



Part D

Technical Guidelines

1. Technical Guidelines Overview

The planting of trees in streets and footways is a time consuming process that can involve saw cutting of concrete, jack hammer work, excavation by hand, disposal of soil, planting, mulching, and installation of tree guards. If tree planting is carried out on major thoroughfares of either vehicle or pedestrian traffic, additional traffic control measures will be required including the scheduling of work in the early mornings or on weekends.

This amount of time and expense is largely wasted if the tree dies shortly after planting and must be replaced. It is therefore essential that the tree is in optimal condition when planted, and the method of planting, protection and maintenance is of a high standard.

This section outlines the required steps to provide new street trees with the best possible chance for success. This Section will act as a specification for the purchase, installation and maintenance of street trees for use by the City of Sydney and developers carrying out work in the public domain.

Factors to consider include:

- Purchase of trees of the specified size and quality
- Tree installation specification - including size, backfill and provision of watering point
- Street planting technical details
- Specification and installation of tree guards
- Maintenance requirements

2. Trees in Footways Guidelines

2.1 Layout and placement

There are many limitations to the positioning of street trees on footways immediately behind the kerb. Distances from infrastructure elements such as intersections, light and

electricity poles, stormwater inlets, underground service pits and bus stops, are important in determining final planting locations. Typically this will require individual site assessment and will be determined on a case by case basis.

2.2 Spacing of street trees

Taking into account clearance requirements, street trees are to be planted as follows:

- small trees – spaced at 5 to 7 metre intervals
- medium trees – spaced at 7 to 10 metre intervals
- large trees – spaced at 10 to 15 metre intervals

2.3 Width of footway

An essential factor in species selection is the width of the footway proposed for street tree planting. Too small a tree in a wide footway free of obstructions is a lost opportunity for a large shade tree that would greatly add to the appearance of the streetscape. Conversely a tree with too large an ultimate size for the width of the footway can become both an expensive maintenance item, and a danger to pedestrians.

The City of Sydney footways consist of either stone or decorative unit paving, asphalt/concrete pathway with grass verge, or concrete/asphalt paving from building line to kerb line. The footways outside the CBD vary in width but are generally between 1500mm and 3600mm wide.

For the purposes of tree planting Council footways can be divided into four categories:

- narrow - less than 1800mm;
- medium - 1800 to 3000mm;
- wide - greater than 3000mm and
- grassed - combination of grassed verge and paved footway.

Part D - Technical Guidelines

2.4 Narrow footways (less than 1800mm)

For the comfortable passage of pedestrians in single file, a clear width of at least 900mm is needed between the back of the tree pit and the building/ boundary line. As the minimum practical width of tree pits is 400mm, the minimum width of footway that can be safely planted is 1300mm (400mm plus 900mm), subject to the following conditions: -

- that there are no obstructions overhanging the building line from the front yard of the adjacent property (eg. shrubs and vines) and;
- that the lower branches of the tree can be pruned to a height of at least 2000mm.

Problems occur on narrow roads where parking is restricted to one side only. Larger vehicles tend to ride up over the kerb onto the footway to avoid parked cars. In this case trees can only be planted on one side of the street even if the footway is sufficiently wide.

The size of a tree pit that is appropriate in such footways is 400mm wide and 700mm long.

Trees planted in footways less than 1300mm wide (from building line to back of kerb) force pedestrians, particularly those with strollers, to walk on the road. As it is far safer to encourage pedestrians to stay on the footway, trees will not be planted in footways less than 1300mm in width.

It should be noted however that existing trees that have been planted in footways less than 1300mm wide will not be removed (unless considered unsafe), but more trees will not be added to the footway. In streets with footpaths less than 1300mm, which already support tree planting, in-road or shared zone options will be explored for new trees.

2.5 Medium footways (1800mm - 3000mm)

Medium width footways are generally free from problems of narrow footways and are of a suitable scale to allow the planting of both small and medium sized trees.

The minimum size of a tree pit that is appropriate in such footways is 600mm wide and 900mm long. Larger size tree pits should be considered wherever space allows.

2.6 Wide footways (>3000mm)

Wide footways naturally have the greatest scope for tree planting and allow the growth of the largest of the suitable street tree species. In these footways the large trees are the most appropriate so as to take advantage of the large space available.

2.7 Grassed footways

Council footways with a grassed verge are generally constructed of an 1800mm wide concrete strip and 1800mm of grass up to the kerb. Trees have traditionally been planted half way between the kerb and the edge of the concrete footway. This method of planting allows a large area of water penetration to the roots of the tree and avoids some of the problems of pavement lifting by the roots of the tree.

In this type of footway species selection is based upon the overall width of the footway from the building line to the back of the kerb, i.e. small trees in narrow footways, medium trees in medium footways and large trees in wide footways.

3. Street Tree Supply Specification

3.1 General conditions and quality

All trees to be provided to the City of Sydney are to conform to the NATSPECguide and "Guide for assessing the quality of and purchasing of landscape trees" by Ross Clark 2003. The following specification details the requirements for the supply and transportation of trees.

Nursery stock shall meet design criteria for minimum dimensions, container size and shape, plant shape or special pruning requirements outlined in this document and the table below.

Container Volume	Height above container (metres)	Calliper (at 300mm)	Clear Trunk Height (metres)
75 Litre	2.2	45 mm	0.8
100 Litre	2.5	50 mm	1.0
200 Litre	3.5	70 mm	1.2
300 Litre	4.0	85 mm	1.5
400 Litre	4.2	95 mm	1.5
500 Litre	4.6	105mm	1.5
600 Litre	5.0	120mm	2.0
800 Litre	5.5	135mm	2.0
900 Litre	6.0	150mm	2.4
1000 Litre	6.0	150mm	2.4
1100 Litre	6.5	165mm	2.4
1200 Litre	7.0	170mm	2.8
Palm trees	-	n/a	3.0

Part D - Technical Guidelines

Definitions for the terms used within this specification shall be in accordance with the NATSPEC guide.

3.2 Labelling of stock

Clearly label individual trees and batches with the species name and cultivar / variety / provenance if appropriate. The label is to withstand transit without erasure or misplacement.

3.3 True to type

The trees supplied and planted shall be the species, and variety or cultivar that the City has specified.

3.4 Health and vigour

The trees supplied shall be healthy and vigorous at the time of delivery and planting. Supply trees with foliage size, texture and colour at the time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species. Supply trees with extension growth consistent with that exhibited by vigorous specimens of the nominated species.

3.5 Pest and disease

Trees shall not be diseased or show evidence of pest attack that could affect the long term health of the tree or adjoining plantings. Supply trees with foliage and soil free from attack by pests and diseases. For Australian native trees with a history of attack by native pests (eg. *Ficus macrophylla* & *Eucalypts*), evidence of previous attack must be restricted to less than 15% of the foliage and there must be no actively feeding insects or evidence of fungi.

