protection Zone is equivalent to the Critical Root Zone and is defined and enclosed by the Tree Protection Fencing for an individual tree designated for tree preservation and protection.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Tree Relocation and Protection Plans

.1 For trees to be relocated and/or retained on site, the Project Landscape Architect must provide Tree Protection/Relocation Plans indicating surveyed grades at base of trunks, DBH, extents of drip lines and location of Tree Protection Fencing. Specifications and cross-sectional details for applicable preservation strategies including, but not limited to, requirements covered in this general guideline must be included in construction documents.

2.2 Approvals, Inspections and Supervision

.1 The Planner/Landscape Architect (C+CP), Landscape Architect (Municipal Services), Project Landscape Architect, Consulting Arborist, and a UBC Municipal Services Arborist Technician shall coordinate as early as possible in the project to identify trees to be retained, protected, transplanted or removed and clearly establish tree preservation measures and significant design criteria.

.2 General Contractor to meet with Project Landscape Architect, Consulting Arborist, and a UBC Municipal Services Arborist Technician as required for review of Tree Protection Plan prior to any fencing or hoarding on site.

.3 During the construction phase, the Contractor shall contact a UBC Municipal Services Arborist Technician immediately regarding any changes impacting tree preservation on site or to trees immediately adjacent to site boundary.

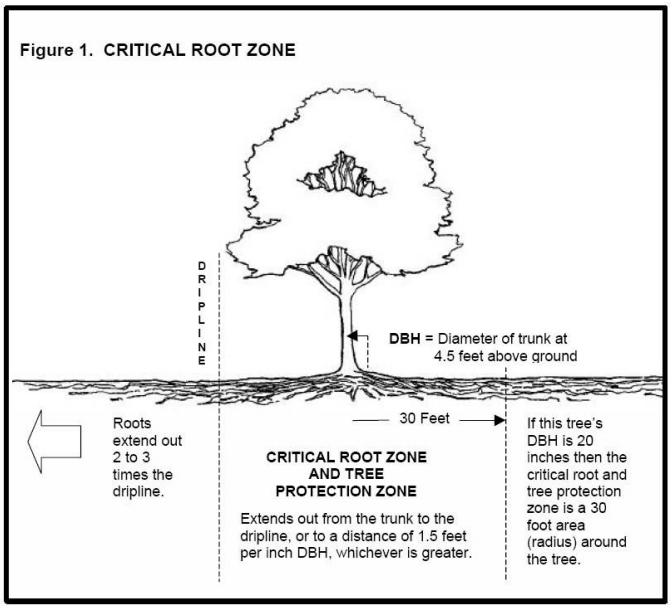
.4 Tree Protection Fencing must be approved by a UBC Municipal Services Arborist Technician prior to the commencement of site work.

2.3 Tree Protection

.1 Tree Protection Fencing must be erected before the onset of construction in relationship to each tree's Critical Root Zone (see fig.1 below) as follows unless otherwise approved in advance in writing by a UBC Municipal Services Arborist Technician:

.1 Orange snow fencing securely fastened to 50 x 100 mm (2" x 4") wood frame with uprights driven into the ground. Fencing will be 1.8m (4') in height and extend to at least the dripline, or to a distance of 1.0m (1.5') of DBH (diameter breast height) radius for every 1.8cm (1") of trunk diameter at DBH (diameter breast height), whichever is the greater (see fig. 1 below).

.2 Tree Protection Fencing for woodlots or groups of plantings, shall be placed at least I.0 meter beyond the dripline of outer canopies.



2.4 Tree Protection Signage

.1 Tree Protection Fencing should be provided with signage at reasonable intervals to discourage hoarding, grade changes and heavy equipment intrusions into Tree Protection Zones. Use either UBC standard signage shown below or an equivalent approved by Campus and Community Planning.

2.5 Root Curtain

.1 A temporary Root Curtain is required to cover exposed roots and conserve moisture along the cut face of excavations made adjacent to Tree Protection Zones. The Root Curtain is to consist of heavy wire mesh lined with burlap and supporting posts.

2.6 Tree Mulch and Anti-desiccant

.1 Based on scope of site disturbance and/or adverse drought conditions, the Project Arborist or a UBC Municipal Services Arborist Technician may require that mulch or anti-desiccant be applied to trees either at the beginning or at any time during the construction process.

.2 Tree chip mulch, including parts of the leaf, twig, bark and stem wood must be free of pests or diseases and must not contain Western Red Cedar or Black Walnut.

.3 Anti-desiccant shall be specified by the Project Arborist or a UBC Municipal Services Arborist Technician, and applied by an Arborist/Arborist Technician according to the manufacturer's recommendations.

.4 Provide a sample of the proposed tree mulch and source, and/or anti-desiccant for approval by a UBC Municipal Services Arborist Technician.

2.7 Site Work

.1 All underground utilities, drainage and irrigation lines must be routed outside the Tree Protection Zone. If utility lines must traverse the Tree Protection Zone, they shall be air-spaded or tunneled under the tree at depths and distances recommended by the Project's Consultant Arborist.

.2 Any pruning required on the project site must be performed by the Project Arborist.

.3 Any pruning required outside the construction site to access the site prior to or during construction must be performed by a UBC Municipal Services Arborist Technician.

.4 Any injury or tree damage during construction must be reported immediately to the Project Arborist or a UBC Municipal Services Arborist Technician who will recommend remedial actions as required to be carried out.

.5 Any grading, construction or other work that is expected to encounter tree roots must be monitored by the Project Arborist or a UBC Municipal Services Arborist Technician.

.6 Erosion control devices such as silt fencing, debris basins and water diversion structures must be installed to prevent siltation and/or erosion within the Tree Protection Zones as specified by the Project Arborist or a UBC Municipal Services Arborist Technician.

.7 Any roots damaged during construction shall be exposed to sound tissue and cut cleanly with proper pruning equipment by the Project Arborist or a UBC Municipal Services Arborist Technician. Under no circumstances shall roots be severed by unqualified personnel using excavation equipment or inappropriate tools.

.8 If temporary access roads must pass over the root area of trees to be retained, a road bed of 6"-10" wood-chip mulch with a supportive mat of boards or other rigid material shall be created to protect the roots and soil. The road bed shall be replenished as necessary to maintain a 6-10" depth. The Project Arborist or a UBC Municipal Services Arborist Technician is to be consulted for site-specific recommendations which may exceed these requirements.

.9 Spoil from trenches, building basements, or other excavations shall not be placed within the Tree Protection Zones. No burn piles nor debris pits shall be placed in the Tree Protection Zone. No ashes, drywall concrete tailings or other debris or garbage may be dumped or buried within the Tree Protection Zone.

2.8 Care and Treatment of Retained Trees

.1 During the construction process, the General Contractor must ensure adequate watering is provided within the Tree Protection Zone of each retained tree. The Contractor General must consult with a UBC Municipal Services Arborist Technician for recommendations on a watering schedule.

.2 The General Contractor will exercise due diligence, stop work immediately and contact Project Landscape Architect, Project Arborist, and/or UBC Municipal Services Arborist Technician should any unforeseen site conditions impact the success of tree preservation on site.

*****END OF SECTION*****

1.0 GENERAL

.1 The integrity and continuity of unique paving designs or materials such as exposed aggregate, coloured concrete, tile mosaics, rubberized asphalt, etc. may be difficult or impossible to match or replace. Designers should consider the need to repair or replace these materials over time.

.2 Laying of flagstones or slab type paving with large gaps in between should be avoided due to the likelihood of weeds growing between them.

.3 The maintenance and repair of non-standard paving materials will be customer funded expenses of the unit requesting them.

.4 Base prep requirements must follow standard requirements specified in Master Municipal Construction Documents (MMCD).

1.1 Related Guidelines

.1 MMCD Master Municipal Construction Documents, current edition

.2 Transportation Association of Canada, Geometric Design Guide for Canadian Roads, current edition

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Design Requirements

.1 All standard municipal roadways should conform to MMCD and the Transportation Association of Canada's, Geometric Design Guide for Canadian Roads, current editions.

.2 All road repair, remediation and rehabilitation shall be compliant with MMCD, current edition.

*****END OF SECTION*****

1.0 MATERIALS AND DESIGN REQUIREMENTS

1.1 General Requirements

.1 The integrity and continuity of unique paving designs or materials such as exposed aggregate, coloured concrete, tile mosaics, rubberized asphalt, etc. may be difficult or impossible to match or replace. Designers should consider the need to repair or replace these materials over time.

.2 The maintenance and repair of non-standard paving materials will be customer funded expenses of the unit requesting them.

.3 All expanses of paving associated with all Public Realm spaces must be detailed to accommodate maximum anticipated vehicular loading. Vehicles and heavy equipment such as snorkel lifts required intermittently to service buildings, large trees, or respond to emergencies, must be accommodated without damage to surfacing due to loading.

.4 Any utility upgrades or other projects that disturb and damage existing paving shall reinstate paving to original condition in compliance with relevant guidelines.

.5 Where manholes, catch basins and service covers occur within expanses of unit paving, concrete surrounds should be considered as and additional detail to minimize uneven settling of adjacent paving – especially where increased vehicular loading is anticipated.

1.2 Unit Pavers

.1 Public Realm unit paving should be installed such that:

.1 No end paving unit to be smaller than 8” x 8”.

.2 A complete bonded installation of paving units at the ends and/or edges of paving each course is achieved.

.3 A minimum overlap of paving units is specified thus avoiding the incidence of running straight joints or near straight joints.

.4 Groupings of similar sized paving units are avoided (e.g. linear runs of 100 mm units would be unacceptable.)

.5 Sharp-angled cuts are to be avoided.

.6 Place aggregate base over compacted subgrade. Compact base to 100 percent of ASTM D 1557 maximum laboratory density and screed to depth required to allow setting of pavers.

.7 Concrete unit pavers to be 4” (100mm) thick in all areas that are accessible to vehicle traffic.

.8 Concrete unit pavers to be minimum 2-3/8” (60mm) thick in pedestrian only areas.

