

A REFERENCE GUIDE

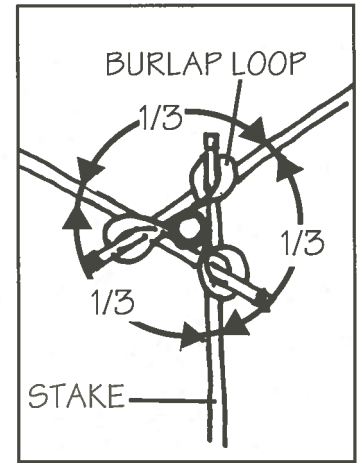
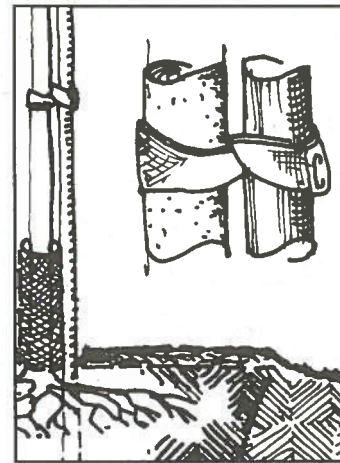
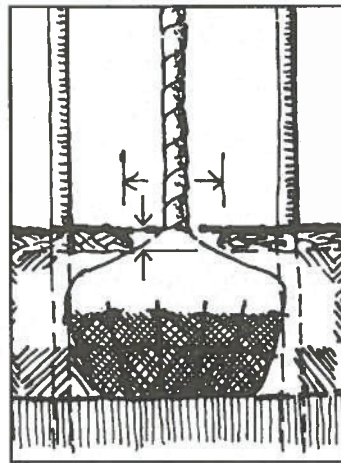
FOR DEVELOPING PLANTING DETAILS

1995

N • Nitrogen
• green growth

P • Phosphorus
• root growth

K • Potassium
• drought/disease
/pollution tolerance
and hardiness



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 *Green for Life!*

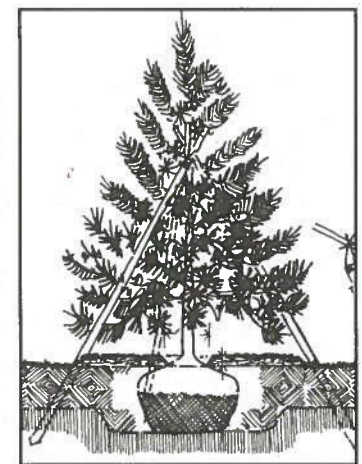


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INTRODUCTION

This guide is one of a series of references for soft landscape development prepared by the liaison committee of the Ontario Association of Landscape Architects and Landscape Ontario Horticultural Trades Association.

All of the guides together will form the "*Green Book*", *A Manual of Landscape Practice in Ontario*. This book is essentially an up-dated version of the *Landscape Ontario Landscape Specifications*, re-organized, re-arranged and supplemented with the knowledge gained over the last 2 decades.

The original "*Landscape Specifications for Ontario*", in use for the last two decades was a success. Changes however, are a part of natural life, as we see in the greatly expanded landscape industry and the greater awareness of our environment.

The mounting pressures on the overall environmental health of our communities make it vital to maintain and expand healthy urban forests and landscapes. The methods and materials used in the landscape industry must reflect the best and most current scientific knowledge and experience.

The need to upgrade and use scientific knowledge and experience was essential. All efforts have been made to ensure the accuracy of information presented.

This information represents the current ideal situation but it will be the responsibility of the user to adjust the *Green Book* guidelines to suit the site conditions and plant species of specific projects.

It is hoped that the *Green Book* will become the standard guideline for municipalities, provincial and federal agencies and individuals alike, all who work in the landscape industry.

Landscape Architects and Horticulturists are the resource professionals providing advice in applying these guidelines.

These guides are endorsed by:

HORTICULTURAL TRADES ASSOCIATION
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ACKNOWLEDGEMENTS

The *Green Book* and Guides required the thoughtful attention that can only come from the experience, knowledge and dedication of individual committee members.

The members of the Liaison Committee by generously giving their time and expertise, provided the resource without which this work could not have been completed. Without the timely reminder of meeting dates, word processing and production provided by LOHTA staff this work would not be where it is today. A special thanks is in order.

1.0 PLANTING HOLE PREPARATION:

1.1 WELL-DRAINED SOILS

Planting Hole Depth

Planting holes should only be dug deep enough to accommodate the root system or root mass at the desired depth relative to the surrounding ground. Plant the tree with the root collar at the same level as surrounding ground.

Planting Hole Width

For balled and burlapped, container grown, or bare root plant material the width of the actual hole should be at least 30 cm wider around the perimeter of the rootball or root system.

1.2 HEAVY POORLY-DRAINED SOILS

Planting Hole Depth

Planting holes should only be dug deep enough to accommodate the root system or root mass at the desired depth relative to the surrounding ground. The tree should be planted with the root collar positioned 75 to 100 mm above the surrounding ground level as settlement may occur.