3.6 Injury

Supply only trees free from injury and wounds.

3.7 Self supporting

Supply only trees that are self supporting.

3.8 Stem taper

Supply trees where the calliper at any given point on the stem is greater than the calliper at any point higher on the stem.

3.9 Pruning

Trees are not to be pruned into a saleable shape just prior to shipment. All pruning shall be a clean-cut at the branch collar, no lopping or topping of trees is to be carried out and the diameter of any wound must not exceed 50% of the calliper immediately above the point of pruning.

Clean stem height: trees shall be supplied with a clean stem height of 35-40% of total tree height. For example a 5m tree is to be pruned to 2m maximum (clean stem height must not exceed

40% of total tree height).

Pruning wounds: Restrict fresh cuts (i.e recent, non-calloused) to <20% of total tree height.

Type: Ensure a clean-cut at the branch collar that complies with AS4373:Pruning of Amenity Trees.

3.10 Crown symmetry

The symmetry of the crown is an important aspect of the presentation and appearance of the tree in the landscape. Difference in crown distribution on opposite sides of the stem axis must not exceed 20%.

3.11 Stem structure

Species with an excurrent form: Supply trees with a defined central leader and the apical bud intact. Trees that have had their leaders cut or damaged will not be accepted. Supply trees with a single stem roughly in the centre of the tree with any deviation from vertical <15°.

Species with decurrent form: Supply trees where the central stem is not divided at any point lower than the clean stem height nominated, and that the stem junction at the point of division is sound.

All species: Ensure that branch diameter is less than or equal to one-half of the calliper immediately above the branch junction.

3.12 Included bark

Supply trees where the branch/stem bark ridges at junctions between stems and branches and between co-dominant stems are convex, except for species prone to include bark that are known to remain strong (as approved by the City of Sydney).

3.13 Trunk position

Supply trees with the distance from the centre of the trunk to any extremity of the rootball is not varying by >10%.

3.14 Compatibility of graft unions

When purchasing named cultivars propagated by grafting, it is critical that the graft union is sound and that the scion and root stock are compatible. The union between the scion and the root stock must be sound for the entire perimeter of the graft. The diameter of the scion immediately above the graft must be equal to the diameter of the rootstock immediately below the graft (+or -20%).

3.15 Indication of north

Trees in containers >100 litres: Indicate the northerly aspect

Part D - Technical Guidelines

during growth in the nursery and ensure it is marked so to withstand transit without erasure or misplacement.

3.16 Root division

Trees in containers >45 litre: Primary division of roots is to have occurred within the outer 50% of the rootball at <100mm intervals.

3.17 Root direction

Ensure that roots, from the point of initiation, generally grow in outwards (radial) or downwards direction, and that any deviation from the established direction <45°.

3.18 Root ball occupancy

Soil Retention: On shaking or handling of the unsupported rootball at least 90% of the soil volume shall remain intact.

3.19 Rootball depth

Rootball depth assessment for containers/rootballs 45 litres or larger must:-

- have a depth of less than or equal to the maximum depth specified for palms;
- have a diameter greater than or equal to their depth; and
- rootballs (regardless of size) must not exceed 550mm in depth (except for palms).

3.20 Height of root crown

Ensure that the trees root crown is at the surface of the rootball and free from suckering.

3.21 Non-suckering rootstock

Grafted cultivars/varieties: Supply trees grafted onto non-suckering rootstock.

3.22 Rejection of non-conforming specimens

Any tree not conforming to the specifications and standards listed in this specification shall be rejected and suitable replacements provided. If non-conforming trees are provided, the City require new stock that complies to be supplied and planted, or alternatively may provide replacement specimens and deduct the costs from any applicable bank guarantee or bond.

4. Street Tree Soil Specification

4.1 Soils - General

The following soil specifications are generally extracted from the book *Soils for Landscape Development* by Simon Leake and Elke Haege (CSIRO Publishing; 2014). They have been adapted for common and typical street tree planting sites in the City. Major tree planting work, unique or difficult sites, or special contracts shall be subject to a specific specification that may be issued

separately, and will override the requirements contained here, unless otherwise stated. If any doubt exists please refer to the City of Sydney Tree Management Team for further information and instructions.

4.2 Tree planting sites – existing soil investigations prior to planting

For all high profile sites and for existing sites where more than 3 trees are to be planted a site soil investigation shall be conducted prior to any planting operations. This assessment shall be carried out for all sites, whether natural or disturbed. A site soil survey and assessment shall be carried out to assess the following:-

- 1) The uniformity or otherwise of the residual surface materials must be determined to 500mm minimum depth.
- 2) The morphology (texture, structure and colour) of the main types of surface materials present and their horizon designations should be determined.
- 3) The depths of each soil horizon to rock or parent material should be measured if possible.
- 4) All areas of disturbed, filled or altered conditions (if the site is disturbed or does not possess any topsoil profiles)
- 5) Any physical limitations posed by the materials (stoniness, clay, poor drainage) should be assessed.
- 6) Samples representative of the main types of surface horizon (topsoil) material present must be analysed for the following properties, as a minimum:-
 - pH
 - salinity
 - cation exchange properties
 - plant available nutrient contents P, N, S, Fe, Mn, Zn, Cu, B
 - dispersibility and aggregate stability
 - organic matter
 - texture or particle size analysis
 - stone content.

Where there is any suspicion of salinity, a deep subsoil sample (to around 800mm depth) must be taken and also analysed for subsoil properties as above.

4.3 Reporting on soil investigations

The Consultant/Contractor must provide a report identifying as a minimum:-

- 1) General description of the soils
 - a) a description of the field condition of the surface materials soil (results of the field survey)
 - b) interpretation of test results
 - c) a statement of 'fitness for purpose' as topsoil, subsoil or subgrade

Part D - Technical Guidelines

- d) recommendations for reuse, amelioration or improvement of both topsoil and subsoil.
- 2) The report must include comments and recommendations on the following details:-
 - a) the depth of each soil horizon
 - b) the morphology (texture, structure and colour) of at least the A and B horizons
 - c) the presence of any inclusions (ironstone, manganese pellets, lime concretions)
 - d) the soil type or classification of the soil(s) present
 - e) any areas of disturbed, filled or altered conditions that render the soil unusable or raises special requirements
 - f) the depth of the topsoil and any variation in depth for stripping purposes
 - g) recommended topsoil stripping depths and stockpiling methods
 - h) any limitations imposed by the chemical and physical properties of the soils
 - i) the means by which the soils may be ameliorated or improved for various landscape purposes.
- 3) The report must be in a professional and technical format and include the:-
 - a) Name and qualifications of the person undertaking the investigations / survey.
 - b) Name of the organisation and their contact details.
 - c) Details of any subsequent testing undertaken.