.9 Edge Restraint: The edges of all areas of unit paving must be detailed with a continuous, robust edge to support loading and prevent lateral expansion. PVC edge restraint manufactured by Pave-Tech Inc. Provide PAVE EDGE INDUSTRIAL PROFILE edge restraint and all associated parts, including galvanized steel spikes (10”x3/8”). Install as per manufacturer’s recommendations, www.pavetech.com.

*****END OF SECTION*****

1. GENERAL

1.1 Related Scope of Work and UBC Guidelines

.1 Section 05 00 00 Metals
.2 Section 09 90 00 Painting & Coating
.3 UBC Campus Design Guidelines (Vancouver and Okanagan) – for metal screens and finishes installed in the public realm.

1.2 Description

1. The Guidelines apply to all work completed on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. Work includes fencing, screens, guardrails and shelters within 10m of any building.

1.3 Coordination

1. In instances where conflicts are found between the UBC Technical Guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
2. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
3. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.

1.4 Submittals

.1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures
.2 O&M Submittals
  .1 Product specifications, type and colour.
  .2 Final reviewed shop drawings for metal fabrications and where required, signed and sealed by a professional engineer registered in the Province of BC.
.3 Provide Letter of Assurance for 1.5.2.2 above.

2. MATERIALS

.1 All fencing, screens and shelters within 10 meters of a building shall be constructed using non-combustible materials such as metal.

*****END OF SECTION*****

1.0 GENERAL

1.1 Unique materials and complicated designs or detailing may be difficult or impossible to replace when repairs are needed over time and should be avoided in favor of standard materials that can be easily obtained from local suppliers and sources over time.

1.2 Any necessary repair and replacement of site furnishings that utilize non-standard materials or complicated designs, or are movable and not fixed in place, will be customer funded expenses of the unit that has requested these site furnishings.

1.3 Movable site furnishings are the responsibility of the sponsor and must not be placed in locations that obstruct standard maintenance and operation.

2.0 DESIGN REQUIREMENTS

2.1 UBC preferences for site furnishings including benches, waste receptacles, and light standards are referenced in the Vancouver Campus Plan, Design Guidelines unless otherwise noted in this section.

2.2 Provide minimum 2.2m spacing between bollard to allow passage of landscape and snow removal equipment.

2.3 Site furnishings must be attached using load-appropriate anchors and tamper-proof bolts and fittings.

2.4 It is imperative that hard landscape steps, furniture, walls and railings are designed to be resistant to skateboarding damages. After-the-fact add-on straps and studs are less desirable than surfaces that have been pre-considered as targets, and aesthetically designed to deter skateboarders. Preferred deterrents should be considered at the schematic design stage. Design strategies should include incorporation of air gaps, notching, and offsets in seat walls, uneven surfaces, and other creative alignments and articulation of surfaces, walls, steps and railings.

2.5 Minimum one year warranty on all site furnishings.

2.6 Minimum five-year warranty on garbage receptacles.

3.0 MATERIALS

3.1 Materials, including structural components and fasteners, must be rust and corrosion resistant.

3.2 Materials must be resistant to vandalism and to damage from skateboarders.

3.3 Use of tropical hardwoods in site furnishings is not permitted.

3.4 Selection of materials should be environmentally responsible including consideration of embodied energy of production and avoidance of endangered wood sources.

3.5 Clear vertical grain Cedar is to be utilized in custom designed benches and other site furniture as appropriate.

3.6 Bike Racks: Exterior bike racks installed on campus are to accommodate locking of the front wheel, rear wheel and the frame if desired by the user. UBC has adopted the use of a standard inverted U-style rack as follows.

.1 Manufacturer: Urban Racks (Phone 888-717-8881) or approved equivalent.

.2 Model: SU20-E-G (or SS)-CB

.3 Height 36”
.4 Width
.5 2” Schedule 40 steel pipe with flat horizontal cross bar
.6 Finish:Hot-dipped galvanized or stainless steel

Bike Rack Spacing:

i. Inverted U-Racks in a row shall be placed between 865mm and 915mm from centre of rack to centre of rack. This allows room for two bicycles to be secured to each rack.

ii. If adjacent to landscaping, bike racks should be offset 600mm from the landscaping.

iii. If adjacent to a wall, bike racks should be offset 300mm from the wall.

iv. The depth of a row of bike racks is to be at least 2.4m.

v. If designing for multiple rows of bike racks, the aisle space between parked bikes is to be a least 1.2m

Location and Mounting:

i. Racks are to be surface mounted on a concrete pad at a convenient, weather protected, well-lit location that can be easily accessed by visitors, and seen by occupants of the building.

ii. Mounting hardware shall be as flush as possible to the ground using 3/8” x 5” anchors and shall include one tamper proof nut per leg of the bicycle rack.

iii. At the discretion of Campus and Community Planning, bicycle rack installation may be embedded into concrete, rather than surface mounted.

iv. Where concrete unit paving is used as a surface treatment, installation options include pouring small concrete pads, concrete footing, or embedding the rack in a concrete slab below the unit pavers (least preferred).

v. Location of racks must not interfere with emergency access routes, pedestrian routes, fire connection points or hydrants and must allow for barrier-free access to the building.

3.7 Local supply of materials is preferred.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the supply and installation of materials and equipment required to provide complete and properly operating irrigation systems for UBC Campus landscapes.

1.2 Related Work

.1 Section 32 91 00 Planting Preparation
.2 Section 32 92 23 Sodding
.3 Section 32 93 00 Plants
.4 Section 33 10 00 Water Utilities

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Design Requirements

.1 Irrigation is required in all planting areas to support establishment of new plantings or future planting renovations, and to support plant health during periods of extended drought or unforeseen site disturbances.

.2 Drip irrigation is prohibited within institutional landscapes maintained by UBC *Facilities*, Municipal Services. This includes both core and customer funded landscapes. (See Part 2.11 Exclusions).

.3 Consider surrounding areas affected by the work. For existing systems work limit, design and specify to protect, restore and/or alter to proper working order. Consider utilizing existing irrigation systems and components. Demo existing irrigation to be supplanted by new irrigation by capping and removing whenever possible. When necessary to abandon piping in place, as in the case of it being within the root zones of trees to remain, show it on the as-built drawings and cap all open ends. Provide smooth transitions and balanced coverage between existing and new systems.

.4 In situations where existing irrigation systems are severed or otherwise made inoperable by construction work, temporary irrigation measures must be undertaken by the project to ensure the preservation of adjacent landscape areas that are to remain.

.5 Locate valve boxes, valves, and quick coupler valves in beds at least 36-inches off hardscape edges.

.6 Provide dedicated tree zones when tree water requirements differ significantly from surrounding shrubs and groundcovers.

.7 Zones shall not be on more than one side of a building.

.8 In support of UBC's water conservation initiatives (i.e. the Water Action Plan), the following is required of all landscape projects to reduce short and long term landscape water requirements:

.1 Simple rain sensors in conjunction with high-efficiency heads, valves and controllers must be specified in favour of other less practical technologies such as soil-moisture sensors or weather stations (see also: 2.11 Exclusions).
.2 Tough, vigorous, drought tolerant plant species must be specified.

.3 Provision of evergreen groundcover to reduce soil surface exposure to desiccation.
.4 Irrigation system water is to be metered separate from that of the building.
.5 Use of organic soil amendments to improve water retention.
.6 Organic surface mulches to facilitate soil moisture retention.
.7 Large growing shade trees in lawn areas are to be irrigated on zones separate from the lawn area that surrounds them.

2.2 Quality Assurance

.1 All irrigation work and irrigation design shall be done by a competent and experienced irrigation consultant/contractor having the skills, facilities, equipment and personnel adequate for the work specified.

.2 Irrigation layout must be designed according to recognized design principles to account for adequate overlap (e.g. head to head coverage), efficient and sustainable water use with separate zoning for lawns, plantings, trees etc. and significant micro-climatic variations as required.

.3 A manufacturer's warranty is required for all irrigation equipment outlined in this guideline and on the irrigation drawing(s).

.4 Do not cement pipe and fittings under wet or muddy conditions.

2.3 Submittals

.1 Water Service Connections: All new or substantially modified connections to the water distribution system at UBC require the submission of a Service Connection Application Form (see https://buildingoperations.ubc.ca/resources/policies-procedures-forms/). Project design drawings shall be provided to UBC Energy & Water Services for review (see Section 33 10 00 Water Utilities, 2.3 Water Service Connections for further details).

.2 For Operating and Maintenance Manuals requirements, see Technical Guidelines, Section 01 78 23 Operation and Maintenance Data. Submit one (1) copy of Record drawings to UBC Energy & Water Services.

.3 For UBC Record drawings requirements, see Technical Guidelines, Section 01 78 39 Project Record Documents.

.4 Submit one set of special tools and equipment required for proper operation and maintenance of the system.

.5 Instruction: Once the system is operational, the Project Manager must schedule a site meeting(s) as required to adequately instruct a UBC Municipal Services Irrigation Technologist in the complete operating and maintenance procedures for that system.

2.4 Site Conditions

.1 Verify the existence and location of all on site utilities and cooperate with the Contractor and UBC Energy & Water Services. Notify the Project Landscape Architect immediately for direction, as to procedure, should any piping or utilities be encountered during excavation.

.2 Prior to the work of this section, carefully inspect the installed work of other trades or contractors and verify that all such work is complete to the extent that irrigation work may commence properly.

.3 Field Measurements: Make all measurements in the field and adjust the design to meet the on-site conditions. In the event of major discrepancies between the drawings and the actual site conditions notify the Project Landscape Architect before proceeding with the work.

.4 Verify the locations of underground services by hand digging or by use of an M-scope.

.5 Repair all damage to underground services. Damage to services that are shown on the drawings or have been brought to the Contractor's attention in the field shall be repaired at the Contractor's expense.

2.5 Protection and Damage Repair

.1 Protect existing buildings, equipment, sidewalks, landscape reference points, monuments, markers and other completed work. Make good all damage resulting from work of this contract at no expense to UBC.

.2 All existing irrigation components, valves and lines to be retained or which serve an adjacent site, must be projected and/or repaired if damaged due to construction activity. Provisions must be made by a Project Manager to provide temporary irrigation to planting areas whose access to irrigation has been severed during construction.