All efforts should be taken to avoid glazing of the tree hole surfaces which occurs especially during mechanical digging. Glazing results in the tree hole acting as a pot which does not allow water to percolate out and inhibits root development outside the confines of the tree hole. Tree hole surfaces must be broken up by scarifying to encourage water percolation and root growth.

The use of an auger to dig planting hole is strongly discouraged.

Planting too deep will result in the death of roots due to lack of sufficient aeration and excessive soil water content, and predisposes the tree to crown rot at the trunk. Therefore when planting where drainage correction is impractical or impossible, the root collar (point of attachment of root to trunk) should be planted higher in relationship to the surrounding soil surface by 75-100 mm. This helps to provide

sufficient aeration to the young fibrous roots, normally concentrated between the upper 150-300 mm range of the root ball.

Planting Hole Width

For balled and burlapped, container grown and bare root plant material, the width of the actual hole should be at least 30cm wider around the perimeter of the root ball or root system.

Note:

Where compaction and poor drainage are serious limiting factors, priority consideration should be given to total site preparation using a mechanical aerator such as a vibrating sub soiler or chisel plow.

In heavy clay soils and where the soil in the area of the planting pit has been heavily compacted, priority should be given to aeration or correction of the compaction in an extended circular shaped area surrounding the pit. The aeration should be to a minimum of 300-450 mm deep and 5 times the rootball diameter.

2.0 DRAINAGE: COMPACTED AND/OR HEAVY POORLY- DRAINED SOILS:

In poorly drained soils, typically heavy clay, a prime consideration for the survival of plant material is ensuring that the plants do not become waterlogged. One easy and inexpensive method is to plant high. Where possible the addition of planting hole drainage is desirable. This does not necessarily mean an expensive system of drains connected to the storm drainage system but can be as simple as digging trenches away from planting holes on the down hill side to a depth equal to the depth of the planting hole. The ideal solution would be to place suitable drainage material in these trenches. Examples include, a French Drain or other mechanical drainage materials such as a 100mm diameter perforated drainage pipe.

One method for testing drainage in tree holes is to use a water testing method. If water ponds in the planting hole for more than 12 hours then drainage is recommended.

3.0 PLANT PLACEMENT:

Research has shown that there is directional variation in plant growth. This means that bark, roots, branches and leaves are different on the north side of a tree than on the south side. Therefore if no other factors come into play, orient the plant in the same direction that it was grown in the nursery.

Additional factors in plant orientation are:

- facing the lowest branch away from greatest traffic (pedestrian and vehicular)
- orientation of the plant for best viewing
- avoidance of potential problems for delicate species such as cherry trees by placement in protected areas.

4.0 CONTAINMENT MATERIALS:

The effect of containment materials on trunk and root growth varies. Rope, twine, burlap (whether natural or synthetic) and wire, should be untied and cut away from at least the top third of the root ball. This will prevent girdling of the trunk, create a safer environment for equipment and pedestrians, and will improve the appearance of the tree.

Research has proven that wire baskets do not girdle roots and therefore only the top portion (1/3 to 1/2) of the basket should be removed. It should be noted however that a problem may develop in the distant future if a stump is used to remove large dead trees which have been planted in wire baskets.

Poly 'burlap,' plastic bags, geotextile pots, plastic and metal containers should be totally removed at planting because these materials will inhibit root growth and development.

Fibre pots should ideally be totally removed, provided the root mass will not collapse. If there is a danger of disrupting the root system too dramatically then the minimum requirement is to remove the top rim, then slice the side of the pot vertically at least in three places. If left protruding above ground level, the rim looks unattractive and draws moisture from the soil. The bottom of the pot has no harmful effect on root growth.

5.0 PLANTING SOIL

Soil Amendments

The purpose of amending soil is to correct undesirable soil characteristics and thereby encourage plant vitality.

Undesirable characteristics of typical urban soils include:

- compaction, resulting in poor aeration and drainage
- the presence of foreign debris, contaminants and toxins
- nutrient and structural variability
- pH levels not matching the plant material requirements
- temperature extremes
- soil crusting

Typically, in urban situations backfill tends to be a mixture of soil, compacted subsoil and construction debris subject to any or all of the undesirable soil characteristics noted above.

The minimum treatment of all backfill material should include:

- aeration
- removal of foreign material ie: miscellaneous matter, lumber, cement, mortar and other construction debris
- removal of all soil which has been contaminated with gas, oil and residual long term herbicides
- addition of quality top soil to replace any soil or debris which has had to be discarded.
- mixing of material to ensure uniform consistency

Soil Texture - Structure

Various opinions exist regarding the benefits, cost-effectiveness and potential detrimental effects of total replacement or significant alteration of backfill soil, particularly where surrounding parent material is clay. Some research indicates that plants benefit from the addition of 50-100% by volume of soil texture/structure amending materials.

Other research encourages the maintenance of a texture/structure most closely representative of the

parent surrounding soil.

If the backfill soil is so poor as to inhibit plant growth, then it may be necessary to remove and replace with soil of similar texture and structure to the natural surrounding area.

For heavy clays: mix 50% sandy loam to improve aeration.

For well drained sands: add decomposed organic matter to improve moisture retention.

For well-drained sandy loam: no texture/structure correction is required.

