Urban Forest Management Strategy
Technical Guidebook

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Department of Parks & Recreation
City of New Westminster

NEW WESTMINSTER

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1 Introduction

In 2016, the City of New Westminster adopted the Urban Forest Management Strategy and Tree Protection and Regulation Bylaw No., 7779. Through these policies the City has committed to reversing canopy cover decline by protecting our existing canopy, requiring replacement trees, and planting more trees on public land with the goal of increasing canopy cover to 27% by 2035.

New Westminster preserves trees through the Tree Protection and Regulation Bylaw No. 7799, 2016, which prevents unnecessary harm or removal of trees on public and private lands. The Bylaw regulates which, when, and how trees can be removed or altered through such acts as pruning, root cutting or topping. The Bylaw does not apply to the City or its authorized agents working around City-owned trees in accordance with approved City operations; however, all City projects must adhere to Tree Protection and Regulation Bylaw No. 7799 for private trees (requires a Tree Permit), and an equivalent standard for City trees.

This guidebook provides City staff, City contractors, consulting arborists and development professionals with:

1. Standards for supporting documentation required under Bylaw No. 7779, 2016 or to meet an equivalent standard for tree protection and replacement; and,
2. City standards for tree protection, planting and working around City trees.

If your project involves working around private trees, you will need to apply for a tree permit. Please refer to our website[1] or call **604-636-4318** for more information. If offsite protected trees are required to be protected and/or removed, you are required to consult and obtain consent from the property owner. This consent will be verified by the City as part of the tree permit process.

If your project involves working around City trees, please call **604-636-4318** in the pre-design stage of your project, or as soon as possible, to determine the scope of tree protection required.

[1] https://www.newwestcity.ca/services/environment-and-sustainability/urban-forest-management-strategy/articles/5348.php

2 Supporting Documentation Standards: Tree Protection and Replacement

This section provides standards for the:

1. Tree survey
2. Arborist report
3. Tree protection plan
4. Tree protection barriers
5. Letter of undertaking
6. Tree replacement plan and suggested replacement species

2.1. Tree Survey

The purpose of the tree survey is to accurately locate the position of the trees on or adjacent to a property in order to establish ownership and/or to accurately establish the critical root zone and tree protection requirements for tree retention during development. **The Tree Survey should be used as the base for the Tree Protection Plan**.

The **tree survey** must:

1. Be completed by a registered BCLS surveyor;
2. Have all dimensions in metric;
3. Include the location and diameter at breast height (DBH) of:
    a. a tree or shrub of any size located on City-owned or occupied land;
    b. a tree of any species (excluding hedges as defined in Bylaw No. 7799, 2016) that has a DBH ≥ 20 cm, or a combined DBH of its two largest trunks or stems of ≥ 20 cm;
    c. a replacement tree identified on a tree replacement plan or a retained tree identified on a tree protection plan;
    d. a tree with evidence of nesting by a bird defined in the *Wildlife Act*, RSBC 1996, c 488; and,
    e. Protected Trees as per above (3.a – d), on adjacent lots and City lands when their dripline is within 4 metres of the property line or whose diameter would require tree protection barriers on the subject property or at the property line.
4. Include the base elevations of all trees;
5. Include the location and type of all existing utilities above and below grade entering or immediately adjacent to the subject site;
6. Include the existing and proposed legal description, rights-of-way, easements, property lines, principal and accessory building footprints, walkways, patios, driveways and access, existing grades at each of the four corners of the subject site, water, storm and sanitary sewer lines, Hydro, telephone, cable, internet and gas lines, plus any existing service kiosks and boxes;
7. Include a title block with north arrow, scale, date, surveyor's seal and company name, a legend to identify symbols;
8. Revised plans must be dated; and,
9. Surveys should be provided in hard copy and/or pdf format and be of a scale to permit detailed information to be legible when printed in 11 x 17 format including labels.

The BC Land Surveyors provide sample survey plans. An example that would meet the requirements of a Tree Survey can be viewed at:
http://www.abcls.ca/wp-content/uploads/pdfs/Site-Plan-Sample-Plan-2016-01-18.pdf

2.2. Arborist Report

The City requires an Arborist Report as per Tree Protection and Regulation Bylaw No. 7799, 2016. The purpose of the Arborist Report is to provide an inventory and assessment of all protected trees on and adjacent to a property. **The Tree Survey and Tree Protection Plan should be submitted with the Arborist Report.**
The **Arborist Report** must:

1. Be completed by an **ISA Certified TRAQ Arborist** OR **an arborist technician certified by the British Columbia Industry Training Authority** who has a valid City of New Westminster **Business Licence** number and proof of **professional liability insurance**;
2. Include an **inventory**, with tag numbers or unique IDs (as defined on the associated Tree Protection Plan) of:
    a. a tree or shrub of any size located on City-owned or occupied land. **City trees <u>shall not</u> be tagged or physically marked in the field.** Within the inventory documentation, allocate a unique id (e.g., City01);
    b. a tree of any species (excluding hedges as defined in Bylaw No. 7799, 2016) that has a DBH ≥ 20 cm, or a combined DBH of its two largest trunks or stems of ≥ 20 cm;
    c. a replacement tree identified on a tree replacement plan or a retained tree identified on a tree protection plan;
    d. a tree with evidence of nesting by a bird defined in the *Wildlife Act*, RSBC 1996, c 488; and,
    e. Protected Trees as per above (3.a – d), on adjacent lots and City lands when their dripline is within 4 metres of the property line or whose diameter would require tree protection barriers on the subject property or at the property line.
3. Include inventoried trees in a **Tree Assessment Table** (see example in Appendix 1 - Example of an acceptable Tree Assessment Table) that includes:
    a. Tree tag numbers for onsite trees or unique IDs for off-site or City trees that correspond with the Tree Protection Plan. Do not tag City owned trees;
    b. Species;
    c. DBH;
    d. Condition rating (health and structure ratings of excellent, normal, moderate, poor, dead/dying, high risk with qualitative definitions in the arborist report);
    e. Comments describing any health or structural defects;
    f. Risk rating in a separate table (if high or greater as per TRAQ);
    g. Retention suitability as an individual tree or as part of a group given proposed site changes, or relocation suitability if applicable;
    h. Comments describing activities that will require arborist supervision;
    i. If recommending relocation of a tree, provide detailed descriptions of transplanting specifications including the methods of removal, transport, storage and replanting;
    j. Retention/removal recommendation inclusive of reasons for proposed removals; and,
    k. Critical root zone/proposed tree protection zone for fencing (if different from CRZ).
4. Provides **photographs** of protected trees in the context of the site;
5. For hazardous trees, include mitigation options and residual risk;
6. For all Protected Trees to be retained, describe the **recommended tree protection and mitigation measures** during phases including, but not limited to, demolition, site excavation, site preload, construction, servicing, landscaping, grading or other works proposed and describes recommended post-development tree maintenance measures;
7. Includes the arborist's business license or intermunicipal **business license number**;
8. Plans must be **dated and signed** by the arborist; and,
9. All dimensions in **metric**.

2.3. Tree Protection Plan

The purpose of the Tree Protection Plan is to accurately map the location of protected trees in relation to property lines, determine the location of proposed tree protection zones for each retained tree, and to identify any trees proposed for removal. **The Tree Survey should be used as the base for the Tree Protection Plan.**

The **Tree Protection Plan** is a map, annotated with specific tree protection measures defined in the Arborist Report, that must:

1. Be completed by an **ISA Certified Arborist or landscape architect**;
2. Have all dimensions **in metric**;
3. Include the surveyed location and **tag number** or unique ID (as defined in the associated Arborist Report) of:
    a. a tree or shrub of any size located on City-owned or occupied land;
    b. a tree of any species (excluding hedges as defined in Bylaw No. 7799, 2016) that has a DBH ≥ 20 cm, or a combined DBH of its two largest trunks or stems of ≥ 20 cm;
    c. a replacement tree identified on a tree replacement plan or a retained tree identified on a tree protection plan;
    d. a tree with evidence of nesting by a bird defined in the *Wildlife Act*, RSBC 1996, c 488; and,
    e. Protected Trees as per above (3.a – d), on adjacent lots and City lands when their dripline is within 4 metres of the property line or whose diameter would require tree protection barriers on the subject property or at the property line.
4. Include a **separate symbology** for trees to be retained, relocated and or removed;
5. Include the proposed tree protection zones for trees to be retained (as per Schedule B of Bylaw No. 7799, 2016);
6. Include the location and type of all **existing and proposed** below and above grade utilities entering or immediately adjacent to the subject site;
7. Include the **existing** (greyed out under the proposed plans if to be changed) **and proposed** rights-of-way, easements, property lines, principal and **accessory building footprints, walkways, patios, driveways and access**, grades at each of the four corners of the subject site, water, storm and sanitary sewer lines, Hydro, telephone, cable, internet and gas lines, plus any existing service kiosks and boxes;
8. **Include landscape plans for all hard and soft landscape inclusive of irrigation, fences and retaining walls;**
9. Include a title block with north arrow, scale, date and company name, a legend to identify symbols;
10. Be of a scale to permit detailed information to be legible when printed in 11 x 17 format including, but not limited to, tree tag identifiers, road names or other labels; and,
11. Revised plans must be dated.

Note: The applicant must provide the arborist with up-to-date drawings and inform the arborist of any details for proposed changes to grades.

2.4. Tree Protection Barriers

The City requires **Tree Protection Barriers** be placed around retained protected trees. The purpose of Tree Protection Barriers is to protect the tree from damage during site work or construction. **A letter from the consulting arborist** must be submitted to the City confirming that the tree protection barriers and signage are **constructed as per Schedule B of Bylaw No. 7799, 2016** and the Tree Protection Plan, with supporting photographs**. No tree permit will be issued until the barrier letter is approved by the City.**

2.5. Tree Replacement Plan

The City may require a Tree Replacement Plan. When required, the preliminary Tree Replacement Plan is to be submitted with the Arborist Report and must be prepared by an arborist or landscape architect in accordance with sound arboricultural practice that identifies the number, location, species and size of replacement trees to be planted. **For tree replacement or landscape plans on City property,** show detail about soils and planting requirements that conform to Standards for Soils, Planting, and Working around City Trees (Section 3) and provide plans to City of New Westminster Parks Department for approval.

A list of acceptable species is provided in the most current version of Bylaw No. 7799, 2016 Schedule C REPLACEMENT TREES. Spacing, stock and planting must conform to the latest **Canadian Landscape Standard**.