4.4 Soil Stockpiling

For normal tree planting there shall be no stockpiling of soils on site. Typically all materials are to be moved directly from the carrier to the hole only stockpiled for a very short period of time. Adjoining pavement and road surfaces are to be maintained in a clean and tidy state at all times.

4.5 Soil Horizon Profiles

The required soil profiles are dependent on the location and type of materials placed around the tree base. The following plantings shall have the following profile horizon structure.

Planting type	Profile horizon structure
Trees planted in paved locations, with decomposed granite or porous paving around the tree base.	B/C horizons only
Trees planted in grass or garden beds with organic mulch surface treatment.	A/B/C horizons
Trees planting in load bearing situations (subject to design review).	B/C horizons, with A horizon

4.6 Schedule of soil horizon depth

The following planting types shall have the following soil depths as a minimum.

Planting type	Total drained soil depth	Topsoil depth (A horizon)	Subsoil depth (B horizon)
Trees planted in paved locations, with decomposed granite or porous paving around the tree base. (100L – 200L nominal tree size)	700mm	nil	700mm
Trees planted in grass or garden beds with organic mulch surface treatment. (100L nominal size)	600mm	200mm	400mm

Important Note: These soil depths are above all drainage layers or soils known to be freely draining. Further, these soil volumes are minimums, and topsoil must not be increased beyond 400mm.

4.7 Drainage Layers

Where a drainage layer is coarser particle size than around 5mm diameter, a transition layer may be needed between it and the filtration soil media to prevent soil migrating into the drainage gravel layer. Generally this will be an intermediate very coarse sand or fine gravel. Do not use geotextile fabrics over the drainage layer to prevent soil migration.

4.8 Tree Planting Subgrade Preparation

Before installing specified tree pit backfill soil, the following subgrade treatment must be applied to all finished subgrade areas:-

- 1) Fair and trim to relative level to accommodate the required overall soil depths
- 2) Remove rocks > 100 mm diameter.
- 3) Remove rubbish such as construction generated waste, plastics, metals and glass.
- 4) If required by soil testing, apply gypsum and lime according to the soil report requirements to ameliorate the subgrade.
- 5) Use appropriate hand tools when working on smaller sites / individual tree pits or around underground services. If size permits use an excavator with a tyne attachment to loosen the subgrade and mix the ameliorants to 200 mm

Part D - Technical Guidelines

depth to incorporate. Break up clods but do not smooth (leave the surface 'keyed' to accept the subsoil/topsoil).

4.9 Tree rooting volumes

Some sites may have existing site soils that are incompatible with tree root growth, have paved surfaces requiring heavy compaction of the site soils, or sites where all soil media available to trees needs to be imported. The following table specifies the minimum soil volume for trees where the soil volumes require improvement.

Tree planting	Soil volume per tree –harsh planting sites	Soil volume per tree –favourable planting sites
Small trees (<7m)	36m ³	25m ³
Medium Trees (7 – 15m)	38m ³	27m ³
Large Trees (15m+)	39m ³	27m ³

Important Notes:

1. Harsh planting sites are those that have moderate temperatures / wind, hard paved surfaces surrounding, shallow soil profiles (A and B horizons) and no organic mulch.
2. Favorable planting sites are those shaded and protected from winds, with limited hard / paved surfaces, low reflection, moderate soil depth (600mm+) that is free draining and organic mulch applied regularly.
3. When the tree is irrigated regularly, soil volume can be reduced by 10%.
4. Where the trees have shared root systems, soil volume can be reduced by 10%.
5. When using structural soils, the volume of rock or plastic cells (or other) must be subtracted to determine soil rooting volume. However, the soil depth can often be increased due to increased air at depth, provided there is adequate drainage.
6. May not apply for single infill replacement trees when existing pavements are not being disturbed.

4.10 Soil mixes

Soil Type A - Normal Tree Planting Topsoil

A sandy loam to clay loam topsoil mix designed for general purpose, on-grade landscape garden bed planting of grasses, woody and herbaceous annuals and perennials that have a high nutrient requirement for sustained optimum growth, and are not subject to compaction by pedestrian or other traffic.

The heavier textured soils in this specification may require

the use of engineered solutions (drainage techniques) where excessive wetness is anticipated. Note that the organic soil variant should not be chosen for low P plantings and should not be used below 300mm.

The use of site reclaimed topsoil may be used subject to investigation and testing. Where site soils are alkaline (pH > 7.5 in water), the pH preferences of the planting list must be considered in the design process. Similarly, where salinity is identified as a potential issue, the salt tolerance of planting lists must be considered.

Soil Type B(1) -Imported Subsoils or Ameliorated Subgrades

This specification is to be used to manage the importation of subsoil, or its manufacture from on-site materials where present subgrades do not provide sufficient quality to qualify as a rooting medium to provide rooting depth sufficient for larger plantings.

This soil shall be generally a low organic matter material that is well balanced chemically, is not saline or sodic or excessively acidic or calcium deficient and not dispersive. It is designed to provide improved rooting depth for larger plantings and reduce the likelihood of waterlogging. It may be made up using existing site subsoil or fill materials or a blend of both. It is not generally considered to require the application of fertiliser to subsoil but must be low in P if used for P-sensitive plantings

Soil Type B(2) - Advanced Tree Planting & Vault Subsoils

A sandy, well-drained medium with low organic matter for backfilling below 300mm from the surface in larger potted specimens over 45L or 400mm depth of root ball, semi-advanced, advanced and super-advanced tree planting. It may contain a small proportion of recovered site topsoil or subsoil, provided the organic matter upper limit is not exceeded.

Wherever surface soil is required to support landscape planting (ie. for A horizon, top 300mm) include Normal Tree Planting Soil (A1). Wherever soil is beneath paving, porous paving or decomposed granite surface use Soil Type B2 for the entire depth.

4.11 Soil Type SSS - Structural Support Soils

This specification describes the formulation of a structural support soil (SSS) for tree planting in urbanised environments. SSS are designed to form a basement for load bearing engineered structures such as roads, pavements and kerbing, while also providing rooting volume for tree roots. Due to the high void space, they will permit root growth through the medium and also help distribute root pressures over a wider section of pavement, reducing or delaying pavement heaving by roots. The size of the aggregates or stone fraction determines how large the

Part D - Technical Guidelines

roots can grow before heaving occurs.

SSS is a two-part system comprised of a stone lattice for strength and structural support (load bearing) and filler soil to service the horticultural needs. The stone lattice provides structural stability through stone-to-stone contact, while also providing interconnected voids for root penetration, air and water movement. The system is engineered to maintain a high degree of porosity after installation and compaction. The intention is to 'suspend' the horticultural soil component of the blend between stones, which come together during compaction, producing a load-bearing, compacted stone lattice with uncompacted soil in the voids.