Nutrients

Fertilizer should be incorporated at planting time if soil tests signify a need for enhanced fertility.

Manure provides structural improvement, water retention capacity, nutrients and enhances overall growing conditions.

Peat Moss has no nutritional value but will improve texture, structure and water holding capacity of soils. It will also alter pH towards acidity.

Plants require at least 17 elements for optimum plant growth. However the elements which are required in the largest amounts are Nitrogen, Phosphorus and Potassium.

Most soils in urban areas are lacking in nitrogen due to the fact that nitrogen leaches readily. Nitrogen however is the least important element at the time of planting.

Phosphorus and potassium are usually present in adequate concentrations because they are relatively insoluble and therefore do not leach readily.

The following is a simplified outline of the role of nitrogen (N), phosphorus (P) and potassium (K) in plant growth. The percentage of N., P., K., is stated on all commercial packages in this order:

N

- Nitrogen
- green growth

P

- Phosphorus
- root growth

K

- Potassium
- drought/disease/pollution tolerance and hardiness

Although phosphorus and potassium may be present, they cannot easily be applied and made available to roots after plant establishment and therefore are best incorporated into the soil at planting time. Phosphorus can be applied easily as powdered or granular superphosphate, bone or blood meal, feather meal or in a water solution during planting. The more uniformly the fertilizer is distributed throughout the planting soil the better the results. Fertilizer tablets and spikes are also a convenient, though less uniform method of applying phosphorus and potassium.

Hydrogels

These water-absorbing starch or urea-based polymers have the potential to absorb many times their dry weight in pure water and then release it on demand as the soil dries out. Their use in soils with low moisture-holding capacity such as well drained sand would appear to offer great benefits. These products can be added to planting soil as powder or injected into the soil in watering operations.

6.0 PLANTING:

Planting Soil should be:

- evenly mixed
- well aerated and pulverized, not in heavy clods or frozen lumps and
- free of debris and toxic contaminants.

Planting soil is added in layers and gently tamped before addition of more soil. Do not leave tamping until the completion of the planting process as this leads to the formation of air pockets resulting in roots being deprived of water. Care must be taken during the tamping process to avoid damage to roots. An alternative to the tamping process is to settle in planting soil with water.

A 100mm raised saucer formed of planting soil should be constructed over the rootball to enhance water infiltration into the rootball.

7.0 TRUNK PROTECTION:

Trunk protection may be required for the following reasons:

- to protect against mechanical damage during shipping, handling, during or after the planting process
- to protect from browsing and chewing by mice, rabbits and other animals,
- to protect thinned barked trees from sun-scald and
- to protect the plant from mechanical injury at ground level due specifically to lawn mower and string trimmer mis-use.

Methods of protection are recommended as follows:

Mechanical Injury

- plastic or cardboard collars, burlap strips

Animal Injury

- spiral tree guards, screen collars, corrugated drain (Big "O") collars and various sprays.

Sunscald Injury

- paint trunk with white latex or white-wash, or wrap with burlap, "Kraft Wrap" or "Foylon".

Lawnmower Injury

- corrugated drain collars that are split to prevent constriction or girdling.

Note:

All tree protection installed by the nursery for shipping purposes should be removed to facilitate a complete examination of the tree trunk to ensure that no damage has occurred. Once this examination has taken place any additional tree protection which has been specified can be installed.

Materials which are wrapped closely around the trunk may impede trunk growth, allow disease and trunk damage to go undetected or result in girdling.

Tree wrap should be removed after one season to prevent insect infestation.

Mice may congregate inside some collar-type protective materials.

8.0 MULCHING:

Mulching is the placement of material over planting holes and shrub beds. Mulching is of limited benefit on heavy poorly-drained soils and in fact can be harmful.

Mulching benefits:

- soil moisture (in well drained soils) is conserved
- weed problems are reduced
- surface soil erosion is reduced
- soil structure is improved
- soil compaction is reduced
- salt build-up is reduced
- soil temperatures are moderated
- reflection and re-radiation of heat is reduced by some mulches
- prevents soil temperature fluctuations
- aesthetics

Mulching problems:

- decomposition of fresh, non-decomposed organic mulches may deplete soil nitrogen
- some diseases and insect pests may be unknowingly transmitted
- rodents may be attracted in some locations if the mulch is too thick
- excessive moisture may be trapped in heavy clay soils
- holds frost in the ground longer than open soil
- fire hazard

Mulch Materials

Wood chip mulch should be made up of partially composted twigs, branches and bark of hardwood and softwood trees. The size of mulch materials should be about 25mm. Saw dust should not be used.

Wood chip mulch should not originate from diseased or insect infested trees or from sawdust of any tree.

Application of Mulch

On well drained soils mulch should be applied to a depth not greater than 75 mm. Mulches should be kept back at least 150 mm away from the trunk to prevent rodent nesting and disease (rot).

There are many alternatives to bark mulches

including peat, leaves, cocoa shells, stone, recycled papers produced for horticultural purposes, etc..

The practice of using fabrics as a weed barrier under mulch is controversial from an environmental stand point and may be detrimental to biological activities. Plastics should not be used under any circumstances.