.3 Trenches and other excavations cannot be left open overnight unless they are protected to WCB Standards. In all areas excavated trenches must be covered and barricaded to ensure public safety.

2.6 Warranty

.1 Provide a written warranty for all workmanship and materials for one (1) year from the date of Substantial Completion of the landscape and irrigation work.

2.7 Equals and Alternatives

.1 Any proposed substitutions must be approved in advance and in writing by UBC Municipal Services. Products and materials must equal or exceed the specifications of the equipment specified.

.2 The proposed equipment shall have a comparable warranty and a local, well stocked distributor.

2.8 Exclusions

.1 The following restrictions on irrigation technologies are to be adhered due to limitations with durability, longevity, operations and maintenance:

- no drip irrigation emitters or tubing systems
- no centralized weather stations
- no subscription-based weather sensors

2.9 Pipe and Fittings

.1 Plastic pipe to be extruded, virgin, high impact PVC pipe that is continuously and permanently marked showing manufacturer's name or trademark, type of material, pipe size and pressure rating. Note: Black, flexible Polyethylene (Poly) pipe may be used where flexibility is essential in working around existing services or tight installations.

.2 All piping to be Schedule 40 PVC.

.3 Plastic pipe fittings to be Schedule 40 PVC designed for solvent welding to PVC pipe except where valves, risers, etc. require threaded joints.

.4 Pipe solvent cement to be CSA approved type as recommended by the pipe manufacturer.

.5 Pipe sleeves under hard surfaces to be Schedule 80 PVC pipe.

2.10 Solenoid Valves

.1 Use Rainbird PEB valves or equivalents.

.2 If a solenoid valve is installed on the irrigation service connection from UBC Energy & Water Services' water distribution system, a hammer arrestor shall be installed upstream of the solenoid valve.

2.11 Sprinkler Heads

.1 Use Rainbird 1800 Series Spray and 5000 Series Rotors or equivalents.

.2 Use 12" pop ups in shrub areas.

2.12 Automatic Controller

.1 Locate in mechanical room.
.2 Use Rainbird ESP Modular Controller or equivalent.
.3 Mount an 11x17 color coded laminated zone control map adjacent to the controller, showing the location of main valves, numbered zone valves, associated color coded laterals, and a listing of zone numbers & descriptions, e.g. "turf, west side of building".

2.13 Rain Sensor

1. Use Rainbird model WR2RFC Wireless Rain/Freeze Sensor

2.13 Control and Common Wiring

.1 Insulated single-strand copper wire TWU-40 #14 gauge to be used where directly buried in the landscape. White to be used as the common.

.2 Wiring from the controller to the landscape may be a minimum of #18 solid wire run in conduit.

.3 All electrical connections to be made with CSA watertight connectors.

2.14 Water Supply

.1 The irrigation branch supply from Utilities service main to the demarcation point shall be ductile iron or copper piping as specified in Section 33 10 00 Water Utilities, 2.6, and valves per Section 33 10 00 Water Utilities, 2.7. See also standard drawing 1140-UT-Waterirrig-Demarc for Demarcation point of Utilities service.

.2 Submit to UBC Energy & Water Services the irrigation load as required on the service connection from UBC Energy & Water Services' water distribution system.

.3 Upon completion of the irrigation assembly in an irrigation chamber and before service is activated, the contractor shall notify for inspection: Energy and Water Services - Engineering

and Utilities at 604-822-9445. Notification for inspection shall be provided a minimum 24 hours in advance.

2.15 Irrigation Chamber

.1 For irrigation chamber equipment details, see Section 33 10 00 Water Utilities, 2.6.4.

2.16 Backflow Preventer

.1 Backflow/Cross Connection Control shall be installed as per BC Plumbing Code. Refer to Section 33 12 13.13 Water Supply Backflow Preventer Assemblies for details.

2.17 Layout of Sprinkler System

.1 Co-ordinate exact locations of lines, valves and heads, with planting locations to avoid conflicts and damage to plants during installation. Stake locations and check grades of all components.

2.18 Excavation and Backfilling

.1 The excavation depths for piping shall be:
- .1 In landscape areas a minimum cover of 300mm (12").
- .2 Under paving a minimum cover of 450mm (18").
- .3 On slab: place pipe on filter fabric above drain rock if 300mm (12") cover cannot be met.

.2 Trenches shall be straight with uniform slopes to the bottom of the trenches.

.3 Place pipe on firm soil at all points of the trench.

.4 Backfill trenches in 150 mm (6”) layers, tamping to ensure compaction of trench is equal to surrounding undisturbed area.

.5 Backfill material shall be free from rocks and other unsuitable materials which could damage the pipe or create unusual settling problems.

2.19 Installation of Piping

.1 Install the piping in accordance with the drawings and with manufacturer's recommendations.

.2 Pipe installation must include a ¾" hose-bib blow-out connection where it can be accessed with air-compression equipment in-tow for winterization. Locate this on the exterior of the building as close as possible to the water source point of connection. Vertical lines into mechanical rooms below grade should also be manually drainable by ensuring that backflow device is provided with a drain cock valve.

.3 Where possible, main and lateral lines may occupy the same trench provided a minimum 100mm (4") horizontal clearance can be maintained.

.4 No line may be installed parallel to and directly over another line.

.5 All piping to run as straight as possible between fittings.

.6 For secure, durable connections, all pipe joints must have a double-swipe of bonding agent – i.e. applied to the outside (OD) and inside (ID) respectively – of adjoining pipe surfaces.

.7 Remove all excess PVC solvent cement from all solvent weld joints.

.8 The entire irrigation system shall be thoroughly flushed with water to remove dirt, scale and foreign matter before sprinkler heads are installed.

2.20 Installation of Sprinklers

.1 Pop-up sprinklers shall have an adjustable riser assembly (triple swing joint) assembled by using at least three standard PVC street elbows.

.2 Triple swing joint risers shall be of Schedule 40 PVC and fittings of Schedule 40 PVC unless otherwise designated on the drawings. Flexible polyethylene swing joints may be substituted where PVC triple single joint installation are not practical.

.3 The bottom street elbow shall be connected to the side outlet on the lateral line.

.4 The PVC nipple on a pop-up sprinkler shall be installed at 45□ to the lateral line.

.5 All stationary spray sprinklers shall be installed with two PVC street elbows to connect to the lateral line and a schedule 40 PVC nipple that is long enough to be 100mm (4") above finished grade.

.6 All sprinkler heads to be installed a minimum of 25mm (1") and maximum 100mm (4”) away from any hard surface.

2.21 Installation of Valves and Valve Boxes

.1 All valve boxes to be installed flush with finish grade.

.2 All valves to be installed horizontally and centred in the valve box for ease of accessibility for servicing.

.3 All valve boxes to be blocked so that the valve box does not rest on the piping below.

.4 Valve box sizes and configurations shall be selected to adequately accommodate single or multiple valves such as to allow adequate operation and space for servicing. Use square irrigation boxes only.

.5 All wiring connection in valve boxes to be of sufficient length to permit removal of the top of the valve from the valve box.

2.22 Installation of Wire

.1 Protect low-voltage wiring by installing beneath irrigation lines

.2 All electrical connection to be made in an accessible valve box.

.3 All zones and mainlines to have independent dedicated trace wire. Secure 14-gauge trace wire to all irrigation piping at 10-foot intervals. Solder tracing wire to all lateral irrigation piping. Do not cut and splice main trace wires to control valves.

2.23 Clean-Up

.1 Any damage to paving, planting or any other structure due to settlement of improperly compacted trenches shall be promptly repaired at the contractor's expense.

.2 No activities of backfilling or hard/soft landscaping shall cover up any valve boxes, manholes, or other utility line openings.

2.24 Inspection and Demonstration

.1 Upon completion of the irrigation system, and before acceptance of the project by Municipal Services, the irrigation installer must demonstrate the complete system to a UBC Municipal Services Irrigation Technologist. A coverage test will determine if coverage of water to planting and lawn areas is complete and if any necessary adjustments are required. In the presence of the Project Landscape Architect and a UBC Municipal Services Irrigation Technologist, the irrigation installer shall set controllers in sequence, test through all zones, and make any necessary final adjustments. Adjacent pre-existing and operable irrigation systems must be made whole and included in the demonstration. The Project Manager must advise Landscape Architect in Municipal Services a minimum of forty-eight (48) hours prior notice to Municipal Services Landscape Architect is required before inspection and demonstration of the work..

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the materials, and equipment necessary for the supply, placement, and amendment of growing medium for landscapes.

1.2 Related Work:

.1 Section 32 93 00 Plants
.2 Section 32 93 05 Relocation of Existing Plant Material

1.3 Definitions

.1 "On-Site Topsoil" refers to topsoils (native or commercially processed) on location at project site, or reallocated, stockpiled and transported from elsewhere on UBC Campus lands. In principle, on-site topsoil will not be permitted for use in new landscapes in order to avoid the introduction of weed seeds into newly built landscapes. Permission, in writing, must be obtained in advance from Municipal Services for use of any on-site topsoil in new landscape projects.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Existing Conditions

.1 On-site topsoil designated to remain undisturbed in-situ, must be assessed, tested, amended, protected from compaction and weed infestation, and otherwise managed for the duration of the project as required.

.2 If on-site topsoil has been determined to be infested with pernicious perennial weeds such as horsetail, vetch or morning glory, etc. it must be excavated to depth necessary to prohibit future recurrence and removed from UBC Campus. Alternative remedial strategies must be presented in writing and reviewed and approved in advance and in writing by UBC Municipal Services Head Landscape Technologist.

.3 Identify the size and location of all existing services and sub-grades prior to the work.

2.2 Testing

.1 Testing on growing medium and /or conserved topsoil (if permitted for use) shall be carried out by Pacific Soil Analysis Inc., at #5 - 11720 Voyageur Way, Richmond, B.C. (Ph. 604 - 273-8226), or an equal approved by Project Landscape Architect prior to closing of tender.

.2 Separate tests and analysis shall be conducted for the following:

.1 All distinct types of growing media used on the project including imported soil, retained on-site topsoil (if permitted for use), relocated or mixed on-site media, any other distinct formulated soil substitute or mixture.