Consider the following when selecting species:

- Do not plant trees that are potentially invasive in locations where they could self-seed into natural areas;
- Focus on native trees when landscaping open space immediately adjacent to natural areas; and,
- Avoid trees with low drought tolerance except where there is irrigation or the site is naturally moist in summer.

Do not plant trees:

- Below overhead building encroachments or overpasses;
- Under canopies, awnings or overhead signs;
- In bus zones, except in bus bulges in line with other trees on block;
- In loading or passenger zones;
- In front of doorways, entrances; and,
- Immediately beside any infrastructure (e.g., building, houses, garages, light standards etc.).

When placing species:

- If planting trees to shade buildings, place them adjacent to the east or west façade where possible and far enough away so that branches will not extend over or conflict with the structure;
- Place trees far enough away from utility infrastructure so that branches will not extend over or conflict with utilities; and,
- Consider the following spacing guidelines:

Infrastructure Element	**Minimum Distance from Tree Centre**
Lamp standards	The anticipated mature edge of canopy.
Electrical/Communication/Trolley Poles	1.5 m
Electrical/Traffic Control Kiosks and Vaults	2.0 m
Communications Boxes	2.0 m
Driveways/Crossings	1.8 m
Fire Hydrants	1.8 m

Infrastructure Element	**Minimum Distance from Tree Centre**
Catch Basins/Valve Boxes	1.5 m
Corner Clearance	The greater of 3 m or conformance with sight triangle and canopy size
Stop Signs	The greater of 6 m or conformance with sight triangle and canopy size
Bus Stops	1.8 m
Parking Meters	Clear of tree pit/surround
Buildings – spreading trees	> 3 m
Buildings – columnar trees	> 2 m
Gas	No root ball above intersection of main and lateral gas lines and within 2m of this intersection. Root ball can be placed above main and lateral lines outside of the 2m radial clearance zone
Back of curb	> 0.5 m
Underground service locations (i.e., Gas, Hydro, Water, Sewer) to be determined prior to planting; tree locations shall avoid underground services and utilities where possible to prevent future conflicts. Where unavoidable, decisions to plant above services should be dependent on the depth of service (i.e., acceptable if service is below root zone) and the understanding that tree removal may be required for future service maintenance.	
Tree planting should, where possible, be offset to avoid overhead electrical conductors and/or species selection must consider required clearance distances from electrical conductors. Tree placement or species selection that would result in ongoing, long-term clearance pruning requirements should be avoided. Typically, for low voltage lines plant low growing trees, or trees that can be successfully 'v' drop-crotch pruned, within 4.5 m of the conductor alignment, medium growing trees within 4.5 – 7.5 of conductors and tall growing trees greater than 7.5 m of conductors.	

For replacement trees to be planted on City property, the City will select the species of tree and the placement to be shown on the replacement plan, source the tree stock and install the trees **at the project owner's cost.**

A final Tree Replacement Plan should be submitted prior to construction and landscaping. The Tree Protection Plan (excluding trees approved for removal) should be used as the base for the Tree Replacement Plan**.**

2.6. Letter of Undertaking

If the arborist report describes activities that will require tree protection barriers to be temporarily removed or relocated to allow work to be done within or near a critical root zone **the City requires a signed letter of undertaking** from the applicant's arborist (and signed by the owner and contractor/s) confirming that the applicant's arborist will be onsite and supervising all such work. An example of a letter of undertaking is provides in Appendix 2 – Example of Letter of Undertaking.

The letter of undertaking must:

1. State that the arborist has been retained to supervise works specified;
2. List what the arborist will do on-site (e.g., guidance, supervision, post-construction review, precision root pruning etc.) to supervise and monitor works in or near the CRZ;
3. Annotate the list onto a copy of the Tree Protection Plan; and,
4. Confirm that a follow-up letter/report will be written by the arborist and supported by date-stamped photographs detailing the supervision and works that occurred on site for submission to the City.

2.7. Arborist Site Supervision Report

After each supervision period, provide an arborist site supervision report to the City that records the tree protection and supervision that occurred onsite compared to what was planned, and makes any recommendations for mitigation. Specifically, the arborist site supervision report should include:

- Dates of supervision;
- Description of the works that occurred, any impacts to trees and what was done by the arborist/contractors;
- Recommendations for any mitigation required; and,
- Photos documenting the works and impacts described at each time of supervision.

2.8. Applying for Return of Tree Protection and Replacement Securities

To satisfy the requirements for the return of Tree Protection Securities:

- Applicants can apply for the return of Tree Protection Securities after final building inspection has been issued;
- The applicant's arborist or landscape architect must provide a letter that includes:
    - Notes and photographs documenting dates of supervision of activities defined in the letter of undertaking and arborist report, or for any works within a tree's critical root zone or involving relocation of the tree protection barrier, OR reference to arborist memos previously submitted that document those works; and,
    - A statement confirming that retained trees have not been damaged and have been properly protected and maintained in accordance with the bylaw and tree permit, and/or a statement clarifying which retained trees have been damaged.

To satisfy the requirements for the return of Tree Replacement Securities:

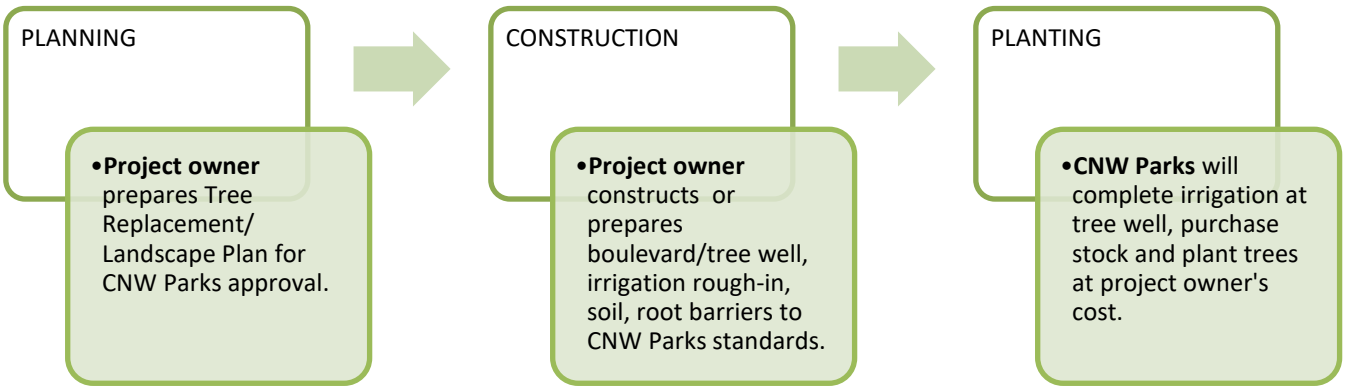
- At the time of planting, applicants must notify the City of installed and complete tree planting by:
    - Providing a memo from the arborist or landscape architect certifying that:
        - Replacement trees have been planted per the Tree Replacement Plan and an update to it if any tree locations or species selections were changed; and,
        - Stock meets the *Canadian Nursery Landscape Association, Canadian Standards for Nursery stock*, current edition.
    - Or, if the tree replacement plan was waived, the applicant must provide a letter and photographs as supported by an invoice from the nursery of the timing of plant purchase and photos of the trees to the satisfaction of the City.
- 12 months after planting (or a longer period if recommended as part of the approved tree replacement plan), applicants can apply for the return of Tree Replacement Securities. The applicant must provide:
    - A memo from the arborist or landscape architect certifying that the replacement trees have been planted and maintained for 12 months or longer;
    - The memo or letter shall include to the satisfaction of the City:
        - Comment on whether or not the maintenance has met the ANSI A300 *Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices*;
        - Recommendations for any mitigation required; and,
        - Recent photos of replacement trees.
    - Prior to providing the memo or letter, all tree wrap shall be removed, all stakes and wires shall be removed, **and trees shall be in leaf.**

Upon inspection and acceptance of tree protection and replacement documentation provided, the City will release the security or, if the tree protection or tree replacements were not provided to the City's satisfaction, notify the applicant that securities are to be held or drawn on.

3 Standards for Soils, Planting, and Working around City Trees

Tree replacement or landscape plans for City property should conform to the standards presented in this section, and to the satisfaction of City of New Westminster Parks Department. When preparing a site for new trees on City Property, the project owner (e.g., developer, City contractor or City department) is responsible for providing the soil and preparing the planting site to City standards. **City of New Westminster Parks Department will purchase the stock, plant trees and complete the irrigation loops.**

Responsibility for implementing project phases for tree planting on City of New Westminster (CNW) property is as follows:



3.1. Soils, Irrigation & Root Barriers

The soil that trees are growing in influences the success with which trees can establish and grow because it affects the availability of water, air and nutrients to plant roots.

3.1.1. Soil Volume Requirements

The following are recommended as guidance only and site specific exceptions may be made by the City. In general, the City aims to select the largest tree suitable for the site while balancing the available soil volume and constraints for site lines, utilities or other relevant considerations. Generalized per-tree minimum soil volumes are provided below:

Tree size category	Average Spacing	Per-tree Minimum Soil Volume*
Large (>10 m canopy spread)	9 - 11 m	45 m3/30 m3 shared
Medium (~10 m canopy spread)	8 - 10 m	25 m3/20 m3 shared
Small (~6 m canopy spread)	6 - 10 m	10 m3/5 m3 shared
Very Small (~3 m spread)	3 – 6 m	5 m3

*Soil volume should be a depth of 1 m. The soil volumes quoted should be considered as minimums for the size categories listed and are based on a minimum of 0.3m^3 of soil per 1 m^2 of canopy area (Lindsey, P. and Bassuk, N.L. 1992. Redesigning the Urban Forest from the Ground Below: A New Approach to Specifying Adequate Soil Volumes for Street Trees. Arboricultural Journal. 16(1) 25-39)

Both soil volume and the permeability of the surface area around in hardscape (i.e., the “tree pit”) should be maximized. To increase root zone volume, suspended pavement, structural soils or soil cells may be required (**see Details 2.3-2.5**).

3.1.2. Growing Medium: In-situ Soil

Whenever possible, retain and protect the existing soil and soil structure unless it cannot support healthy tree growth or is infested with noxious weeds (e.g., knotweed or hogweed). Backfilling with the existing soil will prevent changes in soil texture that create interfaces that can disrupt water flow. The existing soil will also have structure and microbial activity that commercial soil mixes lack and avoids the cost of purchasing soil. Even if using soil cells or suspended pavement, it is preferable to backfill with existing soils. Landscape soil testing may be required at the City's discretion to ensure that the soil will meet the basic requirements for plant growth. Retaining native soil also saves the cost of having to purchase and import commercial soil to the site.