9.0 STAKING AND GUYING:

Staking or guying of all trees is recommended for the following reasons:

- to provide anchorage for roots while they become established,
- to maintain trunk in vertical position
- to provide support for the trunk and crown and
- to provide protection to the trunk.

All staking or guying should be completed in such a way that the desired anchorage and/or support are accomplished, while allowing enough trunk movement to promote healthy development of trunk calliper and taper, and to prevent trunk injury due to stakes rubbing against the bark or girdling due to ties being left on too long.

Staking

For best anchorage and health of the tree, three stakes should be used and installed as follows:

- stakes can be made of many materials, the most common are 38 x 38 (2 x 2) wood or grape stakes,
- stakes should be set apart at equal distances around the trunk,
- stakes should not be driven through the root ball but be set outside the root ball edge,
- bare root material should be staked prior to planting so as not to damage any roots,
- stakes should be driven into solid undisturbed ground at least 300 mm to provide adequate stability to the tree,
- stakes need only be tall enough above ground to provide adequate support,
- all stakes should be at least 100 mm away from the trunk of the tree to reduce the chances of abrasion.

- the tree should be tied to the stakes by suitable biodegradable material such as burlap, etc.
- where the wire passes around the tree trunk, at least 25 mm of space should be provided between the rubber hose and the tree trunk.
- for tripod staking, see detail

Guying

For best anchorage and health of the tree, three guy wires should be used and installed as follows:

- anchoring stakes should be made of wood or approved equal
- guys should be set apart at equal distances around the trunk,
- anchoring should not be driven through the root ball but be set outside the root ball edge,
- anchoring stakes should be driven into solid undisturbed ground at least 300 mm to provide adequate stability to the tree,
- the guy wires are to be #9 wire and should be encased in a rubber hose other than black where the wire passes around the tree trunk.
- at least 25 mm of space should be provided between the rubber hose and the tree trunk
- a method of tightening the guy wires must be provided by means of a galvanized turnbuckle, "Spanfix" or similar device.

10.0 PRUNING AT PLANTING:

Pruning at the time of planting should be limited to removal of branches which are dead, diseased, broken or damaged severely. In addition remove multiple leaders (if applicable) interfering or rubbing branches, suckers, narrow angled branch unions and other uncharacteristic shoots.

Avoid "Heading" or "Tip-pruning" the ends of branches. These tips will produce leaves which supply the essential energy for root regeneration. In addition hormones responsible for initiation of root regeneration are concentrated in the outer 50-75 mm of the twig tip.

Tree wound dressings currently available do not provide any reliable protection and most pruning wounds made at planting are small enough to close satisfactorily without treatment.

PLANTING DETAIL: DECIDUOUS TREE

IMPORTANT:

It is essential to use this detail in conjunction with the specifications. Some or all notes may not apply to the special requirements of a species or a planting environment. Contractor is responsible for obtaining written confirmation of utility locates prior to commencing digging.

TRUNK PROTECTION:

- Trunk wrapping in place prior to planting to be totally removed for trunk inspection.
- When required use only approved tree wrap material and install from the ground up to above the lowest branches.

SOIL AMENDMENT:

- As per specifications.

PLANTING SOIL:

- Hole to be backfilled and concurrently tamped and watered to eliminate air pockets.

WATERING:

- Ensure trees are thoroughly watered at planting. As required.

MULCHING:

- Mulch with shredded bark or composted hardwood chips to a maximum depth of 75 mm, over an area of the rootball. Keep mulch 150 mm away from trunk. For other types of mulching materials, refer to specifications.

PLANTING AREA:

- Actual hole to be 30cm wider around the perimeter of the rootball.
- Soil preparation area to be 5x rootball diameter.
- Scarify soil preparation area to a depth of 300 mm for aeration.

PLANTING DEPTH:

- In heavy clay or poorly drained soil all woody plants to be placed so that the root collar is positioned 75-100 mm higher than surrounding grade.

CROWN PRUNING:

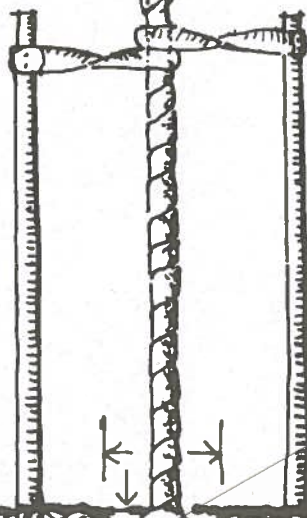
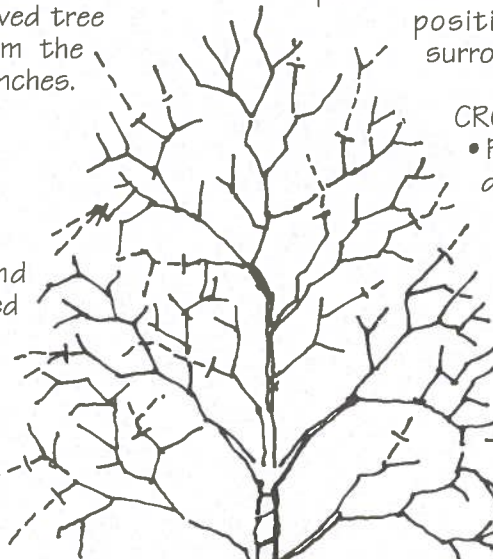
- Prune at planting to carefully remove dead, broken, damaged and interfering branches, double leaders and narrow angle branch unions. Thin head when and where applicable.