The ratio of filler soil to aggregate is the major consideration for achieving the engineering and horticultural objective. Thus the 'aggregate', 'filler soil' and blending ratio of the two need to be specified and carefully validated. Generally, it will be an amount of filler soil equal to half the void space of the compacted aggregate. Assuming the aggregate has a void space of 40%, it will be 10 parts aggregate by volume to 2 parts filler soil.

The assessment criteria apply to a nominal 63 mm aggregate being used in the SSS blend. The aggregate must be a free-draining granular material capable of sustaining the anticipated load bearing requirements of the pavement and must be free of 'unwanted material'. As a guide, an aggregate that conforms to the requirements of AS 2758.7 (1996) for Class L 60 mm railway ballast is likely to possess the desired properties.

Important note: The total volume of SSS is determined by the volume of aggregate as adding filler soil does not increase the overall volume. Tree soil volume estimations must factor this into calculations for recommending soil volume.

4.12 Transport and placement of structural support soil

Soil Type SSS must be a uniformly blended mixture of aggregate and filler soil and are prone to segregation during handling at the source and during transport. Particular care must be taken to ensure that all structural soil is thoroughly homogenised before placement and compaction. To assist this, and to prevent segregation, ensure that the mixture remains moist at all times during mixing, transport, storage and placement.

4.13 Fertiliser Additions to SSS filler soil

The following table provides an example base level requirements for soil and fertilisers to be added to the filler soil (this is to be verified by laboratory testing and per agronomist's report).

Item	Rate
Filler soil clay loam, sandy clay or clay	80–90% v/v
Composted soil conditioner conforming with AS 4454	10–20% v/v
Gypsum	500 g/m3 of filler soil
Urea	500 g/m3 of filler soil
Iron sulphate	1.5 kg/m3 of filler soil
Magnesium sulphate	400 g/m3 of filler soil
Lime or dolomite	600 g/m3 of filler soil
Potassium nitrate	500 g/m3 of filler soil
Superphosphate	500 g/m3 of filler soil
Trace element mix	300 g/m3 of filler soil
8–9 month controlled release	2 kg/m3 of filler soil

For the purposes of tendering, the contractor must allow for the inclusion of the above soil amendments, but the specific amendments required must be verified by laboratory testing and agronomist's recommendations.

4.14 Soil - Physical and Chemical Properties

Generally all soils must be free of 'unwanted material' and must meet all the requirements of the Tables that follow. Where variations from these requirements occur refer to Soil Quality Control specifications and hold points.

Note 1 to Properties Table

For alkaline soils the pH in water (1:5) range shall be 6.8-8.0

For alkaline soils the pH in CaCl₂ (1:5) range shall be 6.5-5.5

Note 2 to Properties Table: For base level requirements for fertilisers (to be verified by laboratory testing and per agronomist's report). For the purposes of tendering, the contractor must allow for the inclusion of the below soil amendments, but the specific amendments required must be verified by laboratory testing and agronomist's recommendations.

Additive	Rate
Lime and/or dolomite	300 g/m3 at mixing
Balanced compound NPK turf starter fertilizer	1 kg/100 m2 after placement
Minor and trace elements	2 kg/m3 at mixing

Part D - Technical Guidelines

Physical Property	Units	Tree Planting Subsoil Target range	Advanced Tree & Vaults Subsoil Target range	Normal Tree Planting Soil Target range	Structural Soils – (Filler Soil)
Texture, preferred range	n/a	Sandy loam to clay loam	Loam to sandy loam	Sandy loam to clay loam	Loam to Clay loam
Organic matter	% dwb	n/a	<5	3–6	3-8
Organic matter (organic soil variant)	% dwb	n/a	n/a	15–25	n/a
Permeability (@ 16 drops by McIntyre Jakobsen)	mm/h		> 50	> 30	n/a
Wettability	mm/h		> 5	> 5	> 5
Dispersibility in water		>4 (Emerson Agg Class)	1 or 2 (AS 4419) category	1 or 2 (AS 4419) category	1 or 2 (AS 4419) category
Large particles (naturally occurring)					
2–20 mm	% w/w	<30 (with <10 for 10-20mm)	< 20	< 20	Gravel >4mm to be less than 2
> 20 mm	% w/w	<10	< 10	< 10	nil
>50 mm	% w/w	<2	nil	nil	nil
Visible contaminants > 2 mm (glass, plastic and metal)	% w/w	<0.5	< 0.5	< 0.5	< 0.5

Chemical Property	Units	Tree Planting Subsoil Target range	Advanced Tree & Vaults Subsoil Target range	Normal Tree Planting Soil Target range	Structural Soils – (Filler Soil)
pH in water (1:5) Standard range	pH units	5.4–6.8	5.4–6.8	5.4–6.8	5.4–6.8
pH in CaCl2 (1:5) Standard range	pH units	5.2–6.5	5.2–6.5	5.2–6.5	5.2–6.5
Electrical conductivity (1:5)	dS/m	< 0.65	< 0.5	< 0.65	< 0.5
Phosphorus – P-tolerant/standard plants. Acid soils method 18F1	mg/kg	50–150	30–80	50–150	30–100
Phosphorus – P-tolerant/standard plants. Alkaline soils method 9B1 or 9C1	mg/kg	30–60	10–30	30–60	n/a
Phosphorus for P-sensitive plants, acid soils method 18F1	mg/kg	< 30	< 30	< 30	n/a
Phosphorus for P-sensitive plants, alkaline soils method 9B1 or 9C1	mg/kg	< 20	< 20	< 20	n/a
Exchangeable sodium (Na)	% of ECEC	< 7%	< 7%	< 7%	< 7%
Exchangeable potassium (K)	% of ECEC	5–10%	3–10%	5–10%	3–10%
Exchangeable calcium (Ca) method 18F1 or 15A1 in alkaline soils	% of ECEC	60–80	60–80	60–80	60–80
Exchangeable magnesium (Mg)	% of CEC	15–25	15–25	15–25	15–25
Exchangeable aluminium (Al)	% of CEC	< 2	< 5	< 2	< 5
Exchangeable Ca:Mg ratio	Ratio	3–9	3–9	3–9	3–9
Available iron (Fe)	mg/kg	100–400	100–400	100–400	100–400
Available manganese (Mn)	mg/kg	25–100	25–100	25–100	25–100
Available zinc (Zn)	mg/kg	5–30	5–30	5–30	5–30
Available copper (Cu)	mg/kg	1–15	1–15	1–15	1–15
Available boron (B)	mg/kg	0.5–5	0.5–5	0.5–5	0.5–5
Available N (N as nitrate)	mg/kg	> 30	> 20	> 30	> 20

Part D - Technical Guidelines

4.15 Soil Testing and Quality Control

The contractor must use analytical testing to verify compliance with the product specification. This is done in two parts: initial compliance certification and then quality control, as described below.