.2 All media formulated or designated for a special purpose including but not limited to planting, lawns, sports fields, on-slab, extensive or intensive green roofs, structural soils for street tree planting.

.3 The test shall determine the characteristics and quantity of the amendments to be used to bring the growing media and/or on-site topsoil to an optimal chemical and physical condition for landscape use.

.4 Sand shall be tested for sieve size analysis.

.5 Soil testing must be completed and recommendations approved by Project Landscape Architect prior to installation of any plant material. Failure to do so may result in the rejection of the growing media and/or retained topsoil, removal of growing media or retained topsoil from the site at no cost to UBC, and replacement with approved growing media as required.

2.3 Product Handling and Storage

.1 All materials to be handled and adequately protected to prevent damage or contamination.

.2 Stockpile materials in bulk form in paved area(s) approved by Project Landscape Architect. Take all precautions to prevent contamination of basic materials from wind-blown soil particles, weed seeds and from insects. Contamination of the ingredients may result in their rejection for use. Where paved surfaces are not available prevent contamination of on-site soil or sub-soil or construction materials.

.3 Store growing medium and/or excavated topsoil in a dry area or covered and protected from weed infestation, contamination, damage, water saturation, compaction or erosion.

.4 Maintain any stockpiled growing medium, excavated topsoil and all related amendments pre-approved for use by Municipal Services free of weed infestation prior to installation and throughout the duration of the project.

2.4 Samples

.1 Samples must be submitted, tested, and approved by the Project Landscape Architect in writing before the growing medium is amended. Failure to do so may result in the rejection of the growing medium, removal of the growing medium from the site at no cost to UBC, and replacement with approved growing medium.

2.5 Growing Media for Standard Applications

.1 All growing media must conform to the Canadian Landscape Standard Current addition as well as the following guidelines and specifications applicable to projects on UBC Campus.

.2 The following guidelines apply to standard applications where media are formulated for use on-grade, over sub-soil, and designated for application to on-grade lawns, trees and plantings as per Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area.

.3 Growing medium will be composed of proportions of mushroom manure or mushroom manure / peat moss mix, silts and clays, and sand, which provides suitable medium for supporting intended plant growth. Amendments may be required based on the recommendations of the soil analysis.

.4 Growing medium shall be free of pernicious weeds or their roots, sticks, building materials, wood chips, chemical pollutants and other substances at levels toxic to plants, and other extraneous materials which detract from the desirable physical and chemical properties for landscaping purposes. Excessive growth of weeds in a growing medium may be an indication that unacceptable levels of weed seeds or weed parts were present in the growing medium at the time of installation. Such a determination may result in a requirement that the Contractor remove and replace all affected medium and/or all weeds and weed roots and reduce the growth of weeds to acceptable levels.

.5 Sand must be mixed into growing medium prior to placement. Rototilling of sand into installed growing medium is not acceptable.

.6 Organic content shall be within the ranges as per Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area, for the intended application. This requirement may be met by mixing growing medium components or by topdressing and Rototilling in an approved type of organic matter, based on the recommendation from the soil testing laboratory. (See Section 32 93 00 Plants, 3.6.2 - Fertilizer Application and Soil Amendments).

.7 Drainage of growing medium can be measured only after the growing medium is in place. Mixing and handling of growing medium shall be done in such a manner that the minimum saturated hydraulic conductivity as per Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area is achieved. Areas with compacted soil after installation must be cultivated to restore the uncompacted nature found throughout the project.

2.6 Special Purpose Media for Non-Standard Applications

.1 Special Purpose Media includes all media for specialized application that requires formulation or amendment which diverges from the generalized specifications and tolerances shown above under Growing Media for Standard Applications and Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area. Special Purpose Media may include, but not be limited to: on-slab plantings, modular planters, extensive and intensive green roofs, and street tree plantings in pavement.

.2 Complete specifications and details for Special Purpose Media shall be developed collaboratively with the Project Landscape Architect following the recommendations of a Soil Consultant, Structural Engineer, and related project consultants as required before inclusion in contract specifications and drawings.

.3 Specifications and details for Special Purpose Media shall be reviewed and approved by the Project Landscape Architect.

.4 Structural Soils used for the installation of trees in urban pavements, plazas and streets will be the preferred planting medium for this type of tree planting. Alternatively, Structural Cell technologies and associated medium may be used if authorized by the Project Landscape Architect in consultation with UBC Campus Arborist and Municipal Services Head Landscape Technologist.

.5 Specifications and details for Specialized Media shall be provided by Project Landscape Architect in contract documents congruent in scope and equivalent with specifications above detailing Growing Media for Standard Applications and Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area.

2.7 Growing Media Amendments

.1 Required amendments for any landscape growing media or soils, will be the result of:

.1 Recommendations from Soil Consultant made after growing media testing and analysis.

.2 The presence or absence of an irrigation system.

.2 Fertilizer and Chemical Ingredients:

Fertilizer and chemical ingredients may be required by the Project Landscape Architect based on growing media test results to be added to each growing medium to conform to the growing medium standards specified above, and/or as based on the Soil Testing findings as recommended by Soil Consultant.

.1 Fertilizers must be those detailed in the landscape soil analysis report. The Landscape Contractor will not make any substitutions or change of application rates unless having obtained written approval of the Project Landscape Architect.

2.8 Preparation of Existing Grade

.1 Verify that grades are correct. If discrepancies occur, notify Project Landscape Architect and do not commence work until instructed by Project Landscape Architect.

.2 Eliminate uneven areas and low spots, ensuring positive and free drainage.

2.9 Placement

.1 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 25 mm above surface. Dispose of removed material off site, at no expense to UBC.

.2 Scarify entire area which is to receive growing medium to depth of 100 mm. Scarify those areas where equipment used for hauling and spreading has compacted soil.

.3 No growing medium shall be loaded, transported or spread when it is so wet that its structure is likely to be altered, or risk of compaction exists.

.4 Spread growing medium with adequate moisture in uniform layers over approved, unfrozen subgrade, where sodding and planting is indicated.

.5 Manually spread growing medium to achieve final grades around trees, shrubs and obstacles.

.6 Installed growing medium to 25 mm above design grades to allow for settlement.

.7 Place the growing medium to the following dimensions:

.1 Trees – Min. 600mm (24”) deep. UBC Campus Planning requires the following minimum soil volumes:
- Large (>10m canopy spread) 45 m3
- Medium (+/- 10m canopy spread) 25 m3
- Small (+/- 6m canopy spread) 10 m3
- Very Small (+/- 3m canopy spread) 5 m3

.2 Shrubs – Min 450mm (18") depth.
.3 Groundcover - Min 300mm (12") depth.
.4 (Low and High Traffic) Lawns – Min 150mm (6") depth.

2.10 Finish Grading

.1 Leave surfaces smooth, uniform and firm against deep foot printing.

.2 Fine grade growing medium to 25 mm above finished grades shown on drawings. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose, friable beds by means

of cultivation and subsequent raking. Final grades to be approved by Project Landscape Architect prior to further work proceeding.

.3 After planting, spread 100 mm layer of specified approved mulch evenly over all exposed growing medium finished grades, to the satisfaction of the Project Landscape Architect. Refer to Section 32 93 00 Plants for guidelines on mulch specification.

2.11 Acceptance

.1 Project Landscape Architect must inspect growing medium in place and determine acceptance of material, depth of growing medium and finish grading, prior to plant installation.

.2 Approval of growing medium may be subject to soil testing and analysis if any doubt exists concerning its conformity to the requirements as per Canadian Landscape Standard, Table 6-2: Properties of Growing Medium for Level 1 “Well Groomed” Area, or any of the subparagraphs under paragraph 2.1 of this Section.

2.12 Surplus Material

.1 Dispose of materials not required by Project Landscape Architect off site, at no cost to UBC.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the materials, methodology and services necessary for complete installation of seeded or hydro-seeded lawns and meadows, which includes the control of noxious and pernicious weeds within seeded lawns and meadows.

1.2 Related Work

.1 Related Work in Other Sections:

.1 Section 32 80 00 Irrigation
.2 Section 32 91 00 Planting Preparation
.3 Section 32 93 00 Plants
.4 Section 32 01 90 Operation and Maintenance of Landscape

1.3 Pertinent Standards and Legislation

.1 Conform to the requirements of the latest editions of the following standards and legislation:

.1 Canadian Landscape Standard – Current Edition
.2 British Columbia Standard for Turfgrass Sod
.3 British Columbia Weed Control Act
.4 Canada Seed and Fertilizer Act
.5 Canada Pest Control Products Act

1.4 Inspections and Approvals

.1 Notify Landscape Architect (Municipal Services) at least forty-eight (48) hours before final review of seeded lawns and meadows is required. For acceptance by Municipal Services, all lawns and meadows must be alive and in a healthy, satisfactory growing condition at the time of inspection.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 General

1. Avoid creation of convoluted lawn or meadow areas that are less than 2 m wide, end in very narrow angles, punctuated with obstacles, or are oddly shaped that make servicing with riding mowers impossible. Boulevards or medians 2 m wide or less must be planted.

2.2 Approved Equals

.1 All seed mixes and hydro-mulches as specified or pre-approved equals. Contact Head Landscape Technologist (UBC Municipal Services).

2.3 Warranty

.1 All workmanship and materials covered under Work of this Section shall be warrantied for a period of one (1) full year from the date of Substantial Performance.

2.4 Materials

.1 Lawn and Meadow Seed:

.1 Seed mixtures shall be suited to the climate, growing medium, site orientation, sun exposure, terrain, establishment and lawn class designation or intended use under which they are to be grown.

.2 Selections of seed mixtures should take into account the current infestations and impacts of Chaffer Beetle and associated damages by crows and raccoons. Designing with alternate groundcover or planting should also be considered. Consult with authorities, seed suppliers and Head Landscape Technologist (UBC Municipal Services) as required.

.3 Professional consultation is required in selecting or designing special purpose mixes for naturalizing or restoration purposes.

.4 The seed mixture shall be mixed, labeled and supplied by a recognized seed supplier. Labels shall include complete details including species names germination percentages, purity of analysis, year of production, and contact info for supplier.