STAKES AND TIES:

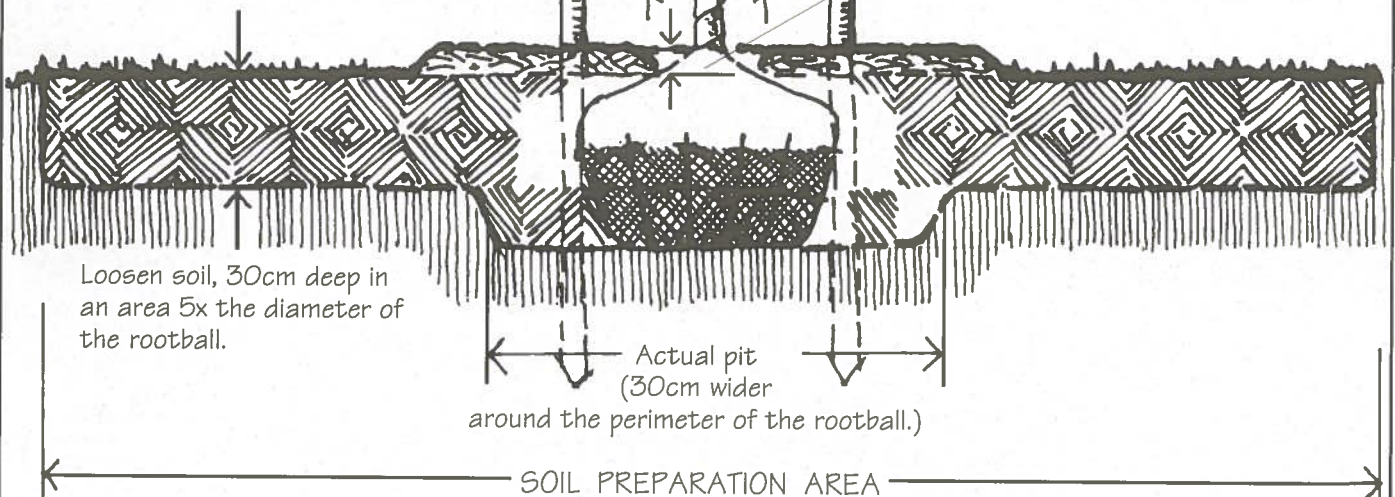
- Stake immediately.
- Tie using biodegradable material such as folded burlap, etc.
- Stakes to be placed to prevent damage to adjacent branches.
- Use 2 wooden stakes to be driven beside and below rootball 300 mm.
- Use 3 wooden stakes or approved equal for large trees when specified.

ROOTBALL, BURLAP, TWINE:

- Cut and remove all wire, rope, burlap and twine from around trunk and the top 1/3 of the rootball.



95-100 mm



PLANTING DETAIL: BARE-ROOT TREE

IMPORTANT:

It is essential to use this detail in conjunction with the specifications. Some or all notes may not apply to the special requirements of a species or a planting environment. Contractor is responsible for obtaining written confirmation of utility locates prior to commencing digging.

TRUNK PROTECTION:

- Trunk wrapping in place prior to planting to be totally removed for trunk inspection.
- When required use only approved tree wrap material and install from the ground up to above the lowest branches.
- Wrap trees larger than 45 mm cal.

SOIL AMENDMENT:

- As per specifications.

PLANTING SOIL:

- Hole to be backfilled and concurrently tamped and watered to eliminate air pockets.

WATERING:

- Ensure trees are thoroughly watered at planting as required.

MULCHING:

- Mulch with shredded bark or composted hardwood chips to a maximum depth of 75 mm, over an area of the rootball. Keep mulch 150 mm away from trunk. For other types of mulching materials, refer to specifications.

PLANTING AREA:

- Actual hole to be 30cm wider around the perimeter of the root system.
- Soil preparation area to be 5x root diameter.
- Scarify soil preparation area to a depth of 300 mm for aeration.

PLANTING DEPTH:

- Plant to be placed so that the root collar is positioned at same level as in the nursery field.

NOTE: Care should be taken to avoid excessive settlement of roots following planting.