Before any soil installation, the contractor or soil manufacturer will submit samples of trial blends likely to meet the performance specifications to a testing laboratory. The trial blend must be based on available test information on components and, if necessary, employ an agronomist for advice. They must allow sufficient time for testing and re-formulation in the case of failure to satisfy the performance criteria. Once compliant, a test certificate clearly stating compliance with the applicable criteria must be presented to the City of Sydney.

Note that alternative test methodologies may be accepted and certified as compliant by an independent expert agronomist or soil scientist.

Non-compliance will automatically generate Hold Point 1. No soil will be installed until initial compliance certification has been demonstrated.

Manufacturer's product representation: For imported soils from soil manufacturers, a 'product representation' document produced by the supplier may be accepted as compliance certificate if:

- it is an off-the-shelf product line, not a custom mix
- a representative test certificate is available and is acceptably recent (within 6 months)
- the testing covers all those criteria in the performance specification
- the manufacturer's quality assurance system is externally certified.

4.16 Record keeping

Growing media initial compliance certification records must be kept in an easily retrievable manner that provides for traceability of purchase and location on site. Each compliance certification for all the product specifications used on site must be identified by date, quantity to be supplied and a copy of the formulation used to reach compliance.

All quality control and compliance testing as required by the product specifications must be arranged by the contractor, and carried out by the Principal's nominated soil testing laboratory. All test results records will be made available to the City of Sydney

4.17 Quality control: compliance during construction

The contractor must submit samples of blended soils or imported soil mixes at regular intervals during construction for the purposes of demonstrating continued compliance as part of quality control.

4.18 Test submissions

Submit representative samples of ~5 kg of each product specification, packed and labelled to indicate the source and the specification to be met. The samples must be taken in a representative manner.

The contractor must refer to the testing frequencies indicated in Table below. Variations to the frequencies in this table are permitted on the submission to the City of Sydney of an alternative testing program that clearly achieves the desired outcome of quality control.

Materials supplied from operations that have a third-party-endorsed quality assurance program may be acceptable pending submission of the relevant documentation.

Activity/ Soil	Minimum QC test frequency
Subgrade and subsoil preparation	1 per 500 m3 or 1 per 2000 m2 for in-situ soils following amelioration
Imported subsoils	1 per 500 m3
Mass planting and garden soil specifications	1 per 500 m3
Structural support soils	1 per 100 m3

Note: Where the delivery is less than the stated QC testing frequency, the initial compliance certification certificate must be deemed to demonstrate compliance.

4.19 Soil Hold Points

There are three applicable soil installation hold points:

- Hold point 1: Initial compliance certification before installation of soils.
- Hold point 2: Corrective procedures and their certification in the case of non-compliant products being installed.
- Hold point 3: Re-certification in the case of on-going non-compliance.

Hold point 1

The test certificate will be accompanied by a statement of compliance from a competent person (e.g. qualified agronomist, horticulturist or soil scientist).

Compliance certificates will be in the form of a report clearly stating the material is compliant, with an attachment showing



Part D - Technical Guidelines

the test result relied upon. In the case of minor non-compliance or substantial compliance, a clear statement must be obtained from a qualified independent agronomist waiving the compliance and certifying the sample is compliant with or without conditions.

Non-compliance

In the case of substantive non-compliance, Hold points 2 and 3 will then occur – one to correct soil already installed and another to ensure new deliveries are compliant. In the case of continuing minor non-compliance or substantial compliance, a clear statement must be obtained from a qualified independent agronomist waiving the compliance and certifying the sample is fit for purpose.

Typically there shall be no further placement of the soils that are non-compliant until suitable compliance is demonstrated.

Non-compliance with the target range criteria does not necessarily render a soil not fit for purpose but making this judgment requires an expert person to take responsibility for such deviation. Also, a conditional compliance certificate may be issued requiring that a certain fertiliser or further organic matter or some other amendment be added, with the aim of achieving compliance.

4.19 Sample Declaration of Compliance

The following page contains the expected minimum content and requirements for a declaration of compliance.

Part D - Technical Guidelines

DECLARATION OF COMPLIANCE [SAMPLE]

Certificate no:

To: <insert addressee's name>

Of: <insert company name>

Phone:

Email:

Project name:

Project location:

Product name:

Supplier:

Supplier's batch:

Compliance standard:

Date sampled:

Laboratory ID:

Batch no. and sample no.:

I, <insert name>, of <insert company name>, having been appointed by <insert principal's name>, hereby certify that:-

1. I am a qualified soil scientist, agronomist or analyst.
or
2. I am a person experienced and competent in the interpretation of soil test results for the establishment and cultivation of plants in amenity horticulture and have been appointed by the Principal or their agents.
3. This sample has been submitted by <insert name of person submitting sample> and has been analysed in accordance with specification <insert reference to specification>.
4. The extent of sampling and the results of all tests carried out on the subject soil mix conducted for the subject project are described in my report <insert report number> dated <insert date> and are attached to this declaration for reference.
5. In my professional opinion, the soil mix described in the attached report complies with the nominated soil specification having given due consideration to the intended use and purpose, under the following circumstance:
 - The soil complies with all target criteria with no further amendment.
 - The soil shows minor or insignificant deviation from some of the target criteria that do not affect its fitness for purpose and do not require corrective action.
 - The soil shows significant deviation from one or more of the target criteria but may be considered compliant if the corrective action as stated below is taken.

Corrective actions required

This certificate is issued on the understanding that the following corrective actions will be undertaken by a competent person. These corrective actions are intended to adjust <insert purpose of the corrective action>.

The corrective actions required are:

<insert list of correct actions>

This professional opinion is furnished to <insert addressee's name> as a representative of <insert company name> for their purposes alone on the express condition this it will not be relied upon by any other person and does not remove the necessity for the normal inspection of site conditions, workmanship and product liability at the time of construction.

Signed:

Date of report

Part D - Technical Guidelines

5. Street Tree Installation Specification

5.1 General

This specification describes the appropriate techniques to be used to install new street trees within the City of Sydney local government area.

There may be allowance for some variation in the techniques to be used, however any change to the techniques from those described here must be submitted in a Work Method Statement for approval by the City of Sydney prior to any work being carried out.

Tree planting works shall be undertaken by an Arborist or Horticulturist with minimum certification in accordance with Australian Qualifications Framework Level 2.

5.2 Typical scope of work

The scope of work for tree installation work typically comprises:-

- (a) Demolition of existing tree pit or cutting of the existing footway.
- (b) Excavation of subgrade for tree pits.
- (c) Supply and installation of imported and existing soil mixes.
- (d) Installation of trees.
- (e) Supply and installation of wooden stakes, ties and guys where required to maintain stability.
- (f) Installation of supplied tree guards where specified.
- (g) Supply and installation of various style tree bases, to the City of Sydney specification, after an initial six (6) month soil settlement and tree establishment period.
- (h) Reinstatement of pavement in aborted tree pits.
- (i) Maintenance of planted trees for a specified period following completion of planting.