- Protect soil in-situ from construction impacts by:
    - Fencing off planting areas or laying down materials like mulch or matting where machine access is needed during construction; and,
    - If grading is required, stockpile the soil drawn from the O and A horizons on the development site, or in a container stored curb-side (requires a street-use permit from the City) and cover the soil to prevent wind and water erosion.
- If excavating a planting hole in the existing soil (i.e., not on a graded site), backfill the planting hole with the soil that was excavated in approximately the order it was removed to match the soil layers. Backfill soil mix in 150 mm lifts and tramp to prevent air pockets; and,
- If excavating a planting hole into a graded site, rip the subsoil if compacted or scarify the bottom of the hole and mix in some of the stockpiled soil so that it blends with the surrounding soil. Backfill the planting hole with the stockpiled soil.

3.1.3. Growing Medium: Imported Soil and General Growing Medium

If existing soils are not suitable for plant growth, imported soil mix should be **New Westminster Soil Mix by Premium Soils (604 541 7645, info@premiumsoils.ca). Any other soil imported to the site will be required to undergo soil testing for texture, OM content, porosity and pH and will need to be approved by the City of New Westminster.**

Prior to planting into commercial soil mix:

- Rip the subsoil if compacted or scarify the bottom of the hole and mix in some of the commercial soil mix so that it blends with the surrounding soil. Backfill the planting hole with the commercial soil mix; and,
- Backfill soil mix in 150 mm lifts and tramp to prevent air pockets.

3.1.4. Structural Soil

If using structural soil to expand soil volume (calculate volume achieved as 20% actual soil) or to create a bridge to adjacent soil volumes while supporting high levels of compaction, structural soil material used shall be from **Premium Soils (604 541 7645, info@premiumsoils.ca),** the only source currently approved by the City of New Westminster.

See Detail D2.3.

3.1.5. Root Barriers

Install root barrier adjacent to sidewalks, paths, parking lots and any other surfaces vulnerable to root heave – **See Detail D2**.

- Root barriers must be installed prior to tree planting; and,
- **12 inch** root barriers will be supplied by the City of New Westminster Parks Department and picked up by the contractor at the City works yard.

3.1.6. Irrigation

Irrigation is to be installed for all City of New Westminster trees unless otherwise directed by the Parks Department. Irrigation specifications are provided in **details D2: Planting Site Overview** and **Street Tree Irrigation Vault Detail.**

The project owner is responsible for installing the irrigation system and service vault rough-in only. City of New Westminster Parks staff will install the DCVA, controller and drip irrigation pipe at each tree location.

Service vault Rough-in:
- ¾ inch service with curb stop valve;
- 25 mm capped irrigation pipe at each tree location; and,
- T266 service box.

Irrigation System:
- Locate wire to be installed beside main run of irrigation pipe, with one end inside service vault. Wire to be insulated 14 gauge solid copper;
- Install 25mm schedule 40 PVC irrigation pipe 25 cm below sidewalk level, uniform distance from sidewalk (max. 30 cm);
- Install 25mm stub (horizontal) into main pipe at each tree location and glue cap on;
- Mark stub location with upright 25mm PVC pipe buried deep enough to prevent easy removal;
- Pipes crossing under any paved surface to be installed in 75mm PVC sleeve extending minimum 40 cm past paved area; and,
- PVC solvent cement to be 711 heavy bodied. Primer to be P70 purple primer. No “Wet or Dry” cements or primers to be used.

3.2. Planting

City of New Westminster Parks will purchase and plant trees for all projects on City property.

3.2.1. Nursery Stock Standard

All nursery-grown plants are to be specified according to the Canadian Nursery Landscape Association *Canadian Standards for Nursery Stock* current edition and *Canadian Landscape Standard*, current edition. All trees must be:

1. On a single leader, with the lowest branch being at least 1 m high on the stem;
2. Of 6 cm caliper or greater if deciduous;
3. Of 2.5 metres height or greater if coniferous;
4. Free of pest and disease;
5. Free of invasive weeds in the root ball;
6. Free of injury, or other defects; and
7. Free of girdling roots.

Tree stock may be container grown or ball and burlapped/wire basket field grown trees. The following precautions are required when working with different types of trees:

Container Grown Trees

Issues to Inspect For	Corrective Actions
Root flare can be buried in potting medium.	If you cannot see the first lateral supporting root, excavate the top of the soil in the container with your fingers or a small garden claw tool to identify the depth of the first lateral feeder root and to expose the root flare. Most container grown trees are planted too deep so **do not** assume that a container-grown tree can be planted "as is".
Circling roots may be hidden in the soil.	Reject the stock.
When you lift a tree out of the container, the soil falls away from the roots.	Reject the stock or, if not possible, plant as a bare root tree (create a mound of soil in the middle of the bottom of the hole to spread roots across, backfill soil as usual, water and stake the tree).
Broken branches	If the main leader is broken, or if more than 15% of the crown is broken, reject the stock. Otherwise, prune off broken branches and maintain a well-balanced appearance.

Ball and Burlap or Wire Basket Field Grown Trees

Issues to Inspect For	Corrective Actions
Root flare can be buried in root ball.	If you cannot see the first lateral supporting root, excavate the top of the soil in the container with your fingers or a small garden claw tool to identify the depth of the first lateral feeder root and to expose the root flare.
Broken branches	If the main leader is broken, or if more than 15% of the crown is broken, reject the stock. Otherwise, prune off broken branches and maintain a well-balanced appearance.

3.2.2. Mulching

Mulch should be installed as per detail **D1: Tree Planting Overview** except where approved by the City (downtown, tree grates, decks etc.).

- In horticultural areas and street or park trees: bark chip varying in size from 25 to 50mm in diameter, from bark of Douglas Fir and/or Hemlock;
- In natural areas: chips varying in size from 25 to 50mm in diameter, from hardwood tree species;
- Ensure soil settlement has been corrected prior to mulching and that newly planted trees have been properly watered; and,
- Spread mulch as indicated in detail D1: Tree Planting Overview no deeper than 10 cm.

3.2.3. Staking or Guying

Staking

Trees should not be staked and tied unless planted in a high pedestrian traffic area where they are prone to being knocked, or in a windy location where they are likely to be blown over. Stakes should be installed as per detail **D1: Tree Planting Overview**.

- Use single stake tree support for deciduous trees less than 3m and evergreens less than 2m. Two stakes may be used if the tree requires additional protection;
- Place stake on prevailing wind side and 150mm from trunk and clear of the root ball;
- Drive stake minimum 150mm into undisturbed soil deeper than the roots;
- Ensure stake is secure, vertical and un-split;
- Install 50mm wide fabric belt in a slightly loose figure 8 at 1/3 of the tree height above ground;
- Ensure that installation of tree stakes does not damage root system of tree; and,
- Ties and stakes should be removed approximately 1 year following planting, unless directed to remain in place for a longer period due to poorly rooted trees.

Guying

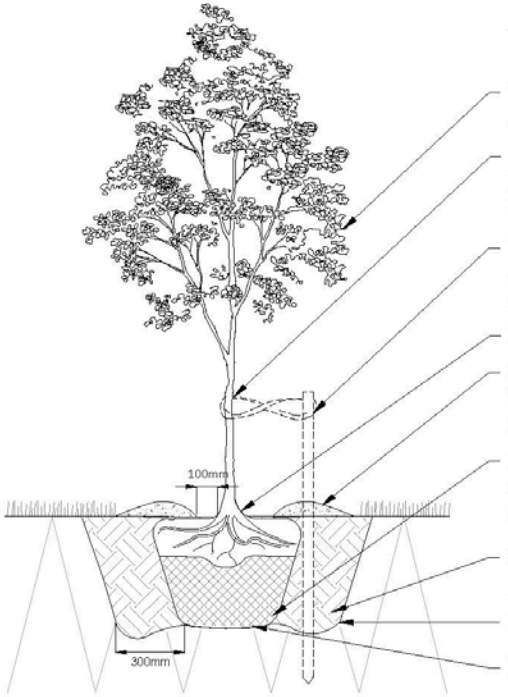
Larger trees (>10 cm dbh) may require guying to stabilize them following transplanting. Use 3 guy wires and anchors for deciduous and broadleaf evergreen trees greater than 3m and conifers greater than 2m.

- Use Type 2 guying wire with clamps for trees less than 75mm in diameter and Type 3 guying wire with clamps for trees greater than 75mm in diameter;
- Use Type 1 anchors for trees less than 75mm in diameter and Type 2 anchors for trees greater than 75mm in diameter;
- Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed .5m above grade;
- Guying collars to be of sufficient length to encircle tree plus 50mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees;
- Install anchors at equal intervals about tree and away from trunk so that guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire;
- Attach guy wire to anchors. Tension wire and secure by installing clamps;
- Install wire tightener ensuring that guys are secure and leave room for slight movement of tree;
- Saw tops off wooden anchors which extend in excess of 100mm above grade or as directed by the City
- Install flagging tape to guys; and,
- Guys should be removed approximately 1 year following planting, unless stabilization is directed to remain in place for a longer period.

3.2.4. Tree Planting Details

1.1 D1: Tree Planting Standard

D1: Tree Planting Standard



Trees on City property will be planted by CNW Parks

Tree: prune to remove damaged branches, do not remove leader

Tree tie: 50mm wide fabric belt in figure 8 pattern at $\frac{1}{3}$ of tree height, attached to tree stake with shingle nails. Secure tree firmly but not rigidly, within 25 mm of top of stake.

Tree stake (if required): position as close to tree as possible without penetrating root ball. Approx $\frac{1}{3}$ height of tree. Drive stake into undisturbed soil 150mm deeper than roots

Root flare: position at existing grade

Mulch: Mulch around tree no deeper than 100mm. Create 100mm deep basin around around tree to encourage water retention. Keep mulch min 100mm back from trunk.

Rootball: ensure burlap and twine are bio-degradeable. Remove burlap from upper $\frac{1}{2}$ of rootball | cut out bottom of wire frames prior to installation, once tree is in place remove wire from sides

Backfill: native soil or soil mix in 150mm lifts and tramp to prevent air pockets - see Note 4.