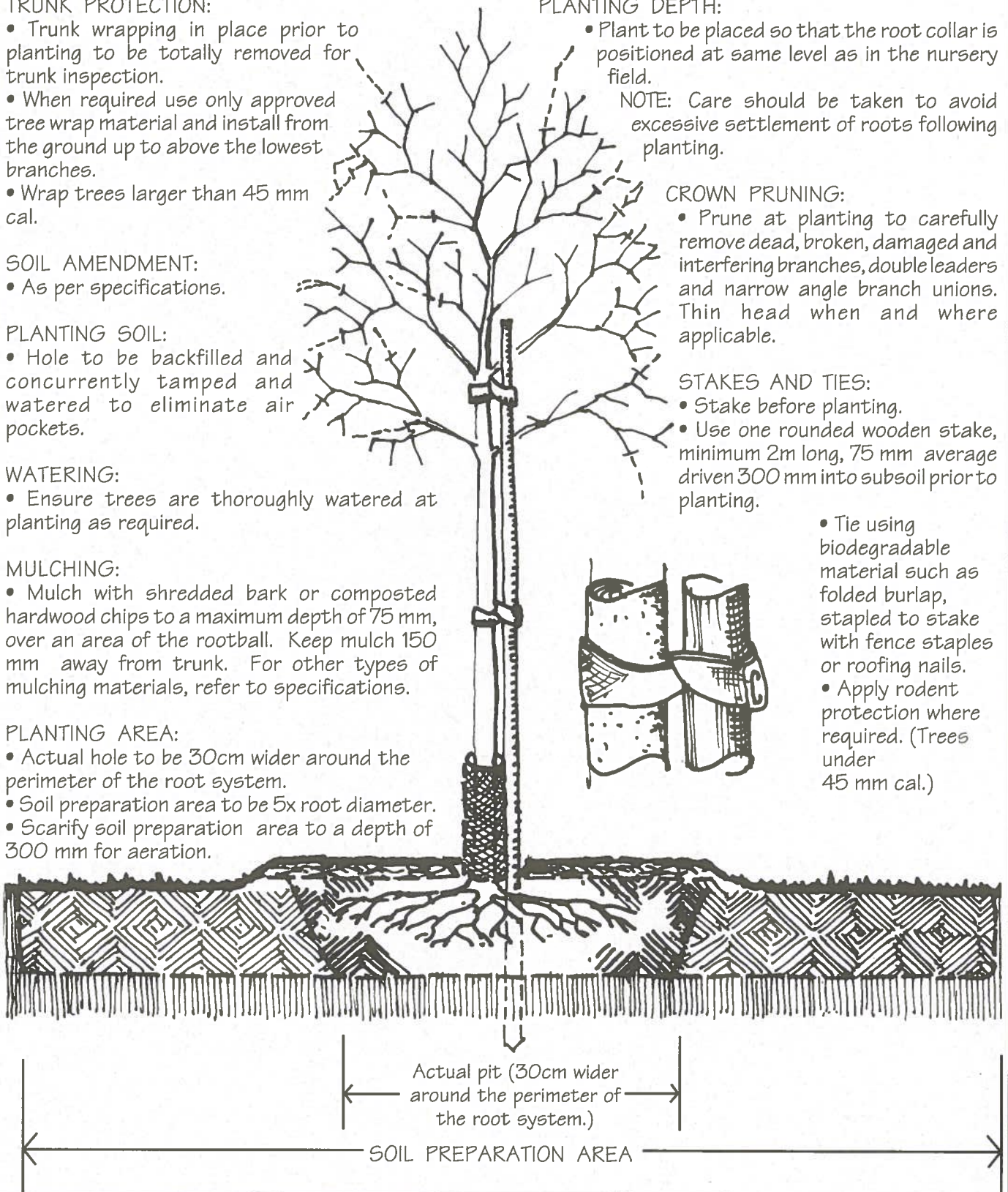
CROWN PRUNING:

- Prune at planting to carefully remove dead, broken, damaged and interfering branches, double leaders and narrow angle branch unions. Thin head when and where applicable.

STAKES AND TIES:

- Stake before planting.
- Use one rounded wooden stake, minimum 2m long, 75 mm average driven 300 mm into subsoil prior to planting.

- Tie using biodegradable material such as folded burlap, stapled to stake with fence staples or roofing nails.
- Apply rodent protection where required. (Trees under 45 mm cal.)



PLANTING DETAIL: CONIFEROUS TREE

IMPORTANT:

It is essential to use this detail in conjunction with the specifications. Some or all notes may not apply to the special requirements of a species or a planting environment. Contractor is responsible for obtaining written confirmation of utility locates prior to commencing digging.

SOIL AMENDMENT:

- As per specifications.

PLANTING SOIL:

- Soil to be backfilled and concurrently tamped or watered to eliminate air pockets.

WATERING:

- Ensure trees are thoroughly watered at planting.

MULCHING:

- Mulch with shredded bark or composted hardwood chips to a maximum depth of 75 mm, over an area of the rootball. Keep mulch 150 mm away from trunk. For other types of mulching materials, refer to specifications.

PLANTING AREA:

- Actual hole to be 30cm wider around the perimeter of the rootball.
- Soil preparation area to be 5x rootball diameter.
- Scarify soil preparation area to a depth of 300 mm for aeration.

PLANTING DEPTH:

- In heavy clay or poorly drained soil all woody plants to be placed so that the root collar is positioned 75-100 mm higher than surrounding grade.