5.3 Standards

All works shall be in accordance with the relevant standards. The following standards are referred to in this section:-

- AS 4419-2003 Soils for landscaping and garden use;
- AS 4454-2003 Compost, soil conditioners and mulches;
- AS 4373-2007 Pruning of amenity trees.

5.4 Statutory requirements

The installer is responsible for compliance with all relevant statutory requirements.

The installer shall apply for a Road Opening Permit and be able to demonstrate clear working programs and sequences. Site specific pedestrian and vehicular traffic control plans are to be submitted as part of this application and shall conform to NSW Roads and Traffic Authority guidelines and any other statutory

requirements. These plans shall include any requirements for parking of worksite vehicles and the delivery of materials.

Approval from the NSW Police Service and the NSW Roads and Traffic Authority may be required when the work has an impact on traffic flow.

5.5 Environmental controls

The installer shall ensure that all materials and the execution of the work are ecologically sound, environmentally benign and consistent with the principles of sustainable development.

The installer shall take all practical precautions to ensure that dust and noise caused by the works are kept to a minimum. The installer shall take all practical precautions to prevent the spread of dirt and mud along roads and paths. The installer shall be responsible for all localised sediment and erosion control of work and stockpiles under their control and use.

The installer must comply, and make sure that sub-contractors comply, with the general provisions of this clause and any other environmental protection provisions within the requirements of any statute, by-law, standard and the like related to environmental protection.

5.6 Inspections

Provide not less than 48 hours notice so that a City of Sydney Representative can make the following inspections:-

- (a) Tree stock prior to planting.
- (b) Plant materials set out and placed in tree pits before backfilling.
- (c) Tree planting completed.
- (d) Footpath reinstated.
- (e) Periodic inspections during maintenance period.
- (f) Completion of plant establishment period.

5.7 Site investigations, existing services and structures

The installer shall confirm with the City of Sydney the exact location of all tree pits associated with tree planting works.

In accordance with NSW electricity and gas supply regulations, all excavations for tree planting require the review of underground service plans sourced from Dial Before You Dig service. Specialist service location tools or expertise may be required when underground service plans are insufficiently detailed or where plans indicate that services are close to the intended planting location. The installer shall be responsible for the rectification of all pavement surfaces where inspections have been undertaken including the making good of any excavation or site markings.

Part D - Technical Guidelines

The installer shall notify the City of Sydney immediately upon discovery of services or obstructions that prevent any planned tree planting. All services shall be considered live until determined otherwise. No liability is accepted, by the City of Sydney or the Service Authorities, for accidents resulting from contact or disturbance to services.

In the event of any damage to any service, the installer shall immediately notify the relevant authority and the City of Sydney and satisfy all requirements of the authority concerned.

The installer shall be liable for all damage caused by the tree installation works to all existing buildings and structures. The installer shall make good all damage at their expense.

5.8 Spoil

Surplus excavated material must be immediately removed from the site. This includes debris resulting from site clearance and excavated material not reusable as topsoil, filling, mulch or the like, unless otherwise specified or directed. Existing topsoil with any stump grinding debris incorporated within it will be removed from site and not re-used in the new planting site.

The installer shall be solely responsible for the safe and harmless disposal of material away from the site. Surplus excavated material shall not be permitted to remain in place overnight.

Existing tree base materials, such as granite setts, can be recycled and reused in the new tree bases as long as specifications allow.

5.9 Extent of excavations

Excavate to an equivalent depth of the new tree rootball measured from the underside of any concrete base slabs, or as shown on the details. Do not disturb services, and excavate by hand around any existing services as required.

The installer shall determine the rootball depth of each tree to determine the appropriate tree pit depth. Allow additional depth to achieve specified falls for subsoil drainage lines and to satisfy finished levels.

Safety precautions must be in place to prevent public entry to worksite area.

5.10 Existing pavement

The existing pavement shall be cut by a road-saw or other suitable tool to the dimensions shown in the details. Cutting shall only be at right angles and parallel to the kerb. The cut shall have a neat straight edge and smooth face. Kerbs must not be cut under any circumstances. In the case of cutting unit paving,

ensure that the cuts are made along the joints without damage to the surrounding pavers. Unit paving may be dismantled rather than cut if this option minimises damage.

5.11 Subgrade preparation

Refer also Section 4. Cultivate or rip the subgrade at the base and sides of tree pits to a depth of 100mm. During cultivation, thoroughly mix in any materials required to be incorporated into the subsoil. Remove stones exceeding 70mm and any rubbish or other deleterious material brought to the surface during cultivation. Grade the base of tree holes to the required design levels and shapes after cultivation.

5.12 Root control barriers

Root barriers will typically not be required, and shall only be installed when specifically instructed by the City of Sydney.

5.13 Soils and Bad Ground

Upon excavation, if the tree site appears to show poor subterranean condition (poor drainage or anaerobic conditions), the installer shall immediately notify the City of Sydney. Site specific soil testing or subsoil drainage may be specified and approved.

Bad ground shall be ground considered unsuitable for the purpose of the works, including filling liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances or ground which is, or becomes soft, wet and unstable and the like. If bad ground is encountered in, or adjacent, to any tree pit during the work, notify the City of Sydney immediately and obtain instructions before carrying out any further work in the affected area.

5.14 Drainage

Subsoil drainage is to be installed as per City of Sydney requirements and will be determined on a site by site basis.

5.15 Planting conditions

Do not plant in unsuitable weather conditions such as extreme heat, cold wind or rain. Avoid planting where unseasonable and adverse weather is forecast within 24 hours of the operations. No trees are to be planted on days exceeding temperatures of 30° Celsius. Generally tree planting is preferred during the cooler months from March to October.

5.16 Watering

Thoroughly water the tree rootballs before planting and then immediately after planting. Prevent the rootballs from drying out during the planting phase.

Apply water so as not to disturb the soil. Raise the moisture

Part D - Technical Guidelines

within the root zone to field capacity. Ensure potted rootball is thoroughly wet through the entire soil profile. Continue watering at a rate and frequency as required to avoid water stress in the plant.

5.17 Lifting of trees

It is preferred that all trees are carried or slung via the root ball. In the event that the trees have to be repositioned or lifted by the trunk, the installer shall provide adequate soft padding to the trunk in the form of underfelt, carpet or rubber wrapping and use only soft slings during the lifting.

5.18 Placement

When the tree pit is excavated and the hole is the correct size, place the rootball in its final position. Ensure the trees are centred and plumb and the top of the rootball level with the finished surface of the surrounding soil mix.

Do not use the trunk of the tree as a lever in positioning or moving the tree in the planting hole.