Planting hole min depth of rootball plus 300mm each side

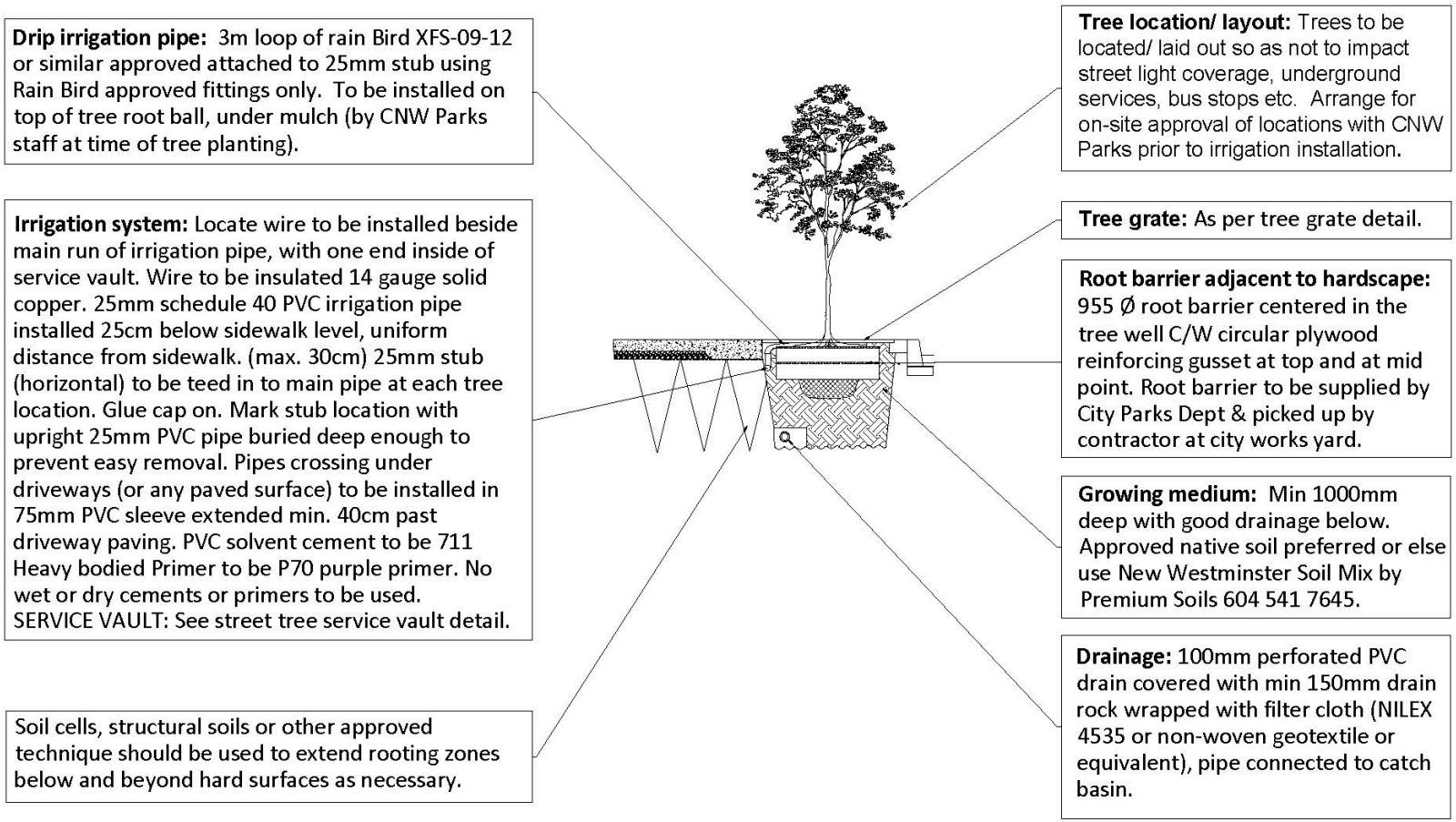
Place rootball on undisturbed or compacted soil to prevent settling of tree

Notes:

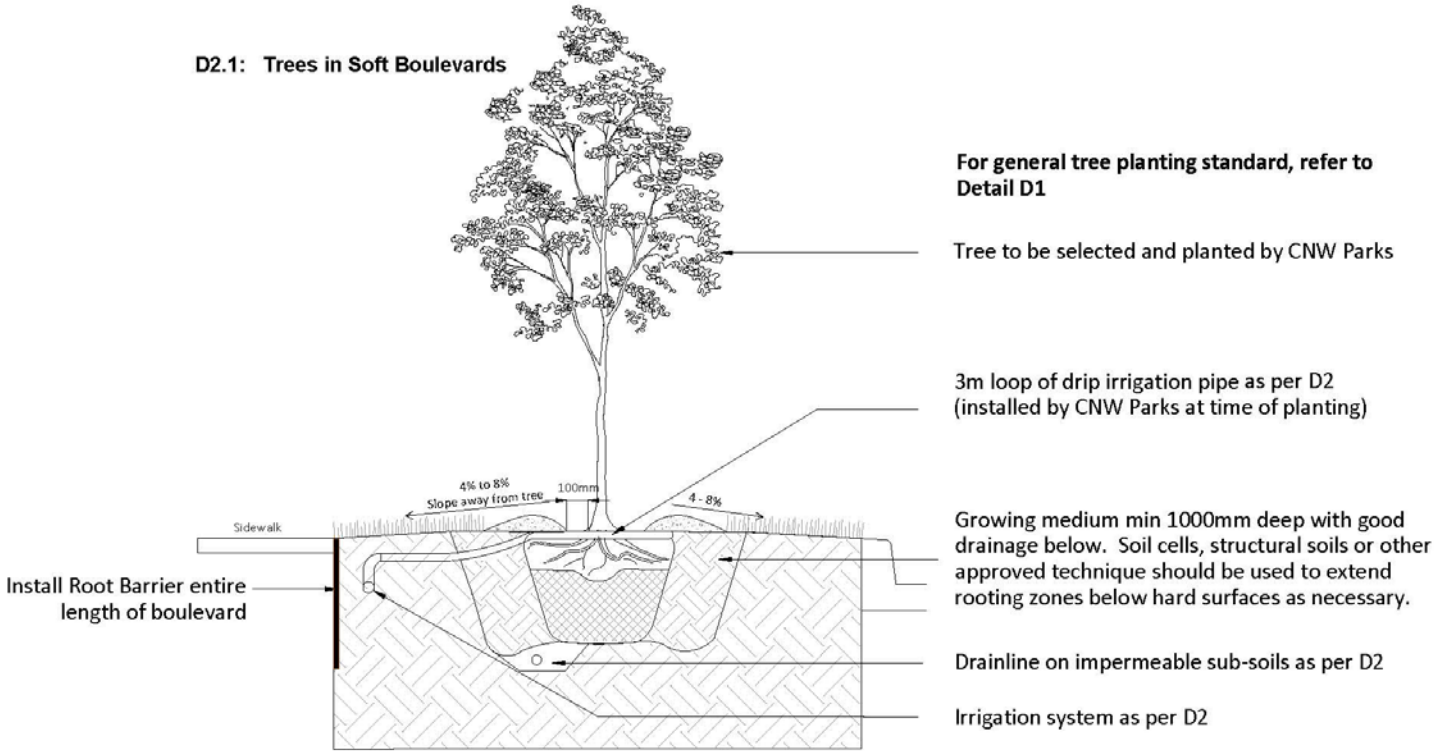
1. Protect tree from damage during transportation.
2. Tree staking may only be required in windy locations
3. If weed whacker tree guards are installed, ensure they are monitored and adjusted regularly.
4. Approved native soil preferred or else use New Westminster Soil Mix by Premium Soils 604 541 7645. If using soil mix, scarify existing subgrade and blend 300mm topsoil growing medium.

1.2 D2: Tree Planting – General Information

D2: Tree Planting - General Information



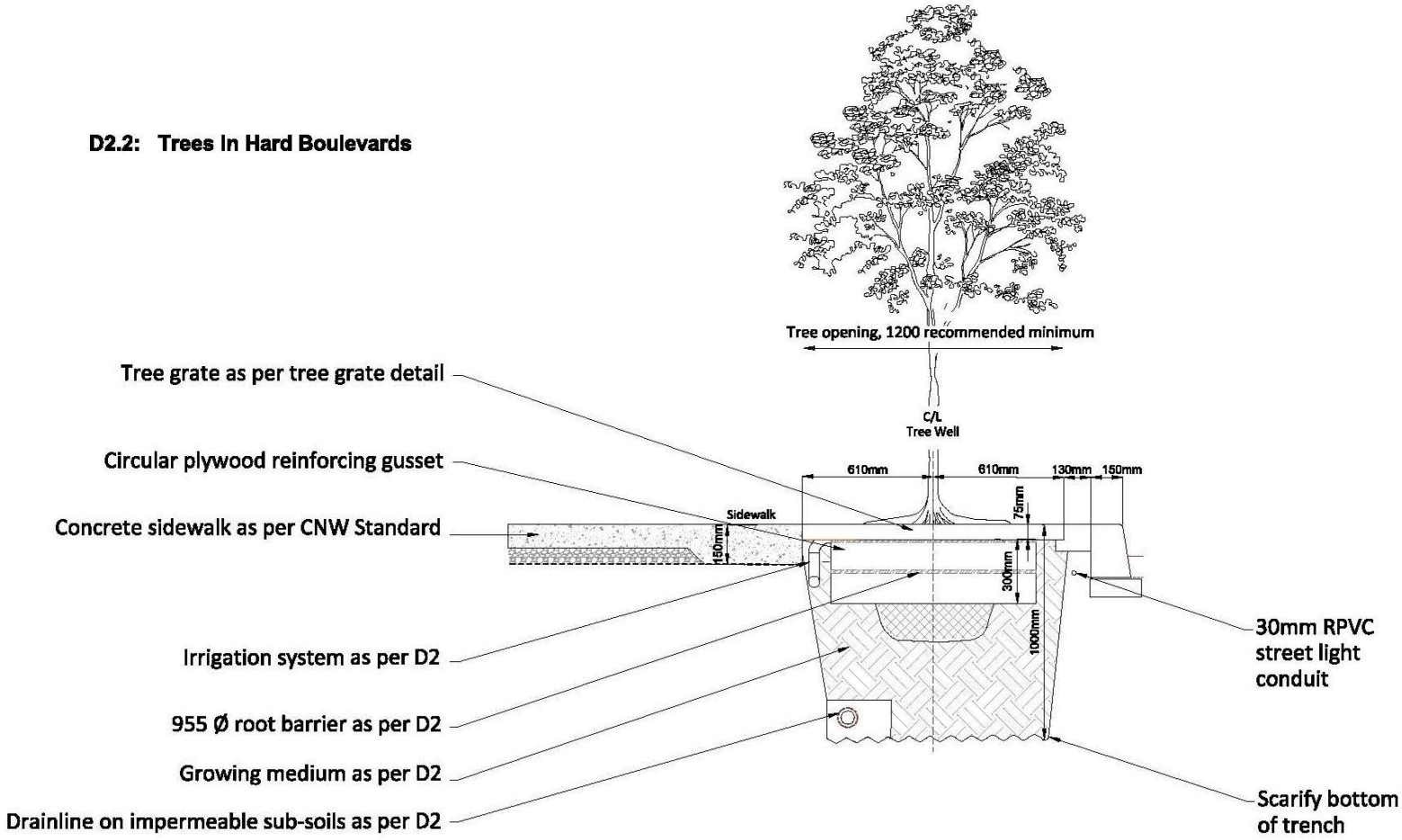
1.3 D2.1: Trees in Soft Boulevards



Notes:

1. Locate and flag all buried utilities in tree planting site prior to digging tree pits.
2. Trees to be located/ laid out so as not to impact street light coverage, underground services, bus stops etc. Arrange for on-site approval of locations with CNW Parks prior to irrigation installation.
3. If weed whacker tree guards are installed, ensure they are monitored and adjusted regularly.