2.5 Hydro-Seeding Materials

.1 Hydro-mulch shall contain no growth or germination inhibiting factors, be dry, be free of invasive and other foreign materials.

2.6 Subgrade Preparation and Finishing

.1 Obtain approval of Head Landscape Technologist (UBC Municipal Services) of subgrade and growing medium prior to seeding of lawns or grasses. Ensure that growing medium is placed to required depths and tolerances as specified and detailed in the Contract Documents and spread evenly over the approved subgrade. Ensure the growing medium is firm against footprints, loose in texture and free of all stones, roots branches etc. as required under Section 32 91 00 Planting Preparation.

.2 Ensure finish grade surfaces are tamped with roller before seeding, and finish grades are congruent with project drawings as specified.

.3 Grades:

.1 Lawn and grass meadow areas must be graded at slopes safe for mowing by maintenance crews and safe for all other Campus users. Maximum allowable slope for lawns and meadows is 5:1. Slopes over 5:1 are only permitted where pre-approved by Landscape Architect (UBC Municipal Services). (See also Section 31 22 00 Grading, 1.1.1)

.2 Crown or slope for surface drainage and eliminate all low spots or depressions.

2.7 Seeding and Hydro-Seeding

.1 Scheduling:

.1 Must be carried out during periods when seasonal conditions are likely to ensure successful germination and continued growth of all species in the seed mix.

.2 All seeding should be conducted during calm weather, and shall be done on soil that is free of ground frost, snow, and standing water.

2.8 Maintenance

.1 The maintenance period begins at the time lawns and meadows are planted and continues until successful establishment of the lawn or meadow and acceptance by Municipal Services.

.2 Maintenance shall consist of all measures necessary to keep lawn and meadows healthy, in a vigorous growing condition and well rooted into the underlying soil.

2.10 Protection

.1 All seeded lawn and meadow areas shall be adequately protected with warning signs and fencing until lawn establishment and acceptance by Municipal Services. Fencing shall be maintained in good condition to provide a continuous barrier until Acceptance. Heavy clippings shall be removed immediately after mowing and trimming. If any seeded areas are damaged with potholes, ruts, divets or uneven surfaces, they shall be repaired to satisfaction of Municipal Services.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the materials, methodology and services necessary for complete installation of sodded lawns, which includes the control of noxious and pernicious weeds within seeded lawns and meadows.

.2 Due to the current prevalence of damages associated with Chaffer Beetle, the scope of sod installation should be limited if not suspended where practical in favour of seeding with resistant seed mixtures, or designing with alternate groundcover or planting. See Section 32 92 00, Turf and Grasses, 2.6.3.2.

1.2 Related Work

.1 Related Work in Other Sections:

.1 Section 32 80 00 Irrigation
.2 Section 32 91 00 Planting Preparation
.3 Section 32 93 00 Plants
.4 Section 32 92 00 Seeded Lawns and Meadows

1.3 Pertinent Standards and Legislation

.1 Conform to the requirements of the latest editions of the following standards and legislation:

.1 Canadian Landscape Standard – Current Edition
.2 British Columbia Standard for Turfgrass Sod
.3 British Columbia Weed Control Act
.4 Canada Seed and Fertilizer Act
.5 Canada Pest Control Products Act

1.4 Inspections and Approvals

.1 Notify Landscape Architect (Municipal Services) at least forty-eight (48) hours before final review of sod is required.

.2 For acceptance by Municipal Services, all lawns and meadows must be alive and in a healthy, satisfactory growing condition at the time of inspection.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 General

1. Avoid creation of convoluted lawn areas that are less than 2 m wide, end in very narrow angles, punctuated with obstacles, or are oddly shaped that make servicing with riding mowers impossible. Boulevards or medians 2 m wide or less must be planted.

2.2 Warranty

.1 All workmanship and materials covered in this Section shall be warrantied for a period of one (1) full year from the date of Substantial Completion.

2.3 Materials

.1 Sod:

.1 Sod shall be nursery grown turfgrass sod, true to type, conforming to the B.C. Standard for Turfgrass Sod. Only "Non-Netted" Sod will be accepted.

.2 The quality grade of sod (based on B.C. Standard for Turfgrass Sod) shall be No. 1 Premium Grade grown on a screened alluvial sand base, cultivated on a sterilized soil base to ensure a weed free product. The maximum fines (silt and clay) in the alluvial sand base to be no more than 1% by weight.

Sod to be:

.1 'Supreme' (30% Kentucky Blue, 30% Fescue, 40% Perennial Rye) as grown by Anderson Sod Farm, 10821 Farms Road, Mission, B.C., 604-826-2383.
.2 Or approved equal. Equivalency to be reviewed and approved by Head Landscape Technologist (UBC Municipal Services).

.2 Weed Control: the use of toxic pesticides for cosmetic purposes is voluntarily suspended on UBC Campus. Manual weed control is the preferred method and may be the only permitted methodology. Remove and replace significantly affected sod. Consult with Head Landscape Technologist (UBC Municipal Services) for approval of any alternative organic weed control substances or methodologies.

2.4 Subgrade Preparation and Finishing

.1 Obtain Project Landscape Architect approval of subgrade and growing medium prior to laying any sod.

.2 Ensure finish grade surfaces are tamped with roller before laying sod, and finish grades are congruent with project drawings as specified.

.3 Grades:

.1 Sodded lawns must be graded at slopes safe for mowing by maintenance crews and safe for all other Campus users. Maximum allowable slope for lawns is 5:1. Slopes over 5:1 are only permitted where pre-approved by Landscape Architect (UBC Municipal Services). (See also Section 31 22 00 Grading, 1.1.1). Areas to be sodded shall be at grades as shown at the time of sodding, less an allowance for the thickness of the sod.

.2 Crown or slope for surface drainage and eliminate all low spots or depressions.

.4 If the surface of the growing medium is dry, lightly moisten the growing medium immediately prior to laying sod.

2.5 Sod Laying

.1 Use full rolls where possible. No bits or sod remnants are allowed.

.2 Only lay sod within acceptable weather conditions during March through mid-October. Do not lay sod during periods of high summer temperatures, or drought when no consistent, supplementary irrigation is available to retain sod and underlying medium in moist condition.

Do not lay sod during periods of heavy rainfall and when excessive puddling is apparent on site.

.3 Lay sod in rows with ends staggered. Butt all sections closely. Do not overlap or allow gaps wider than 2mm between sections. Top of sod to be flush with adjacent walking surfaces.

.4 Protect new sod from heavy foot traffic during laying. Place planks or plywood if necessary to prevent damage. Lay within 24 hours after delivery to prevent deterioration.

.5 Lay sections on slopes at right angles to the direction of the slope. Stake sod into place with wood stakes driven flush with the surface in any locations having slopes steeper than 3:1 (NOTE: Sloped lawns over 3:1 are only permitted where pre-approved by Head Landscape Technologist (UBC Municipal Services). Interval spacing on stakes shall not exceed 500mm. Prior to pedestrian traffic being allowed onto the sod, and only after the sod is well rooted into the growing medium, pegs or stakes shall be removed or driven to an elevation 50mm below the finished surface.

.6 Cut sod where necessary only with sharp tools.

.7 Water thoroughly to penetrate the full depth of the growing medium as specified.

.8 When sod has dried sufficiently, roll with 113kg. (250lb.) roller to obtain smooth uniform surface and ensure a good bond between soil and sod.

.9 Erosion control netting shall be installed in sodded areas where required, erosion control mesh or netting shall be placed and secured with stakes or staples set firmly into the ground to a minimum depth of 150mm. Spacing of stakes or staples shall be adequate to ensure complete anchorage of the sod to the ground.

2.6 Maintenance

.1 The maintenance period begins at the time sod is layed and continues until successful establishment of the lawn and acceptance by Municipal Services

.2 Maintenance shall consist of all measures necessary to keep grass healthy, in a vigorous growing condition and well rooted into the underlying soil.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the handling, care, installation, materials, warranty and replacement of plant material installed for new landscape and building projects on UBC Campus by Landscape Contractors.

1.2 Related Work

.1 Section 32 93 05 Relocation of Existing Plant Material
.2 Section 32 91 00 Planting Preparation
.3 Section 32 92 00 Turf and Grasses
.4 Section 32 92 23 Sodding
.5 Section 32 01 90 Operation and Maintenance of Landscape

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Pertinent Standards and Legislation

.1 All materials and execution to conform to the latest edition of the following standards or as otherwise specified in contract documents:

.1 CLNA, Canadian Standards for Nursery Stock, current addition.
.2 Canadian Landscape Standard, current addition.
.3 ISA / ANSI, ANSI-A300, Standards for Tree Care Operations.

2.2 Planting Layout and Selection

.1 Maintain existing vegetation where possible.

.2 Show all utility lines on a legible but faded back layer on all planting and site plans from design through to record drawings.

.3 Select and arrange plants with careful consideration to strengthening biodiversity, plant communities, space available to grow to mature size and form, shade and sun conditions of site, moisture requirements of plants, climate change, pests, fire resilience, drought tolerance and resiliency in the context of emergency municipal water restrictions, weed control, the safety of gardeners, and the limited capacity of groundskeepers to maintain an expanding and more complex landscape. Apply the following strategies:

.1 Select plants that are tolerant of seasonal moisture conditions, climate change and drought tolerance without additional irrigation. In plant list, provide one column indicating water requirements.

.2 Select plant palettes that reflect the broad range of woody and herbaceous plants that can be grown in our existing and future climate.

.3 Incorporate appropriate native plants to achieve aesthetic, environmental and social objectives.

.4 Factor site sun exposure and shade into plant selection and layout.

.5 Place woody plants no closer to the edge of a sidewalk, lawn area or curb than the maximum spread of the plant when mature (unless it is intended to be maintained as a hedge).

.6 Base siting and spacing decisions on mature height and form of shrubs and trees. Select self-maintaining plants and trees that will grow to the size and form desired, and in the space available, without the requirement to prune.

.7 Plant large growing shrubs as single specimens rather than in masses.