ROOTBALL, BURLAP, TWINE:

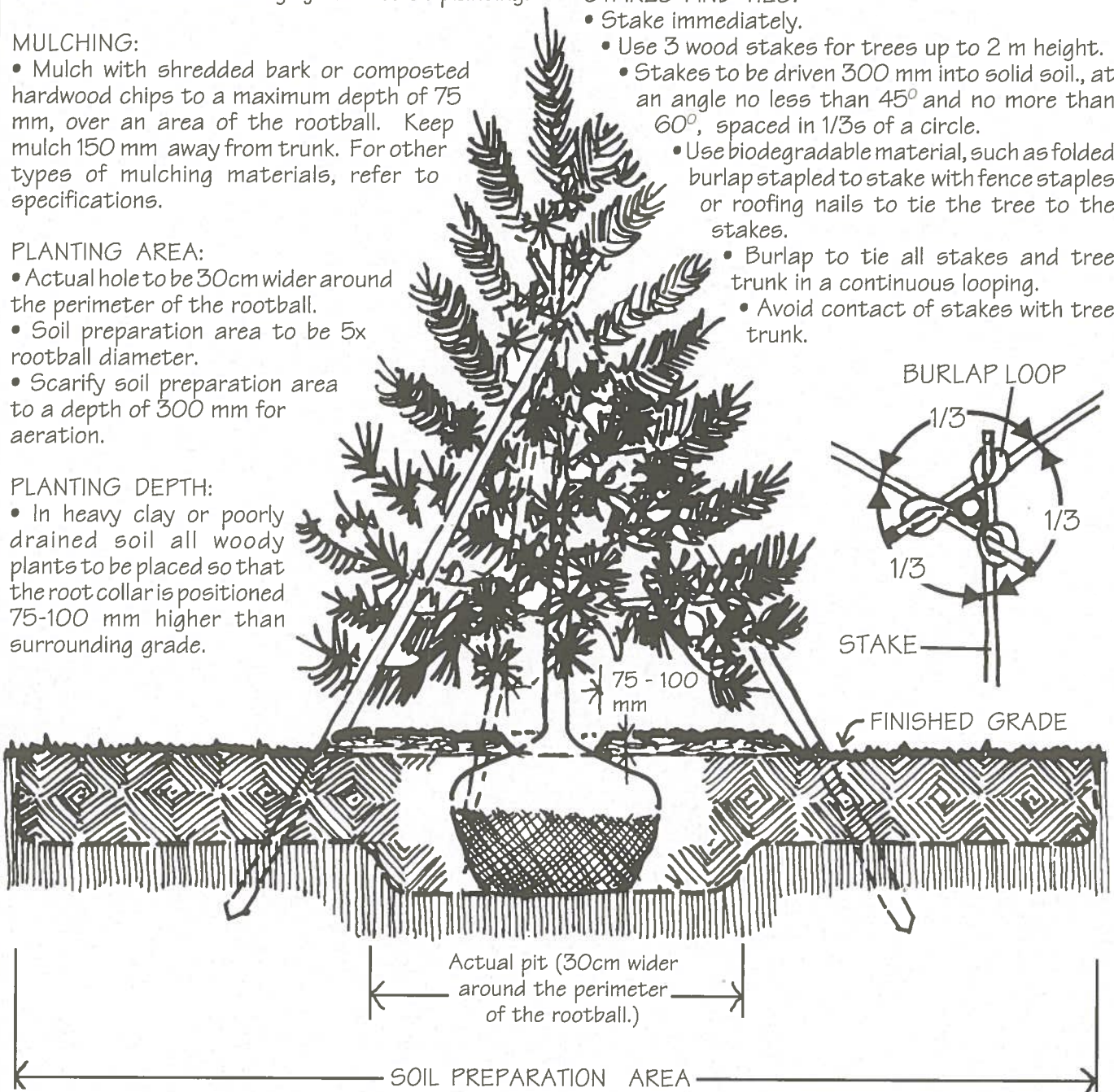
- Cut and remove all wire, rope, burlap and twine from around trunk and the top 1/3 of the rootball.

CROWN PRUNING:

- Prune at planting to carefully remove dead, broken, damaged and double leaders. Never cut a leader.

STAKES AND TIES:

- Stake immediately.
- Use 3 wood stakes for trees up to 2 m height.
- Stakes to be driven 300 mm into solid soil., at an angle no less than 45° and no more than 60°, spaced in 1/3s of a circle.
- Use biodegradable material, such as folded burlap stapled to stake with fence staples or roofing nails to tie the tree to the stakes.
- Burlap to tie all stakes and tree trunk in a continuous looping.
- Avoid contact of stakes with tree trunk.



PLANTING DETAIL: TREE SPADE TREE

IMPORTANT:

It is essential to use this detail in conjunction with the specifications. Some or all notes may not apply to the special requirements of a species or a planting environment. Contractor is responsible for obtaining written confirmation of utility locates prior to commencing digging.

Detail to apply for deciduous and coniferous trees.

TRUNK PROTECTION:

- Trunk wrapping in place prior to planting to be totally removed for trunk inspection.
- When required use only approved tree wrap material and install from the ground up to above the lowest branches.

SOIL AMENDMENT:

- As per specifications.

BACKFILL/WATERING

- Soil to be backfilled and concurrently tamped and flooded to eliminate air pockets and drying of roots at interface.

MULCHING:

- Mulch with shredded bark or composted hardwood chips to a depth of 75 to 100 mm, over an area of the rootball. Keep mulch 150 to 200 mm away from trunk. For other types of mulching materials, refer to specifications.