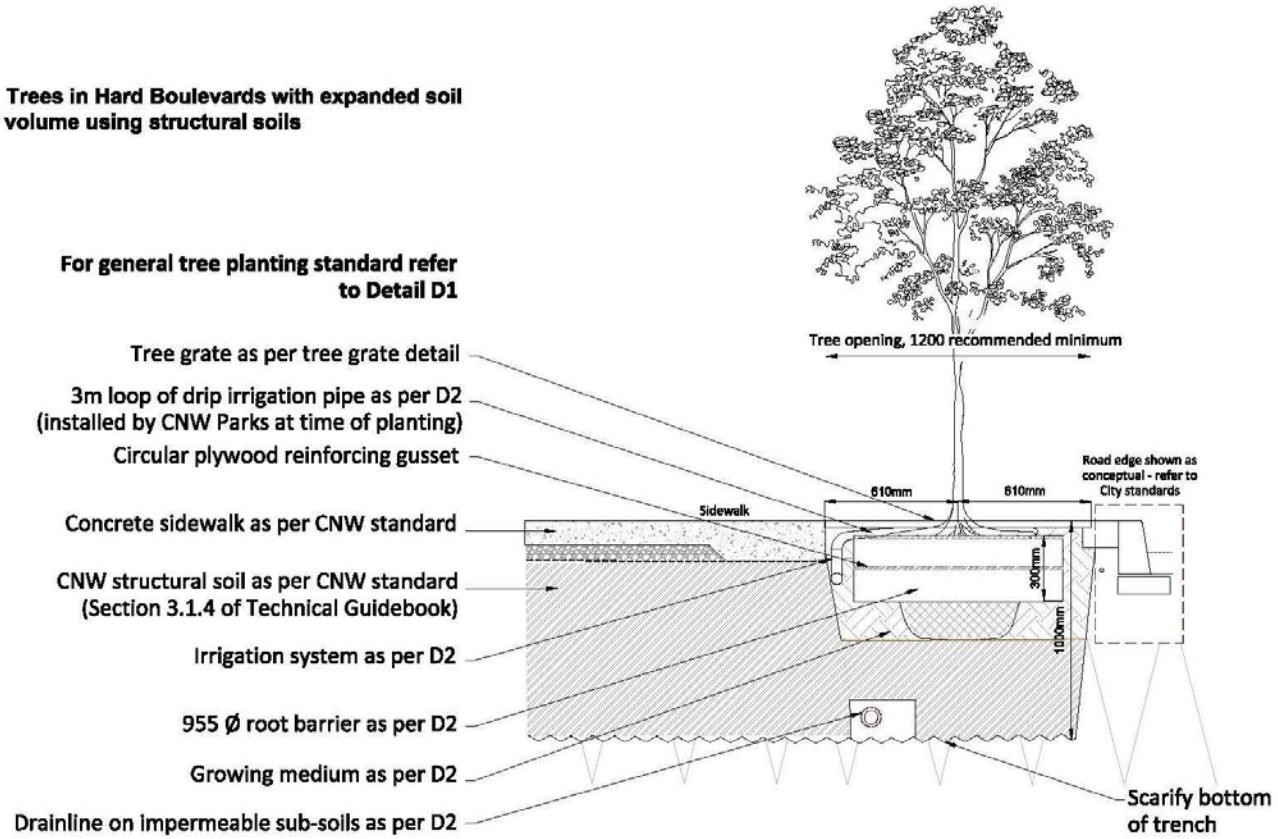
1.4 D2.2: Trees in Hard Boulevard



1.5 D2.3: Trees in Hard Boulevards with Structural Soil

D2.3: Trees in Hard Boulevards with expanded soil volume using structural soils

For general tree planting standard refer to Detail D1

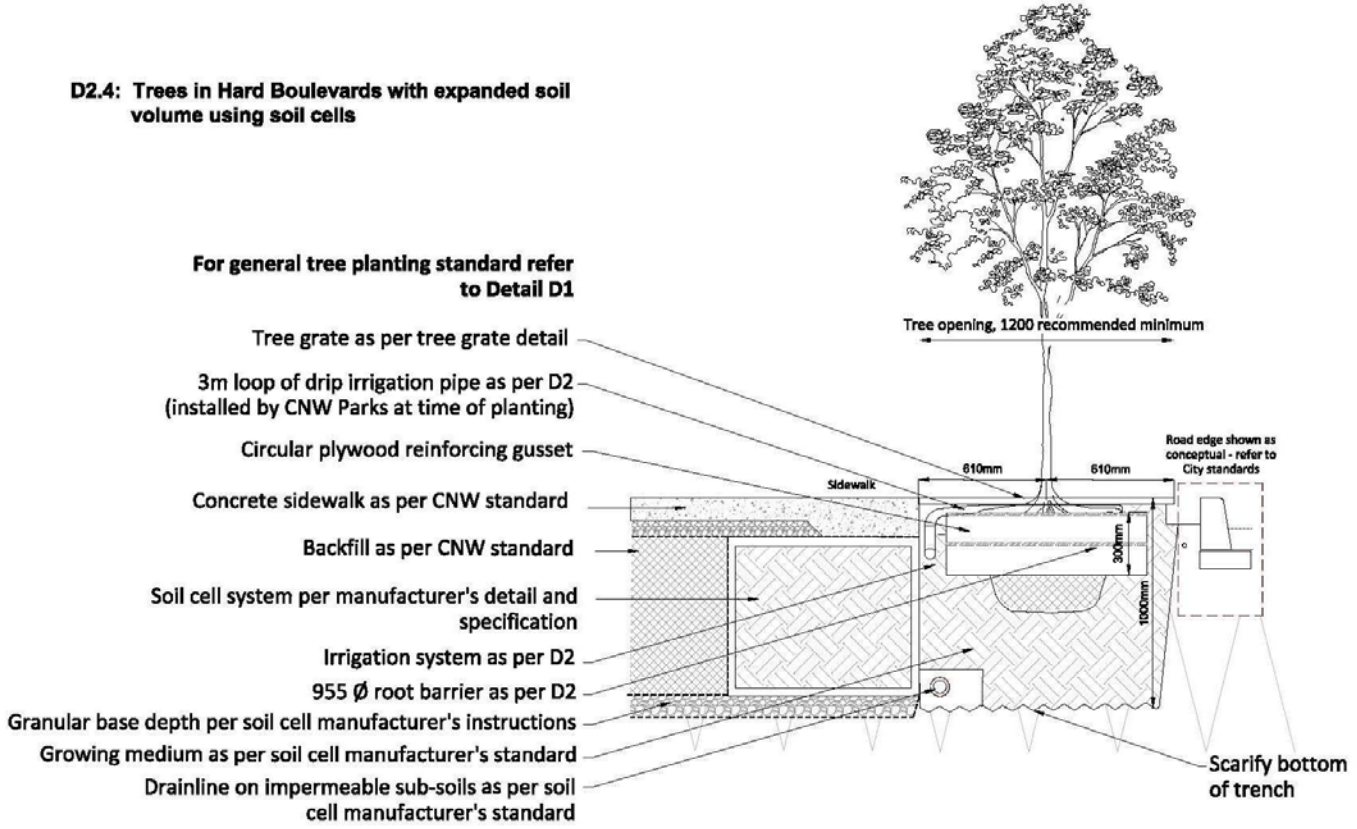


Notes:

1. Locate and flag all buried utilities in tree planting site prior to digging tree pits.
2. Trees to be located/ laid out so as not to impact street light coverage, underground services, bus stops etc. Arrange for on-site approval of locations with CNW Parks prior to irrigation installation.