5.19 Alignment and orientation

Position the tree at the setout distances as indicated in the details. Ensure trunks are set vertically and aligned with other new or existing trees.

Orientate the trees trunk north where indicated by supplied markings where applicable. (+or- 20°). Adjust within the above tolerances so that the primary lowest branches are generally aligned parallel with the kerb and road way (NOT extending into roadway).

5.20 Root trimming

All trees shall have the outer 10-25mm of the external root ball faces pruned or sliced away using secateurs or a sharp and clean spade. Avoid excessive disturbance to the remaining rootball during this trimming and discontinue if excessive rootball soil begins to fall away. Do not leave the rootballs exposed for extended periods. Cover the rootball with moist hessian if backfilling can not occur immediately.

5.21 Backfilling

Backfill with soil mix as specified in soil mixes and in accordance with the details and specification. Lightly compact the soil to ensure all voids around rootballs are filled and that no air pockets are retained.

Ensure that the backfill soil is not paced over the top of the potted rootball. The top of the rootball and plant stem must be kept level with the top of the backfill.

5.22 Mulch

Mulch shall be free of deleterious and extraneous matter, including soil, weeds, rocks, twigs and the like. Lay mulch to nominal 80mm depth. Place the mulch so that it is not in direct contact with the trunk. Feather mulch away from trunk at base of root ball.

Mulch the areas in accordance with the details. The mulch types to be used are as follows:-

- Decomposed granite brown colour, lightly compacted and installed as shown in the detail.
- Composted weed free organic leaf/timber chippings or recycled (no fines) wood waste.

6. Tree Establishment and Maintenance

6.1 Tree establishment period

The tree establishment period commences at the date of practical completion for a period specified by the City of Sydney.

All trees shall also be maintained immediately following their installation, as per the specifications below, up until the above tree establishment period commences. Tree maintenance works shall be undertaken by an Arborist or Horticulturist with minimum certification in accordance with Australian Qualifications Framework Level 2.

The installer shall submit a program prior to the commencement of the tree establishment period. The program shall detail all works required during the planting establishment period including:-

- (a) Rectification of defects;
- (b) Provision of materials;
- (c) Watering;
- (d) Fertilising;
- (e) Control of weed growth;
- (f) Replacement of dead, damaged or stolen plants.

The installer shall provide 7 days notice of any works to replace trees as part of planting establishment. Throughout the tree establishment period, the installer must continue to maintain new trees and carry out maintenance work including, but not limited to:-

- weeding and rubbish removal from tree surrounds;
- fertilising;
- pest and disease control;
- replanting (on approval from the City of Sydney);
- adjustment, removal or replacement of stakes & ties;
- formative and selective pruning to AS 4373 and;
- mulching to maintain and reinstate to depth specified.

Part D - Technical Guidelines

Watering shall be incorporated into the regular maintenance schedule with the soil moisture content of the tree pits to be maintained above 60%. The installer will allow for 2 maintenance visits per week from between June to August, and 3 visits per week for the remainder of the year per tree.

Inspection results and the maintenance procedures shall be recorded and submitted to the City of Sydney every 2 months. The various ongoing maintenance practices shall be carried out to the satisfaction of City of Sydney.

6.2 Tree guards and supports

The installer shall supply and install 3 wooden stakes with hessian ties per tree, for all trees planted up to 200 litre in size. Where advised by the City of Sydney, the installer shall allow to install metal tree guards on specified trees. The metal tree guards will be supplied by the City of Sydney.

6.3 Fertilising

The following table details the required fertiliser program.

Timing	Product and application rate
At time of planting	Slow Release landscape fertiliser suitable for trees and shrubs, 9 to 12 months release time. Osmocote or approved equivalent applied according to manufacturers directions.
6 months after planting and then monthly through to end of plant the establishment period.	Organic liquid fertiliser. Seasol or approved equivalent applied to soil as per manufacturers directions.

6.4 Watering pipe

The watering pipe will be 50mm slotted 'Ag-Pipe'. These will be with or without a geotextile sleeve as specified by the Contract Manager. The surface grates will be as specified in the details for each type of tree base.

6.5 Tree bases

Tree bases surrounded by pavement shall be left as soil or edges filled with decomposed granite for the first six (6) months to allow for any settlement of the rootball and backfill soil.

Following the six (6) month settlement period, the tree base as specified in the detail is to be installed.

The tree base is to be maintained in a safe and level condition at all times.

Failure of the tree bases prior to practical completion will require rectification by the installer. This failure equates to any area of the tree base slumping/lifting/cracking or creating a trip hazard (variation of more than 10mm) and will require rectification by the installer.

6.6 Pavement rectification

Reinstate and make good to match exactly the surrounding pavement, to the satisfaction and approval of the City of Sydney, all pavement, paving, concrete, brick or other surface damaged or affected by the tree planting and tree base installation works.

Existing materials salvaged from the site must be approved by the City of Sydney for reuse and must match existing pavement. Where temporary asphalt topping is required, approval of the City of Sydney shall be sought.

6.7 Tree replacements

Where trees are damaged or die or fail to maintain vigorous growth typical of the species due to neglect or inadequate maintenance, the installer shall replace, replant and maintain trees of the same species, size and quality.