.8 Do not plant large growing shrubs or trees immediately in front of building windows or adjacent to sidewalks. Arrange plants with higher moisture requirements and plants with lower moisture in their own distinct communities.

.9 All plants within 1.5 meters from the building face should include plants selected from FireSmart BC's fire-resistant plant list (any zone) wherever possible.

.10 Do not extend planting or lawns under building overhangs. Drip strips or other no-planted surfacing (other than water features) must be provided to extend away from building face to at least align vertically with outer edge of any building overhangs that are at a height or orientation that would exclude normal rainfall from reaching lawn or planting in question.

.11 Extend groundcover plants under planting plan symbols to account for the actual size of shrubs when installed and to achieve coverage of ground plane until shrubs mature.

.12 Do not use groundcovers on corners or in other places where people may be expected to trample them.

.13 Arrange perennials and groundcovers in a way that does not leave bare patches of earth adjacent to sidewalks or lawn areas if they are dormant in winter and have no structural presence.

.14 As a general principle, arrange plants informally or in communities as you might expect to see them growing in nature. Do not plant trees in lines or rows, except on streets, or any of the Malls where precedent has been established to do so.

.15 Massing of plants, in terms of alignment and dimensions, should be such that plantings are accessible by maintenance staff for weeding, pruning trimming without causing undue damage to plantings.

.16 Hedge plantings requiring regular shearing to maintain height, width or shape must be avoided.

.17 Select plants for their robustness and capacity to endure urban and high pedestrian traffic conditions.

.18 The planting of trees in metal tree grates is to be avoided and will only be supported in exceptional circumstances.

.19 Select vigorous plants for steep slopes to achieve quick coverage, soil stabilizing capacity and limited maintenance requirements. (See Section 31 22 00 Grading regarding slopes)

.20 Do not select plants that contain toxic substances or produce dusts, exudates or odours that cause irritation, chemical burns, poisoning or allergic reactions. See WorkSafe BC, Toxic Plant Warnings.

.21 Select plant species that are known to exhibit a high degree of pest and disease resistance.

.22 Whether lawn, groundcover or shrubs - careful consideration must be given to

gradients, adjacent surface materials and slopes, ease of maintenance, and safety of grounds staff.

.23 Avoid plant species that spread into thickets with underground rhizomes. Where variances to this guideline are granted by Landscape Architect, Municipal Services, plants with these characteristics must be contained with a root barrier to prevent their spread.

.24 Always specify the cultivars of species as required. Specify no plants identified by The Greater Vancouver Invasive Plant Council (GVIPC). See www.gvipc.ca/most_wanted.php

.25 Do not plant suckering vines on building walls. Vines may be used when a trellis structure is provided on which vines can cling or twine.

.26 Living wall planting systems are not permitted.

.27 Where there is a transition between aggregate and lawn or planting, or lawn and planting, they must be defined and separated by landscape edging.

2.3 Tree Selection and Placement

.1 In principle, tree species selected for use on UBC Campus should be:
- .1 Low maintenance.
- .2 Tolerant of local conditions.
- .3 Resistant to branch failure and wind-throw.
- .4 Pest and disease resistant.
- .5 Structurally sound requiring no significant compensatory or remedial pruning.
- .6 Free from problem characteristics such as:
  - Heaving root systems.
  - Significantly messy plant parts (i.e. leaves, fruit, seeds etc.)
  - Allergenic or objectionable properties (excessive pollen, dust or malodorous).

.2 Individual trees selected for planting must be:
- .1 Nursery trained with a single leader (exception: multi-stemmed species).
- .2 Free of pests and diseases.
- .3 Free of pernicious weeds in the rootball or container.
- .4 Free of girdling roots.

.3 Tree planted within 60 cm of walkway or paved surface must have a 45 cm deep root barrier installed according to manufacturer's specifications along edge of surfacing prior to addition of topsoil and tree planting.

.4 Do not plant trees immediately in front of building windows.

.5 Trees should be planted in accordance with the minimum setbacks from:
Lamp Standards – 3m
Driveways/Crossings – 1.8 meters
Street Corners – 5m
Fire Hydrants – 1.8 meters
Underground Utilities, Catch Basins/Valve Boxes – 1.5 meters
Stop Signs – 6 meters
Buildings – 3 meters for large spreading shade trees or conifers
Buildings – 2 meters for columnar trees
Buildings – 2 meters for small ornamental trees

.6 Do not plant fruiting trees closer to paved or lawn areas than the maximum spread of the tree

canopy.

.7 Select trees that will grow to the size and form desired, and in the space available, without the requirement to prune.

.8 Trees that are planted in lawn areas should be located in such a way as to allow the passage of mowers 360 degrees around them to prevent the need for line trimmers (e.g. between tree and curb).

.9 Trees should not be placed where:
- .1 Branches will overhang buildings, light wells or air-intakes.
- .2 Under overhead signs, canopies, or building overhangs.
- .3 in front of entryways or in places that will obscure walkways, roadways or traffic signage.
- .4 In significant conflict with site lighting structures or lighting dispersal pattern intentions.
- .5 In locations that would subject the tree to excessive soil/root compaction due to pedestrian or vehicular traffic.
- .6 Avoid planting areas with limited soil volume (narrow slivers in converging sidewalks, between roads and walkways, or in narrow roadway medians).
- .7 Plan, budget and design to optimize soil conditions for root systems under pavements by utilizing Structural Soil or Suspended Pavements and Structural Cells.

.10 Adopt 10-20-30 rule to support tree biodiversity. No project is to include more than 10% of any one species, 20% of any one genus or 30% of any family.

2.4 Coordination

.1 Tree and plant selection, and planting design to comply with planting requirements specified in this document and in the Vancouver Campus Plan Design Guidelines.

.2 Review any plant or tree substitutions during design or construction phases with UBC Landscape Architects (Municipal and C+CP). Written approval is required for any substitutions.

2.5 Delivery, Storage and Protection

.1 Contractor to ensure all plant material and growing medium in which they are planted is free of damages, defects, noxious perennial weeds and is true to type as specified on plant list.

.2 The contractor shall be responsible for the storage, protection and installation of all plants and associated material.

.3 Verify existence and location of any on-site utilities. Contact the Project Landscape Architect immediately for directions as to procedure should any piping or utilities be encountered during excavation.

.4 Protect existing equipment, sidewalks, landscaping reference points, monuments and markers. Make good all damage incurred during this work.

.5 Erect temporary continuous barriers, and/or tree protection fencing where necessary to ensure safety of existing plants and trees. Refer to Section 32 01 93.01 Tree and Shrub Preservation.

2.6 Warranty

.1 Warranty must stipulate that plant material will remain free of defects as per contract plant lists and landscape specifications, for one (1) full year from the date of substantial completion of the work.

2.7 Replacements

.1 Replace all plant material found dead, or not in a healthy, satisfactory growing condition or which, in any other way, do not meet the requirements of the project or contract specifications, during and up to end of the warranty period.

.2 The cost of replacements resulting from theft, accidental damage, vandalism, carelessness on the part of others shall not be borne by UBC.

.3 All required replacements shall be plants of the same size and species as specified on the plant list and shall be supplied and planted in accordance with the drawings, specifications and change orders.

.4 Replace defective or dead plants, trees, lawns or plantings as required during the 1 year maintenance and warranty period to the satisfaction of the Project Landscape Architect and UBC Municipal Services.

2.8 Planting Time

.1 Do not plant during freezing and/or abnormally hot, dry weather.

2.9 Maintenance

.1 Refer to Section 32 01 90 Operation and Maintenance of Planting for complete maintenance guidelines.

.2 Any plants maintained as hedges must be level and not parallel with the ground.

2.10 Area of Plant Supply and Search

.1 Before substitutions of plant material or plant size are considered, provide written documentation that the specified material is not available at nurseries throughout Pacific Northwest (Canada and United States).

Substitutions: If it is impossible to obtain the particular plant material listed on the Landscape Drawing, the Contractor may be permitted to suggest substitutions with types and variations possessing the same characteristics. The Contractor must request any substitutions of trees in writing at least three (3) months and shrubs and groundcover at least two (2) months prior to planting. Substitutions must be approved by the Project Landscape Architect in consultation with UBC Landscape Architect (C+CP) and Landscape Architect (Municipal Services).

2.11 Plant Material

.1 Trees, shrubs, groundcovers, perennials, etc. shall be nursery grown in sizes and quantities shown on plant lists on landscape drawings and specification. Conform to the Canadian Landscape Standard and Canadian Standards for Nursery Stock.

.2 Trees designated B&B shall be properly dug with firm, natural balls of soil retaining as many fibrous roots as possible, in sizes and shapes as specified in the Canadian Standards for Nursery Stock. Balls shall be firmly wrapped with non-synthetic, rottable burlap and secured with nails and/or heavy, non-synthetic rottable twine. The root collar shall be apparent at surface of ball. Trees with loose, broken, processed or manufactured root balls will not be accepted.

.3 All plants, typical of their species or variety, must exhibit a normal habit of growth and shall be first quality, sound, healthy, vigorous, well branched, and densely foliated, free of disease,

insect pests, eggs or larvae, healthy well-furnished root systems free of binding or girdling roots.

.4 Plants must conform to the size specified in the plant list. Measurements specified are minimum size acceptable for each variety. Plants that meet the requirements specified in the plant list, but that do not possess a normal balance between height and spread will not be accepted. Plants for use when symmetry is required, or when planted in formal rows, shall be matched in form and size as nearly as possible. Do not prune prior to delivery.

.5 If the specified size of plants is not available, and alternate species or quantities or compensation are proposed, the Project Landscape Architect must discuss with Landscape Architect, Municipal Services in advance to obtain support for these remedies.

.6 As per Canadian Standards for Nursery Stock: tree caliper must be the determining measurement when the caliper exceeds 40 mm (1.5 in.). It must be measured no less than 150 mm (6") above the ground level for trees with a caliper up to 100 mm (4"). Trees 100 mm (4in.) and larger caliper are to be measured 300 mm (12 in.) above the ground level.

.7 All trees must have straight trunks with a single leader intact. Trees with multiple leaders, unless specified, shall be rejected. Trees with a damaged of crooked leader, bark abrasions, sunscald, disfiguring knots, insect or disease damage, girdling roots or cuts on limbs over 20mm (3/4") in diameter that are not completely closed must be rejected by Project Landscape Architect.