1.6 D2.4: Trees in Hard Boulevards with Soil Cells

D2.4: Trees in Hard Boulevards with expanded soil volume using soil cells

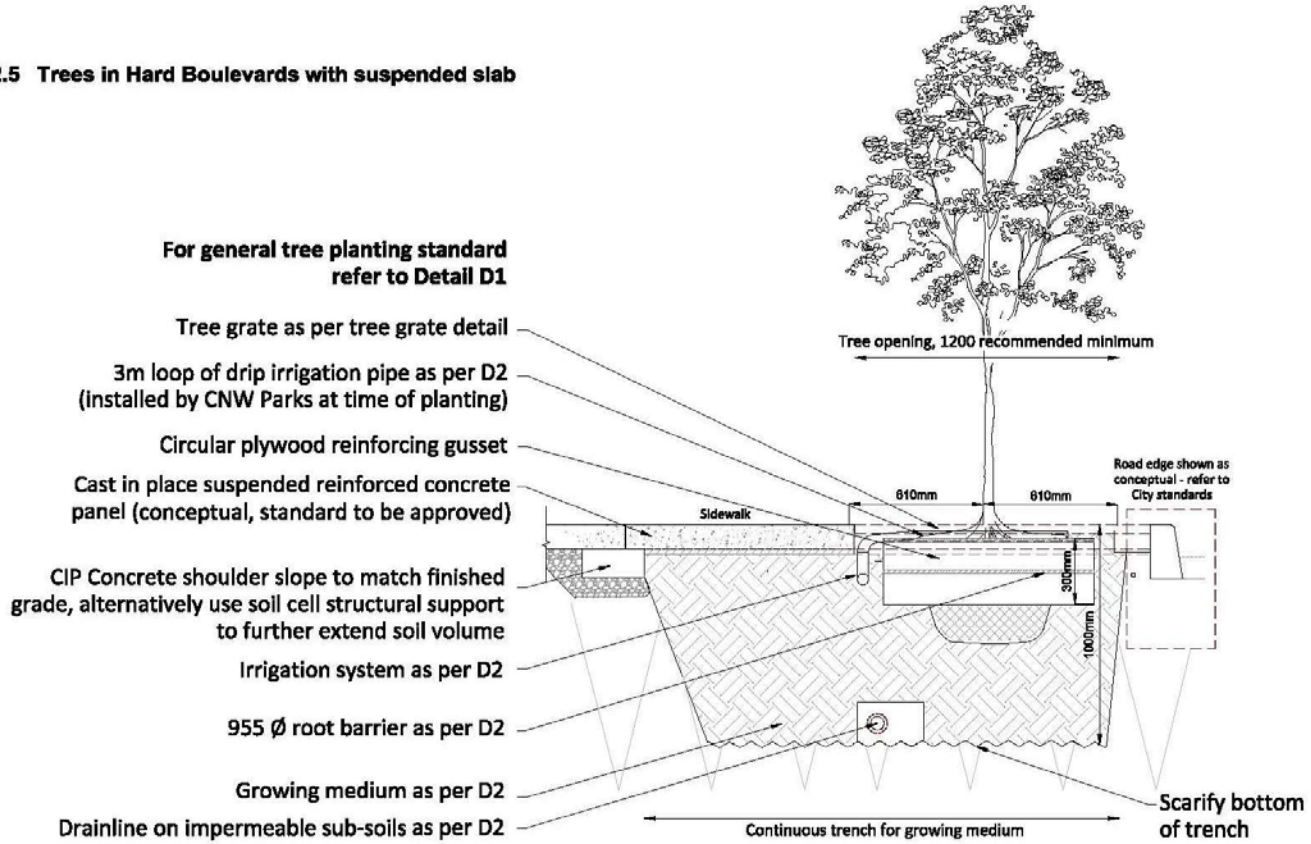


Notes:

1. Locate and flag all buried utilities in tree planting site prior to digging tree pits.
2. Trees to be located/ laid out so as not to impact street light coverage, underground services, bus stops etc. Arrange for on-site approval of locations with CNW Parks prior to irrigation installation.

1.7 D2.5: Trees in Hard Boulevards with Suspended Slab

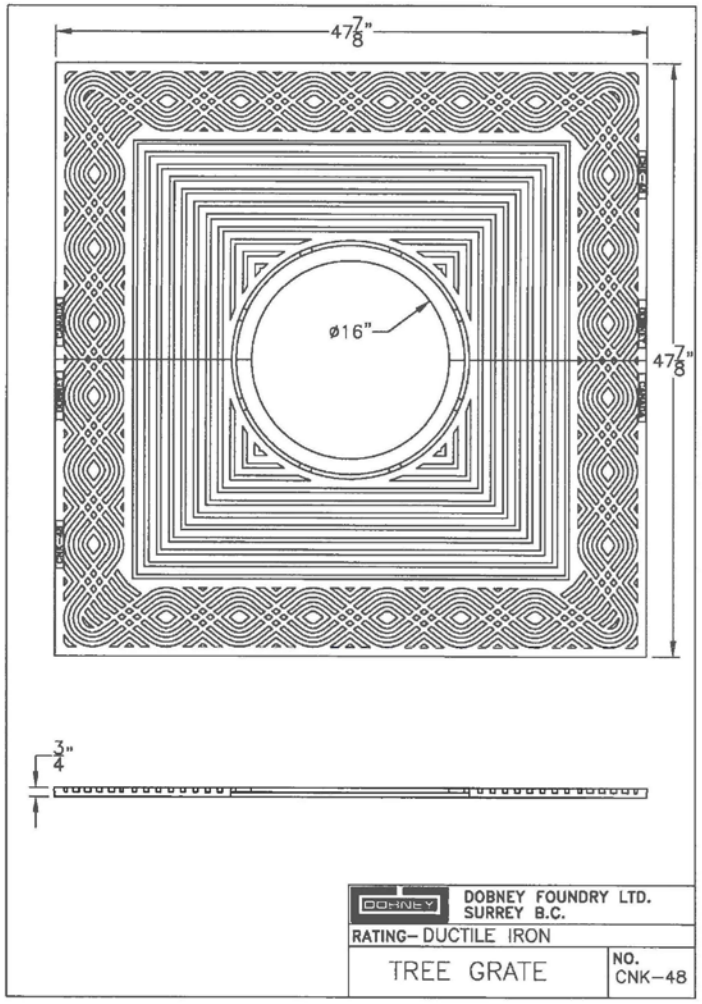
D2.5 Trees in Hard Boulevards with suspended slab

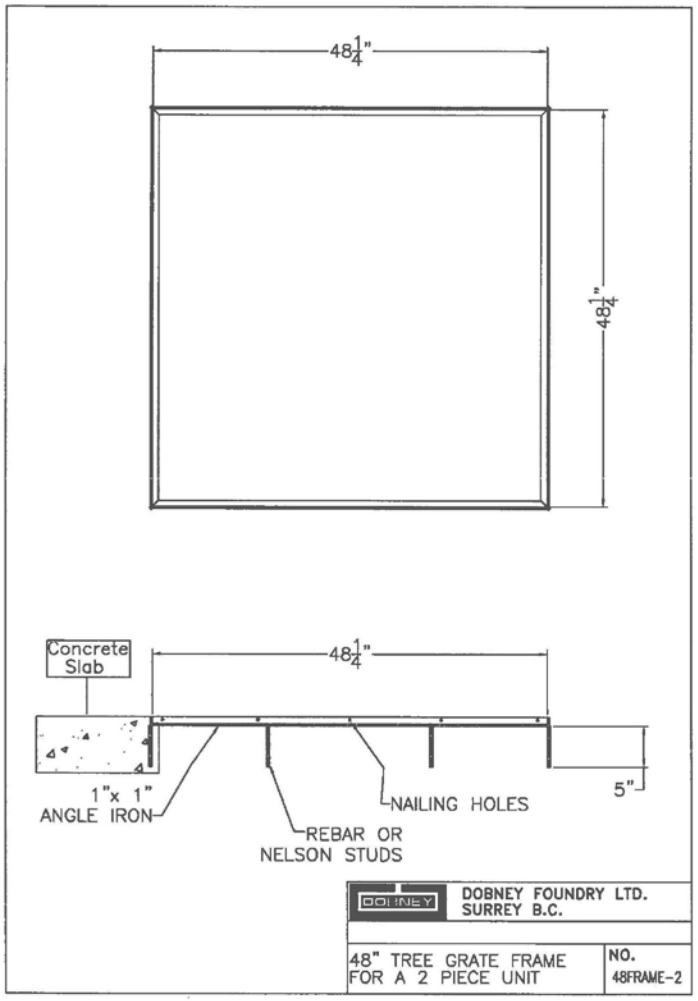


Notes:

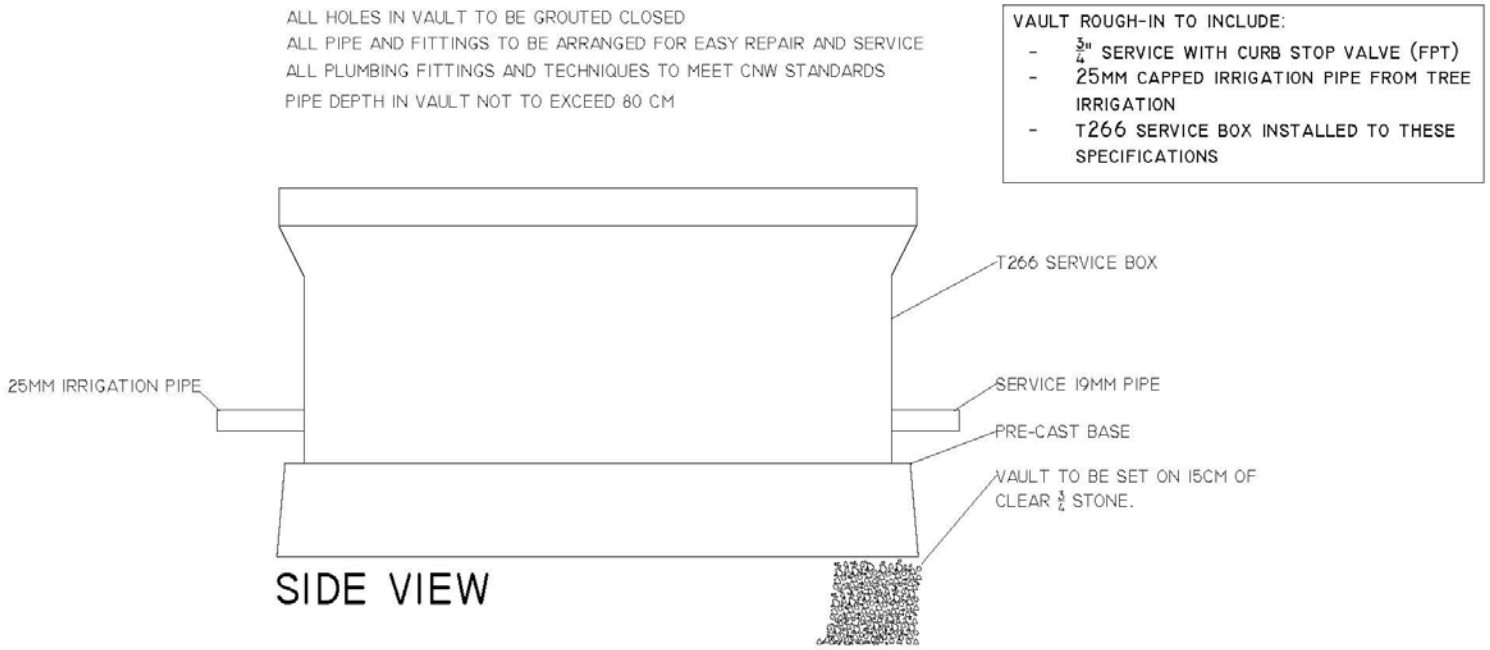
1. Locate and flag all buried utilities in tree planting site prior to digging tree pits.
2. Trees to be located/ laid out so as not to impact street light coverage, underground services, bus stops etc. Arrange for on-site approval of locations with CNW Parks prior to irrigation installation.