PLANTING AREA:

- Tree hole to be 30cm wider around the perimeter of the rootball.
- Soil preparation area to be 5x rootball diameter.
- Scarify planting area to a depth of 300 mm for aeration.

PLANTING DEPTH:

- Plants to be placed so that the root collar is positioned 75-100 mm above surrounding grade.

CROWN PRUNING:

- Prune at planting to carefully remove dead, broken, damaged and interfering branches, double leaders and tight v-shaped crotches.

GUYING & STAKES:

- Stake or guy immediately.

a: GUYING:

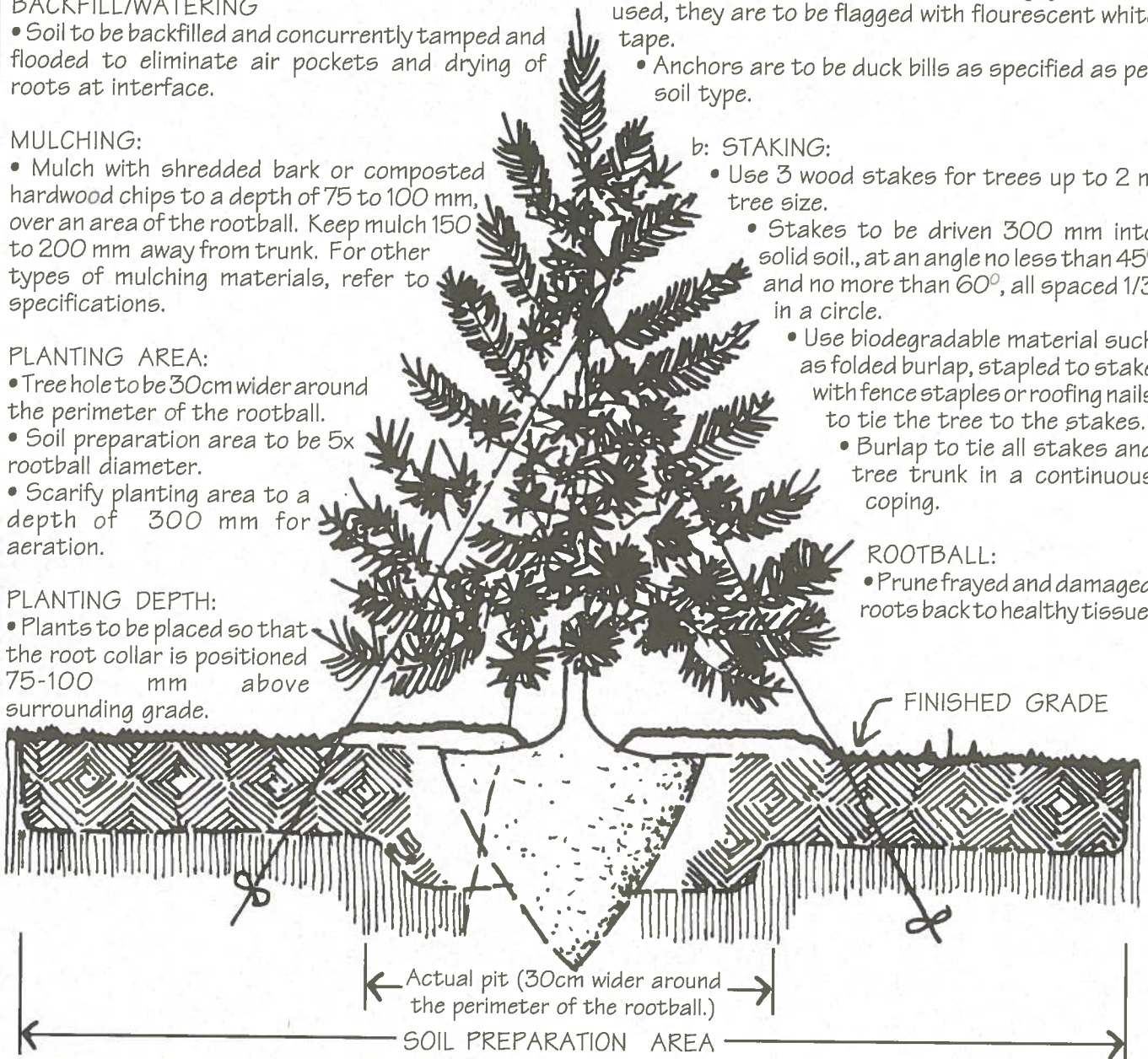
- Use #9 Galv. wire, minimum 3 wires. If guy wires are used, they are to be flagged with fluorescent white tape.
- Anchors are to be duck bills as specified as per soil type.

b: STAKING:

- Use 3 wood stakes for trees up to 2 m tree size.
- Stakes to be driven 300 mm into solid soil, at an angle no less than 45° and no more than 60°, all spaced 1/3 in a circle.
- Use biodegradable material such as folded burlap, stapled to stake with fence staples or roofing nails to tie the tree to the stakes.
- Burlap to tie all stakes and tree trunk in a continuous coping.

ROOTBALL:

- Prune frayed and damaged roots back to healthy tissue.



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