.8 Take precautions during digging, handling and shipping of plant material to avoid injury to plants and root systems.

2.12 Related Materials:

.1 Tree stakes: dressed 50mm (2") diameter treated fir stakes, lengths as detailed. Number per tree as required to keep tree plumb and true during one (1) year warranty period.

.2 Guywires: Trees up to 65mm (2.5") calliper - 14 gauge galvanized, multi-strand, twisted wire. Trees 65mm (2.5") to 75mm (3") calliper - 12 gauge wire, covered with new black garden hose, 2-ply, reinforced and of at least 13 mm (1/2") diameter, around leader at branch crotch.

.3 Deadmen: 100x150 mm (4"x6") pressure preservative treated construction grade lumber or approved equivalent. Lengths to be determined on site.

.4 Plastic Strapping: DeepRoot, Arbortie or approved equivalent. Strapping to be to be 19mm (2") wide, flat, woven polypropylene or nylon; 900 lb. break strength.

.5 Mulch: Shall be non-composted bark mulch with 25mm and minus Douglas Fir / Hemlock bark chips, dark brown in colour and free of cedar chips, soil, wood, stones, roots, plastic and other deleterious matter or pre-approved equal. Minimum compacted depth 100mm (4").

.6 Fasteners: All fasteners hot dipped galvanized.

.7 Fertilizers: Agricultural fertilizer of a formula indicted by soil test results of site soils and/or planting media specified for the project. Fertilizers shall be organic, slow-release compositions incorporated into the planting media wherever applicable.

.8 Anti-Desiccants: if specified, are to be applied to plants in full leaf immediately before digging or as required by the Project Landscape Architect. Anti-Desiccants are to be sprayed so that all leaves and branches are covered with a continuous protective film.

.9 Bio-stimulants: shall contain soil conditioners, VAM, and ectomycorrhizal fungi spores and soil

bacteria appropriate for existing soil conditions. Submit manufacturer's literature for approval.

.10 Edging: Heavy-duty commercial grade aluminum. Minimum 3/16" thick x 8" height c/w 18" long stakes.

2.13 Planting Hole Excavations – Trees, Shrubs and Groundcovers

.1 Trees, shrub, and groundcover beds are to be excavated to the depth and widths indicated on the drawings – neither too high nor too low. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped. If the planting area has not been sufficiently excavated, the tree must be replanted at correct level exclusive of required mulch.

.2 The sides of the excavation of all planting areas shall be sloped at a 45 degrees. The bottom of all beds shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed. The bottom of the planting bed directly under any tree shall be horizontal and tamped such that the tree sits and remains plumb.

.3 Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.

.4 Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected overnight.

.5 On steep slopes, the depth of the excavation shall be measured at the center of the hole and the excavation dug as shown on the drawings.

.6 Detrimental soil conditions: The Project Landscape Architect is to be notified, in writing, of soil conditions encountered, including poor drainage that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received from the Project Landscape Architect.

.7 Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the Project Landscape Architect.

2.14 Planting Season

.1 Plant only during the season or seasons which are normal for such work determined by weather conditions and as approved by the Project Landscape Architect.

.2 Do not plant during freezing and/or abnormally hot, dry weather.

2.15 Tree Layout

.1 Do not plant trees within the dripline of existing trees.

2.16 Planting Procedures

.1 All plants to be installed maintaining original grades of bases as they were in the Nursery.

.2 Loosen bottom of planting hole to depth of 150-200mm (6-8") prior to placing growing medium.

.3 Plant bare root trees vertically with roots placed straight out in hole. Orient plant material to

give best appearance in relation to structure, roads and walks.

.4 Place plant material to depths equal to the depth they were originally growing in nursery.

.5 With balled and burlapped root balls, loosen burlap and cut away minimum top 1/3 without disturbing root ball. This must be done before acceptance by UBC Municipal Services irrespective of any restrictions from doing so by plant nursery providers. Do not remove burlap or rope from under root ball. Remove any excess soil on top of root ball such that root flare is at or slightly above finished grade.

.6 With container stock, remove entire container without disturbing root ball. Non bio-degradable wrappings must be removed.

.7 Tamp growing medium around root system in layers of 150mm (6") eliminating air voids. Frozen or saturated growing mediums unacceptable. When 2/3 of growing medium has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.

.8 Water thoroughly on the interior of the tree saucer until it is filled even if it is raining. A second watering may be necessary to ensure saturation of the root ball.

.9 Prune out any dead or broken branches.

.10 Remove all tags, labels strings, etc. from plant material.

.11 Trees need to have any twine encircling their trunks cut at time of planting to prevent the girdling of the trunk.

2.17 Mulching

.1 Mulch all tree, shrub and groundcover planting areas (See **2.12.5** above).

.2 Ensure soil settlement has been corrected prior to mulching.

2.18 Guying and Staking

.1 Guy and stake all trees immediately after planting according to current recommendations of the International Society of Arboriculture (ISA) and the ANSI A300 – Standards for Tree Care Operations. Plant material not guyed or staked immediately must be replaced if damaged.

.2 Stake or guy a tree only when necessary for the specific conditions encountered and as per ISA Tree Staking Details or project drawing details. Staking may be required in unusual circumstances such as sandy soils or in extremely windy conditions, Poor quality trees with cracked, wet, or loose root balls, poorly developed trunk-to-crown ratios, or undersized root balls shall be rejected if they require staking, unless written approval to permit staking or guying as remedial treatment is obtained from the Project Landscape Architect. Trees that settle out of plumb due to inadequate soil compaction either under or adjacent to the root ball shall be excavated and reset. In no case shall trees that have settled out of plumb be pulled upright using guy wires.

.3 Stakes, anchors wires or plastic strapping shall be of sufficient strength to maintain the tree in an upright position that overcomes the particular circumstances that initiated the need for staking or guying.

.4 Guying: Fasten tree around leader at branch crotch to stake, pin or deadman in the ground, or

laterally to upright tree stake with galvanized wire protected by hose where wire wraps around leader and crotch as per manufacture's or drawing detail specifications. Alternate to wire use Deeproot, Arbortie plastic strapping or approved equivalent.

.5 Trees to stand plumb upon completion of this operation.

.6 Stakes and guys shall be removed at end of first growing season. Any tree that is not stable at the end of this period shall be rejected.

2.19 Maintenance Prior to Final Completion and Acceptance by Municipal Services

.1 Maintain all plant material from date of planting until Final Completion of the landscape and acceptance by Municipal Services. Refer to Section 32 01 90 Operation and Maintenance of Planting for maintenance and operation after Substantial Completion.

.2 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.3 Supply equipment such as pumps, portable sprinklers systems, tanker trucks, hose and sprinklers required for watering operations.

.4 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

2.20 Reviews and Acceptance

.1 At Substantial Completion, the Project Manager must schedule a review of the planting with Municipal Services Landscape Architect to identify any deficiencies. Provide minimum 48 hours notice.

.2 Trees, plant material and plantings must adhere to all requirements included in this section, exhibit healthy growing conditions and be free from annual/perennial/invasive/noxious weeds, disease, insects and fungal organisms.

.3 At Final Completion, the Project Manager must schedule a review of the planting with a UBC Municipal Services Landscape Architect to review satisfactory completion of the deficiencies. Provide minimum 48 hours notice.

.4 Acceptance will not be forthcoming if tree plants, plantings and/or soil show any evidence of invasive or perennial weeds such as morning glory, creeping vetch, horsetail or couch grass.

.5 Plant material insufficiently hardened-off prior to onset of frost and freeze may be rejected and require replacement if signs of frost damage, poor root development or winter desiccation are evidenced.

.6 The Project manager must schedule an end-of-warranty inspection that includes the Project Manager, the Project Landscape Architect, the landscape contractor, the maintenance contractor (if different from landscape contractor) and Municipal Services Landscape Architect.

.7 At the end of the Warranty period, trees, plant material and plantings must exhibit healthy growing conditions and be free from annual/perennial/invasive/noxious weeds, disease, insects and fungal organisms.

2.21 Maintenance During Warranty Period

.1 Refer to Section 32 01 90 Operation and Maintenance of Landscape.

*****END OF SECTION*****

1.0 GENERAL

1.1 Scope

.1 This guideline addresses the requirements for the transplanting of existing trees and plants, plus materials and equipment required to transplant and establish trees and plants in their new locations as shown on site development drawings.

1.2 Related Work

.1 Section 32 01 93.01 Tree and Shrub Preservation
.2 Section 32 91 00 Planting Preparation
.3 Section 32 93 00 Plants

1.3 Consulting Arborists and UBC Building Operations ISA certified arborist

.1 Where trees, or tree preservation strategies are anticipated as part of a development proposal, an ISC Certified Arborist must be retained as an integral member of the project consultant team. The Consulting Arborist is to advise on specific pre- and post-development strategies, and provide expert analysis, details and/or specifications required to optimize planned tree retention and preservation.

.2 A UBC Municipal Services Arborist Technician will serve as UBC's representative in arboricultural matters and can advise on tree issues with consultants and UBC staff as required.

1.4 Coordination

.1 Coordinate as early as possible in the conceptual and design development phases with a UBC Campus Arborist.

.2 Coordinate throughout mobilization and construction phases of a project with a UBC Arborist Technician regarding any site changes, potential damages or pruning required on relocated trees retained.

1.5 References and Standards

.1 Canadian Landscape Standard - current addition

.2 International Society of Arboriculture (ISA), Planting Specification, Tree and Shrub Transplanting

.3 International Society of Arboriculture (ISA), Best Management Practices - Tree Planting

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Tree Relocation and Protection Plans

.1 For trees to be protected and/or retained on site, the Project Landscape Architect must provide Tree Protection/Relocation Plans indicating surveyed grades at base of trunks, DBH, extents of drip lines and location of Tree Protection Fencing. Specifications and cross-sectional details for applicable preservation strategies including, but not limited to, requirements covered in this general guideline must be included in construction documents.