1.8 Tree Grate Detail





1.9 Service Vault Detail



3.3. Working around City Trees

3.3.1. Role of the Consulting Arborist

An arborist report is required by the City of New Westminster for all development projects around trees. The consulting arborist (ISA Certified) for the project is expected to:

During the design process:

- Evaluate the tree resource on site and identify the trees that have good retention value;
- Identify and consider potential tree issues during construction phase and recommend the measures (redesign or workaround) required to avoid or mitigate tree damage to an acceptable level (i.e., maintain tree vigour and long-term retention viability of the tree in the landscape);
- Educate the contractors that will be working on site about the tree protection measures and benefits of preserving the trees on site through a pre-construction site meeting and accompanied by the letter of understanding;
- Recommend tree protection barriers and confirm that they are properly installed; and,
- Commit to supervising tree protection during construction.

During construction:

- Supervise works near trees and advocate for tree care and protection during development with all contractors on site and the project owner if tree protection measures are not being followed;
- Communicate appropriate work procedures around trees throughout the different stages of construction and when different types of machinery are being used onsite;
- Maintain the tree protection zones and ensure barriers are reinstated if removed;
- If changes arise during construction, the consulting arborist should identify the issues and find solutions (to be approved by City of New Westminster Parks and other relevant City departments) that will protect trees to a reasonable extent and enable development to continue; and,
- *In the event that contractors or works onsite **are not** following the recommendations of the consulting arborist or are beyond the scope approved by City of New Westminster Parks Department, the arborist should recommend that the works stop and notify the City immediately.*

After construction:

- Provide an arborist site supervision report to the City that records the tree protection and supervision that occurred onsite compared to what was planned, and makes any recommendations for mitigation. Specifically, the arborist memo supervision should include:
  - Dates of supervision;
  - Description of the works that occurred, any impacts to trees and what was done by the arborist/contractors;
  - Recommendations for any mitigation required; and,
  - Photos documenting the works and impacts described at each time of supervision.

3.3.2. Avoiding Soil Compaction

Soil compaction affects trees by reducing water storage capacity in the soil, reducing the oxygen available to roots and by creating a physical barrier to root growth. The damage typically results in trees that have poor growth, reduced life-span and root systems that are more likely to fail in high winds.

To avoid compaction, site access should be planned to minimize conflicts with trees and future planting locations. If machine access through a tree's critical root zone is unavoidable then one or more of the following methods for weight displacement should be recommended by the consulting arborist (subject to approval by the City's arborist):

1. For light, infrequent traffic up to small vehicles: Wood mulch (40-50 cm deep wood mulch between ½ and 2 inches in length) over a tree protection zone. Maintain wood mulch depth over time and, at completion of the works, reduce mulch thickness to less than 10 cm.
2. For light to medium traffic: Place geotextile on the soil surface and secure it then cover with wood mulch (40-50 cm deep wood mulch between ½ and 2 inches in length). Maintain wood mulch depth over time and, at completion of the works, remove the geotextile and reduce mulch thickness to less than 10 cm.
3. For heavy traffic: Lay down wood mulch (40-50 cm deep wood mulch between ½ and 2 inches in length) over a tree protection zone. Cover the wood mulch with ¾-inch or greater plywood, steel plates or other synthetic substitute. Plywood may need to be replaced if it breaks down over time. At completion of the works, remove plywood and reduce mulch thickness to less than 10 cm.

Temporary storage sites for construction material or soil excavate should be as far from neighbouring trees as possible and **not within fenced tree protection zones**.

3.3.3. Grading Limitations within Critical Root Zones

Grade changes of as little as 10 cm can damage or even kill tree roots. No grade changes are permitted within critical root zones. On a case-by-case basis, the City may approve construction techniques in or near the critical root zone that build above grade, or cut below grade if the consulting arborist can demonstrate to the City's satisfaction that the techniques used (e.g., aerated sub-base, permeable paving, retaining wall etc.) will be to maintain the long-term retention viability of that specific tree in the landscape.

Outside the fenced tree protection zone, grading should not significantly alter drainage to or away from the tree.

3.3.4. Trenching, Excavation and Directional Drilling

Trenching or excavation related to forseeable construction activities (e.g., demolition, excavation for foundations, servicing etc.) should be identified in the Arborist Report and Letter of Undertaking submitted to the City.

When working within a tree's critical root zone, directional drilling is the preferred method and should be undertaken with a horizontal directional drill and hydraulic or pneumatic air excavation technology. The depth of tunnelling below protected trees should be > 1 m (and no shallower than 50 cm) and supervised by the consulting arborist (ISA Certified).

Where directional drilling is not feasible, any excavation or trenching within a tree's critical root zone must be done manually (i.e., with shovels) or using a hydrovac or air spade and supervised by the consulting arborist (ISA Certified). Any root pruning should be undertaken using a saw or narrow trencher with sharp blades under the supervision of the consulting arborist (ISA Certified). Roots greater than 5 cm should be left intact and tunneled under. No excavated backfill shall be placed in the critical root zone and the trench should be filled in the same day if possible. Cover exposed roots with wet burlap.

3.3.5. Construction Impact Mitigation

See Appendix 3 for the ISA's 'Treatment of Trees Damaged by Construction' brochure.

Watering

When root loss has occurred, supplemental watering is needed during dry periods because the tree's capacity for water absorption is reduced. Irrigate to wet the soil within the critical root zone to a depth of 15-30 cm. The watering regime should be determined by the project arborist so that the soil at a depth of 15-30 cm is consistently cool and damp to the touch but not saturated. Watering should continue until seasonal rainfall is adequate to supply the tree's water demand.

Mulching

The application of composted organic mulch (as a soil amendment or mulch) may benefit trees that have been damaged during construction. Composted or fresh mulch derived from plant material is generally appropriate. An air spade can be used to loosen soil to enable compost to be mixed in. See Appendix 3 for the ISA's 'Proper Mulching Techniques' brochure.

Pruning

Trees that have been damaged during construction should not be pruned except to remove branches or roots that are torn, split, broken, dead, diseased or in need of clearance pruning. Pruning should be performed by an ISA Certified Arborist.

Bark Wound Tracing

Torn, jagged or loose bark should be cut away with a sharp knife to leave a smooth edge of attached bark. This procedure should be performed by an ISA Certified Arborist.

3.3.6. Alternatives for Pavements over Tree Roots

Removal of Paving

Expanding the size of the tree pit by cutting out the existing paving is an effective solution if sidewalk or road space will still be adequate for current use. Replacing impermeable paving with permeable paving may also improve the depth of root growth and reduce future conflicts. These works must be supervised by an ISA Certified Arborist to minimize damage to existing tree roots.

Alternatives to Root Cutting

Given that most roots grow close to the surface, curb and sidewalk damage can sometimes occur. Giving trees adequate room to grow will generally avoid these conflicts but when conflicts do occur, or when excavation to access services is required, root pruning may be required. Cutting roots can damage trees and cause whole tree failure therefore alternatives to root cutting are encouraged:

Method	Considerations
Re-route sidewalks around trees	Must adequately avoid the tree to prevent numerous large (> 3 cm) roots being cut.
Install root barriers to deflect roots	Top of the barrier must reach above the soil so that roots don't grow over it. Barrier should be about 6 inches from the structure to be protected. If soils are very compacted and poorly drained, the roots will grow up behind the barrier rather than staying down below.
Build above grade using an aerated sub-base	Clear-crush must be laid down with aeration pipes and/or geogrid and compacted to the required density. Geotextile must be installed to prevent migration of particles into the clear crush or per geogrid manufacturer's instructions.
Bridge roots using suspended sidewalks	Reinforced concrete slabs must rest on lateral supports and pilings or soil cells with growing medium below.
Alternative surface materials	Permeable and flexible sidewalk surfaces such as crushed granite, wood decking, brick-in-sand and rubber allow roots to grow beneath without cracking the surface but are not as long-wearing so best for light use areas.

Appendix 1 - Example of an acceptable Tree Assessment Table

Example of an acceptable Tree Assessment Table (include Risk Rating Table separately if there are high or greater risk trees):

Tag #	Common name	Scientific name	DBH (cm)	Condition rating and comment	Tree retention comments	Critical root zone	Retention/removal recommendation
101	Western red cedar	*Thuja plicata*	80	**Excellent** No notable defects, dominant tree, notable size, 75% live crown ratio, dense crown.	Suitable	7 m (dripline + 1 m)	**Retain** Arborist must supervise demolition and construction of driveway.
102	Douglas-fir	*Pseudotsuga menziesii*	50	**Normal** Phototropic lean, codominant tree in group of 3, 70% live crown ratio, dense crown.	Suitable as group (not to be retained singly)	5 m (dripline + 1 m)	**Retain** No works planned in critical root zone.
OS 1	Little-leaved linden	*Tilia cordata*	45	**Moderate** Minor deadwood, decay evident in old pruning cut, 50% live crown ratio, thinning crown.	Tolerable	2.7 m (6 x dbh)	**Retain – neighbour's tree** Retaining wall planned at edge of root zone. Arborist to supervise excavation and construction. Irrigation and mulching required post-construction (see detailed recommendations in Section X). Letter of understanding required from neighbour.
City 1	Cherry plum	*Prunus cerasifera*	35	**Poor** Bacterial blight and black knot fungus, extensive decay in main stem, 25% live crown.	Unsuitable	n/a	**Remove – with City permission** Due to structural and health defects and conflict with sanitary sewer connection.

Appendix 2 – Example of Letter of Undertaking

NEW WESTMINSTER

LETTER OF UNDERTAKING FOR PROJECT ARBORIST PRESENCE AT SPECIFIED STAGES OF CONSTRUCTION NEAR OR WITHIN THE CRITICAL ROOT ZONE OF A PROTECTED TREE

This letter is to confirm that _____
Name of company/developer/property owner

has retained _____ to supervise the following:
Name of arboriculture company and project arborist

☐ Demolition ☐ Excavation ☐ Driveway ☐ Other _____

near protected trees at: _____ _____
street address *postal code*

as described in the attached arborist recommendations/report. All work is to be **confirmed in a follow-up site supervision report** submitted to the City of New Westminster (CNW) within five (5) working days of completion of the monitored work. The follow-up site supervision report must be written by the arborist submitting this comfort letter and should outline the scope of the work, methodology, documentation (including photos) and final assessment that details observed impacts to tree(s)

Project Arborist obligations:

☐ Must obtain CNW approval for work within the Critical Root Zone (CRZ) and provide guidance and supervise work within or near critical root zone of trees to be retained on and offsite. To include but not limited to – pruning, root pruning, excavation, landscaping, fences, sod, grading, retaining walls etc.