2.2 Coordination, Inspection and Supervision

.1 The Landscape Architect (C+CP), Project Landscape Architect, Project Consulting Arborist, and/or a UBC Municipal Services Arborist Technician shall coordinate as early as possible in the project to identify trees to be retained, protected, transplanted or removed and clearly establish tree relocation strategies for on-site or off-site locations.

.2 Every effort should be made to coordinate transplanting to occur in the dormant season or otherwise optimize conditions for transplanting in conjunction with site development timing and priorities.

.3 A qualified Landscape Contractor or authorized Tree Mover shall be responsible for transplanting of existing trees or shrubs to be relocated including preparation of site and coordination with Project Landscape Architect, Project Consulting Arborist and/or a UBC Municipal Services Arborist Technician.

.4 The Project Landscape Architect, the Consulting Arborist and/or a UBC Municipal Services Arborist Technician must be on site to monitor the relocation operations as required. The Contractor must provide minimum 48 hours' notice prior to relocation operations.

.5 During the construction phase, the Contractor responsible must contact a UBC Municipal Services Arborist Technician immediately regarding any site changes impacting tree or shrub relocation and preservation.

2.3 Site Conditions and Preparation

.1 Protect all existing trees, shrubs, properties, services and buildings from any potential damages from tree relocation work. (Refer to Section 32 01 93.01 Tree and Shrub Preservation).

.2 Consult with UBC Utilities regarding any underground services prior to commencement of work. Ensure work area is free from overhead, above ground and below ground hazards or utilities. Consult with UBC Building Operation and Utilities regarding any unforeseen hazards, structures or services prior to moving trees or shrubs.

.3 Check target locations for relocating plant material to ensure adequate access, soil quality and drainage.

.4 Ensure that soil texture, fertility and drainage at the new planting site(s) is acceptable, and that new transplant site provides analogous cultural conditions to original site. (Refer to Section 32 91 00 Planting Preparation).

2.4 Maintenance

.1 Maintenance of all relocated/transplanted trees and plant material at either on-site, or off-site heel-in/holding compounds will be the responsibility of the Contractor for the duration of the project and maintenance period.

.2 Maintenance of all relocated/transplanted trees and plant materials to permanent planting locations, will be the responsibility of UBC Building Operations unless otherwise specified.

2.5 Guaranty

.1 Unless otherwise specified, the Contractor will not be required to guaranty transplanted trees and plant materials, but will be required to do all work as specified under the direction of the Project Landscape Architect in consultation with Project Consulting Arborist and/or a UBC Municipal Services Arborist Technicianat the time of the plant moving.

2.6 Replacement

.1 The Contractor shall be responsible for replacing any damaged existing trees and plant material to be relocated with the same genus, species, size and character at no cost to UBC.

2.7 Materials

.1 Unless a tree or shrub is moved in one operation, directly to new site within a tree spade, rootballs must be firmly wrapped with non-synthetic, rottable burlap secured with heavy non-synthetic, rottable twine.

.2 Balls must be firmly wrapped with non-synthetic, rottable burlap and secured with nails and/or heavy, non-synthetic rottable twine. The root collar shall be apparent at surface of ball. Trees and plant material with loose, broken root balls shall not be accepted.

.3 Correctly sized wire baskets capable of accommodating the rootballs of trees and large shrubs may be used to facilitate movement, storage and rootball integrity.

.4 Anti-desiccants are to be applied to plants in full leaf immediately before digging or as required by the Project Landscape Architect in consultation with Project Consulting Arborist and/or a UBC Municipal Services Arborist Technician. Anti-desiccants are to be sprayed so that all leaves and branches are covered with a continuous protective film. Anti-desiccant shall be an emulsion specifically for agricultural use, mixed and applied according to manufacturer's recommendations.

.5 Anchors shall be Douglas Fir standard or better grade S4S lumber in the following size: 50 x 100 x 1200mm (2" x 4" x 48").

.6 Tree wraps shall be 8 -10cm wide nylon strapping three (3) per tree, 0.75m in length, with galvanized metal eyes at either end.

.7 Guy wire and safety sleeves shall be galvanized 11 gauge wire with brightly coloured survey plastic sleeves covering the bottom 1.5m of each section.

.8 Turnbuckles shall be galvanized and a minimum body length of 150mm (6").

2.8 Fertilizer

.1 Slow-release fertilizer such as 18-6-12 Osmocote or approved equivalent.

2.9 Complete Chip Mulch

.1 Tree mulch shall be complete tree chip mulch, including parts of the leaf, twig, bark and stem wood. This product may be obtained from local tree contractors or UBC Municipal Services, generally free of charge. The mulch should be free of pests or diseases and should not contain Western Red cedar or Black walnut.

.2 Provide a sample of the proposed tree mulch and its source for approval by the Consulting Arborist and/or a UBC Municipal Services Arborist Technician.

2.10 Planting Soil

.1 Refer to Section 32 91 00 Planting Preparation for general specifications on use of native topsoils and commercial soil products.

.2 Horticultural soil products may be mixed with existing soils to a maximum ration of 2:1 (new to old). The amended soil volume required for each tree will fill a void around the outside of the root ball 60cm in depth and equivalent to the radius of the root ball in width. [For example, a tree with a rootball 2m in diameter will require enough soil to fill a trench around the root ball 60cm in depth below existing grade and 1m wide. Additional soil will be required to raise the grade around the perimeter of root ball in its new location in order to form the watering saucers.

2.11 Period of Planting

.1 Coordinate digging of plant material to be transplanted to ensure minimum time between digging and re-planting.

.2 Trees and plant material designated for B&B, bareroot or as collected plants, shall not be dug or installed before dormancy or after bud break from late fall to early spring.

.3 Transplanting outside of the dormant season may occur in special circumstances only in consultation with Project Consulting arborist and/or a UBC Municipal Services Arborist Technician.

2.12 Protection

.1 Verify existence and location of any on-site utilities. Consult the Project Landscape Architect immediately for directions as to procedure should any piping or utilities be encountered during excavation.

.2 Protect existing buildings, equipment, sidewalks, landscaping reference points, monuments and markers. Make good all damage incurred during this work.

.3 Make every effort to protect all existing plants adjacent to any construction/tree relocation work.

.4 Erect temporary continuous barriers where necessary to ensure safety of existing plants and trees. Refer to Section 32 01 93.01 Tree and Shrub Preservation for protection fencing specifications.

2.13 Layout, Digging, Transportation, Planting and Securing

.1 Stake out the exact location for each tree or shrub transplant as shown on Landscape Plan.

.2 In approved locations, dig tree pit holes that are deep enough to accommodate the depth of the root ball without settling beneath the existing grade. The diameter of the planting hole in the upper 60cm of soil should be approximately twice the diameter of the root ball selected for that location.

.3 Ensure tree pits drain adequately. If drainage is poor, inform the Consulting Arborist.

.4 Dig each plant to the specified root ball diameter using appropriately sized Tree Spade equipment and employing the best trade practices. For trees with stem calipers less than 12cm, minimum root ball diameters will be calculated at 15 times the stem caliper, measured 30cm above grade. [For example, a 10cm. caliper tree will have a root ball no less than 1.5m in diameter.] For trees with stem calipers greater than 12cm, minimum root ball diameters will use a multiplier of 12. [For example, a 20cm caliper tree will have a root ball diameter of no less than 2.4m.] For trees with stem calipers greater than 25 cm, use a multiplier of 10.

.5 Root balls will be dug, where possible, with the tree stem centered in the root ball. If circumstances preclude obtaining the minimum rootball size with the stem centered on the root ball, the contractor will consult with the Project Consulting Arborist or a UBC Municipal Services Arborist Technician before proceeding.

.6 If, in the opinion of the contractor, the stability of the root ball or the tree will be compromised in the new planting site, the contractor is instructed to basket the root balls and ensure that the root balls are adequately strapped in burlap prior to transport. The contractor must ensure that the root plates of the relocated trees are stable and the trees are windfirm in their new sites. The contractor has the discretion to utilize wire baskets and or staking materials and techniques (see below) as his judgment directs. Relocated trees must remain completely windfirm for the duration of the maintenance period (12 months).

.7 Transport the plants immediately to the approved planting area and plant.

.8 Tree Saucers:

.1 Make a saucer around each tree with a berm of soil approximately 150mm (6”) higher than the top of the earth ball, 900-1200mm (36-48”) from the base of the trunk of the tree to facilitate watering.

.9 Tree Guying:

.1 Relocated trees must remain completely windfirm for the duration of the maintenance period (12 months). The contractor is directed to utilize whatever methods reflect the best trade practice of his industry to ensure the stability of the root ball. If, however, in the opinion of the contractor, guying of the tree is required, the following prescription is to be utilized.

.2 Equally space three anchors around the tree. Attach tree wraps approximately midway up the stem of the tree. Anchors should be placed at a sufficient distance to achieve a 45 degree angle on the guy. Anchors should be set at right angles to the guy wires and driven in to a depth sufficient to secure the guy (minimum of 80 centimeters).

.3 Secure the guy to the tree wrap rings and the anchor with a turnbuckle interposed between the two anchor points. Tension the guys once installed and position the protective sleeves. Provide three (3) guy wires per tree with a turnbuckle set in the centre of each wire.

2.14 Mulch and Fertilizer Application

.1 Apply 12 – 14 centimeters of complete tree chip mulch to the area of the planting site [i.e. to an area twice the diameter of the root ball].

.2 Apply fertilizer based on soil test results and incorporate into backfill soil or by surface application. In absence of soil test recommendations, apply approximately 250 grams (1/2 lb) of 18-6-12 Osmocote for each 5 centimetres of caliper per tree. Distribute the Osmocote over the top of the root ball area after mulching.

2.15 Watering

.1 Immediately after mulching and fertilizing, apply approximately 181 liters (20 gallons) of water per tree at a moderate flow rate. Ensure that flow rate does not liquefy soils and destabilize tree.

2.16 Pruning

.1 Prune off any broken or damaged branches to the outer margin of the branch collar. All pruning work to be done by an ISA Certified Arborist in consultation with the Project Consulting Arborist, or a UBC Municipal Services Arborist Technician.

*****END OF SECTION*****