☐ Ensure that barriers are installed and/or re-installed according to City of New Westminster Tree Protection and Regulation Bylaw No 7799, 2016 Schedule "B" after authorized work in the CRZ is completed, prior to City inspection/re-inspection. Notify CNW in writing/email with photos of Tree Protection Barriers once complete.

☐ Coordinate service installers for excavation for utility servicing, particularly when using a common trench.

☐ Other: _____

❖ ***The owner is aware that the arborist must be on site to supervise as specified in the arborist report or as agreed upon with City Staff - Owner Initial_____***

Failure to comply with this signed contract can result in possible penalty fees, stop inspections/stop work orders and project delays.

Printed name of Owner	*Printed name of Builder/Contractor*	*Printed name of Arborist*
Signature of Owner	*Signature of Builder/Contractor*	*Signature of Arborist*
Phone number	*Phone number*	*Phone number*
Date	*Date*	*Date*

Corporation of the City of New Westminster
511 Royal Avenue, New Westminster, BC V3L 1H9
T 604-636-4318 E treeprotectionbylaw@newwestcity.ca

Appendix 3 – ISA Brochures

Treatment of Trees Damaged by Construction

Addresses tree damage assessment and remedial treatments that may preserve trees damaged during construction.

The processes involved in construction can be devastating to the surrounding trees if no measures have been taken to protect them. Remedial treatments may save some construction-damaged trees, but immediate implementation is critical. If you have trees that have been affected by recent construction, a professional arborist can assess tree viability and risk potential and recommend treatment options.

Damage Caused By Construction

- **physical injury to the trunk and crown**
- **soil compaction in the root zone**
- **severed roots**
- **smothered roots from added fill soil**
- **increased wind and sunlight exposure**
- **stress due to grade and drainage changes**

Inspection and Assessment



Because construction damage can affect the structure and stability of a tree, your arborist should check for potential risks. A risk inspection may involve a simple visual inspection, or instruments may be used to check for the presence of decay. Identified risks can sometimes be reduced or eliminated by removing an unsafe limb, pruning to reduce weight, or installing cables or braces to provide structural support. If there is doubt about the structural integrity of a tree and the risk cannot be adequately mitigated, the tree should be removed.

Treating Trunk and Crown Injuries

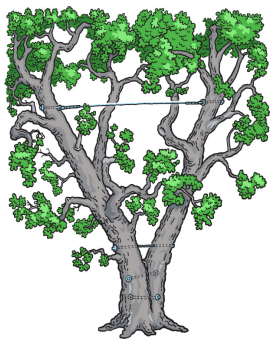
Pruning

Split, torn, or broken branches should be removed. Also, remove any dead or diseased limbs from the crown of the tree. It is best to postpone other maintenance pruning, such as crown raising, for a few years. Do not thin or reduce tree canopies to compensate for root loss. There is no conclusive research to support this practice, and thinning the crown may stress the tree further.



Treating Damaged Bark and Trunk Wounds

Often, the bark may be damaged along the trunk or on major limbs. If this happens, remove the loose bark. Jagged edges can be cut away with a sharp knife. Take care not to cut into living tissues.



Cabling and Bracing

If branches or tree trunks need additional support, a professional arborist may be able to install cables or bracing rods. If cables or braces are installed, they must be inspected regularly. The amount of added security offered by the installation of support hardware is limited. Not all weak limbs are candidates for these measures.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings generally do not reduce decay or speed closure and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, use only a thin coating of a nontoxic material.

Irrigation and Drainage



One of the most important tree maintenance procedures following construction damage is to maintain an adequate, but not excessive, supply of water to the root zone. Water trees as needed, especially during the dry summer months. A long, slow soak over the entire root zone is the preferred method of watering. Avoid frequent, shallow watering or overwatering. Poor drainage must be corrected or trees will decline rapidly.

Mulching

Apply a 2- to 4-inch (5- to 10-cm) layer of organic mulch such as wood chips, shredded bark, or pine needles over a tree's root system for a simple and effective means of enhancing root growth. The mulch helps condition the soil, moderates soil temperatures, maintains moisture, and reduces competition from weeds and grass. The mulch should extend as far out from the tree as practical for the landscape site.

Improving Aeration of the Root Zone



Soil compaction and grade changes can reduce soil oxygen and limit water movement in the tree's root zone. If soil aeration can be improved, root growth and water uptake can be enhanced.

Aeration of the root zone may improve root health, and water and mineral uptake. One effective aeration method employs a high-pressure, air-excavation device, which pulverizes soil with minimal detrimental impact to roots. This process alone can be beneficial, or it may be combined with incorporation of soil additives and top dressing with organic mulch.

What About Fertilization?

Fertilization should be limited immediately following construction damage. Salts associated with quick-release fertilizers can draw water out of the roots and into the soil. Added nitrogen can stimulate top growth at the expense of root growth. Once recovered, fertilization should be based on the nutritional needs of trees on a particular site.

Monitoring for Decline and Risk

Despite your best efforts, you may lose some trees from construction damage. Symptoms of decline include smaller and fewer leaves, die-back in the crown of the tree, and premature fall color. Stressed trees are more prone to attack by certain diseases and pests, which further a tree's downward spiral. Severe damage and decline may also lead to defects and decay. Consult with an arborist for a professional assessment if you are concerned with your tree's health or structural integrity.

This brochure is one in a series published by the International Society of Arboriculture as part of its Consumer Information Program. You may have additional interest in the following titles currently in the series:

- Avoiding Tree and Utility Conflicts
- Avoiding Tree Damage During Construction
- Benefits of Trees
- Buying High-Quality Trees
- Insect and Disease Problems
- Mature Tree Care
- New Tree Planting
- Plant Health Care
- Proper Mulching Techniques
- Palms
- Pruning Mature Trees
- Pruning Young Trees
- Recognizing Tree Risk
- Treatment of Trees Damaged by Construction
- Tree Selection and Placement
- Trees and Turf
- Tree Values
- Why Hire an Arborist
- Why Topping Hurts Trees

E-mail inquiries: isa@isa-arbor.com

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E-mail inquiries: isa@isa-arbor.com

www.isa-arbor.com • www.treesaregood.org

Proper Mulching Techniques

Mulching is one of the most beneficial practices a homeowner can use for better tree health.



Mulches are materials placed over the soil surface to maintain moisture and improve soil conditions. Mulching is one of the most beneficial acts a homeowner can do for the health of a tree. However, improper mulching materials and practices may have little, or even negative, impact on the trees in your landscape.

Benefits of Proper Mulching

- Helps reduce soil moisture loss through evaporation
- Helps control weed germination and growth
- Insulates soil, protecting roots from extreme summer and winter temperatures
- Can improve soil biology, aeration, structure (aggregation of soil particles), and drainage over time
- Can improve soil fertility as certain mulch types decompose
- Inhibits certain plant diseases
- Reduces the likelihood of tree damage from "weed whackers" or the dreaded "lawn mower blight"
- Gives planting beds a uniform, well-cared-for look

Trees growing in a natural forest environment have their roots anchored in a rich, well-aerated soil full of essential nutrients and soil microorganisms. The soil is blanketed by leaves, organic materials, and living organisms that replenish and recycle nutrients. This environment is optimal for root growth and mineral uptake. Urban landscapes and new developments, however, are typically harsher environments with poor quality soils, reduced organic matter, and large fluctuations in soil temperature and moisture. Applying a 2- to 4-inch (5- to 10-cm) layer of organic mulch can mimic a more natural environment and improve plant health.

Types of Mulch

Mulches are available in many forms. The two major types of mulch are inorganic and organic. Inorganic mulches include various types of stone, lava rock, pulverized rubber, geotextile fabrics, and other materials. Inorganic mulches do not decompose and do not need to be replenished often. On the other hand, they do not improve soil structure, add organic materials, or provide nutrients. For these reasons, most horticulturists and arborists prefer organic mulches.



Organic mulches include wood chips, pine needles, hardwood and softwood bark, cocoa hulls, leaves, compost mixes, and a variety of other products usually derived from plants. Organic mulches decompose in the landscape at different rates depending on the material, climate, and soil microorganisms present. Those that decompose faster must be replenished more often. Because the decomposition process improves soil quality and fertility, many arborists and other landscape professionals consider that characteristic a positive one, despite the added maintenance.

Not Too Much!

As beneficial as mulch is, too much can be harmful. The generally recommended mulching depth is 2 to 4 inches (5 to 10 cm). Unfortunately, many landscapes are falling victim to a plague of overmulching. "Mulch volcanoes" are excessive piles of mulch materials applied around the base of trees. While organic mulches must be replenished over time, buildup can occur if reapplication outpaces decomposition or if new material is added simply to refresh color. Deep mulch can be effective in suppressing weeds and reducing maintenance, but it often causes additional problems.

Problems Associated with Improper Mulching

- On wet soils, deep mulch can lead to excess moisture in the root zone, which can stress the plant and cause root rot.
- Piling mulch against the trunk or stems of plants can stress stem tissues and may lead to the development of insect and disease problems or stem girdling roots.



- Some mulches, especially those containing fresh grass clippings, can affect soil pH and may eventually lead to nutrient deficiencies or toxic buildups.
- Mulch piled high against the trunks of young trees may create habitats for rodents that chew the bark and can girdle the trees.
- Thick blankets of fine mulch can become matted and may reduce the penetration of water and air.
- Anaerobic "sour" mulch may give off pungent odors, and the alcohols and organic acids that build up may be toxic to young plants.

Proper Mulching

The choice of mulch and the method of application can be important to the health of landscape plants. The following are some guidelines to use when applying mulch:

- Determine whether soil drainage is adequate and if there are plants that may be affected by the choice of mulch. Most commonly available mulches work well in most landscapes. Some plants may benefit from the use of slightly acidifying mulch, such as pine bark.
- For well-drained sites, apply a 2- to 4-inch (5- to 10-cm) layer of mulch (less if poorly drained). Coarse mulches can be applied slightly deeper without harm. Place mulch out to the edge of a tree's crown or beyond. Remember, if a tree had a say in the matter, its entire root system (which usually extends well beyond the drip line) would be mulched.



- If mulch is already present, check the depth. If sufficient mulch is present, break up any matted layers and refresh the appearance with a rake. Some landscape maintenance companies spray mulch with a water-soluble, vegetable-based dye to add color to faded material.
- If mulch is piled against the stems or tree trunks, pull it back several inches/centimeters so that the base of the trunk is exposed. Composted wood chips can make good mulch, especially when they include some bark and leaves. Fresh wood chips also may be used around established trees and shrubs. Avoid using fine, non-composted wood chips, as soil nitrogen may be taken up by the roots as the wood chips decompose.

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