7. Tree Planting Details

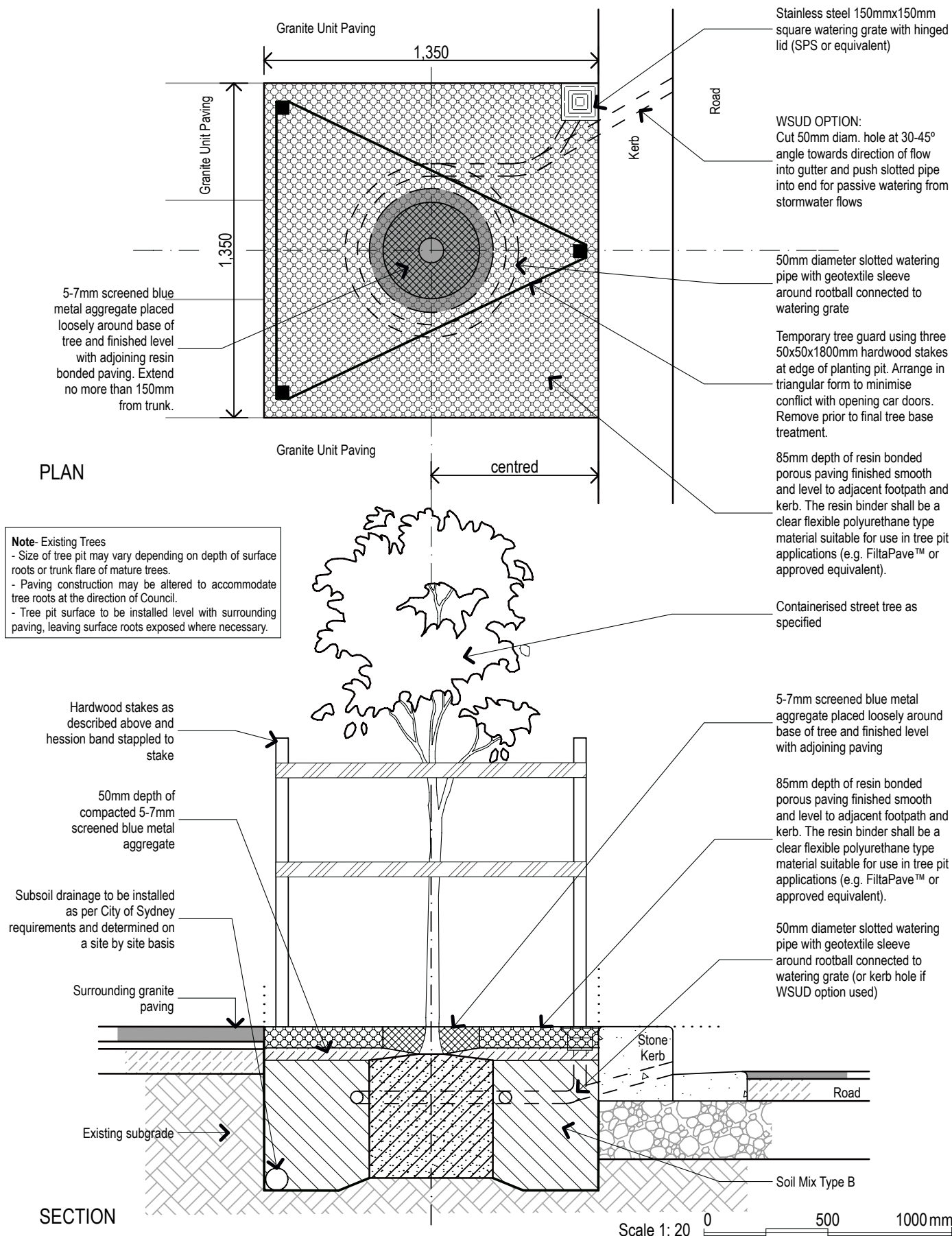
Technical details have been developed to ensure developers and City of Sydney contractors provide an appropriate and consistent treatment for street tree planting throughout the variety of street environments typically encountered.

The following pages illustrate the typical details to be applied.

In-road planting details and median strip details will be dependent on the individual street widths, traffic and services and will therefore require site specific designs to be employed, however the following 'ideal practice' details have been included here to provide general expectations for tree planting in these instances.

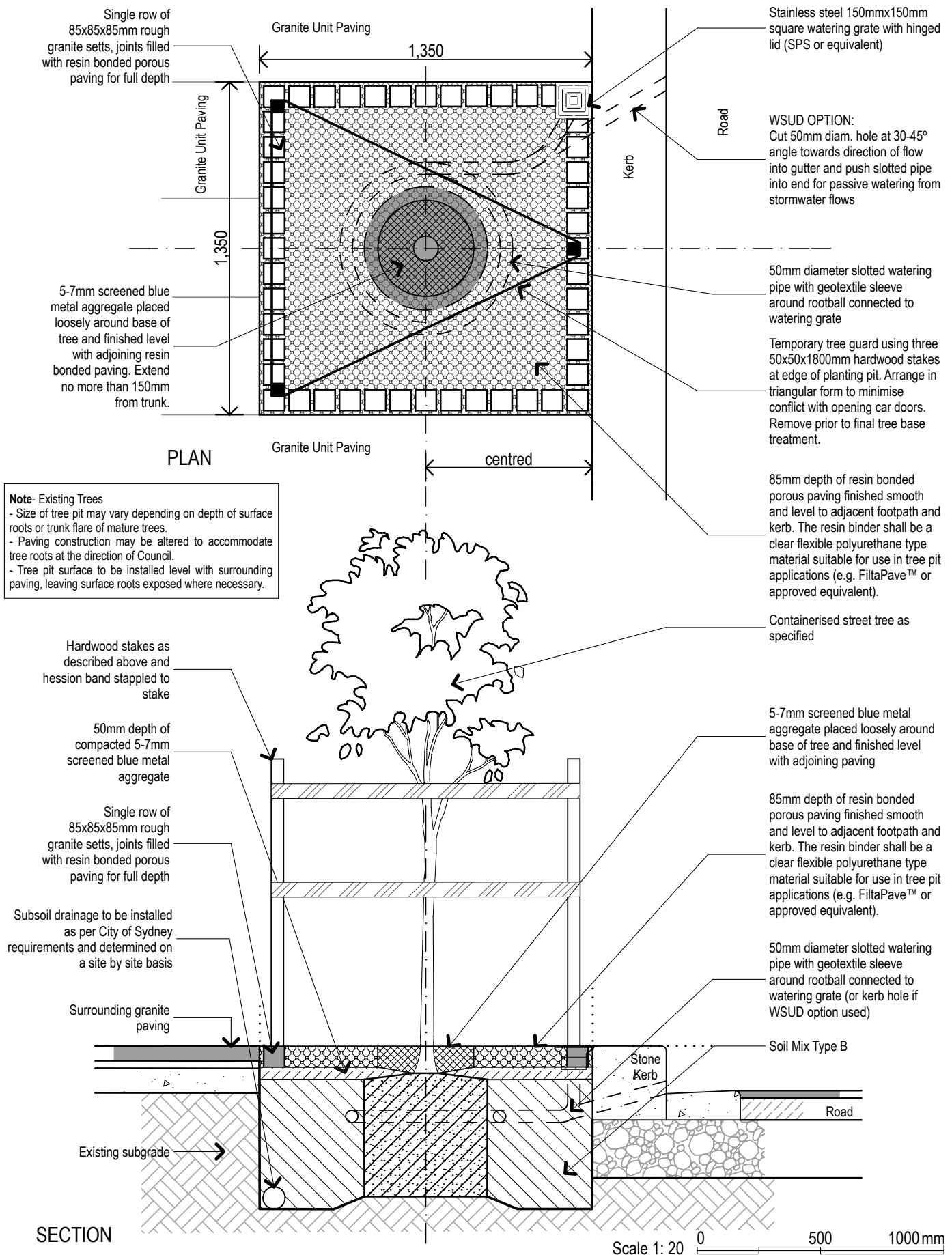
The use of continuous planting trenches, structural soil, structural cells, suspended pavements and other tree planting technology will be considered based on specific site conditions. A generic detail showing the use of structural soil around tree pits and beneath pavements can be found within the Sydney Streets Technical Specifications Drawing 2.1.7.

Actual designs shall be submitted to the City of Sydney for consideration prior to any installation.



TYPE 1 - PLANTING IN GRANITE PAVING

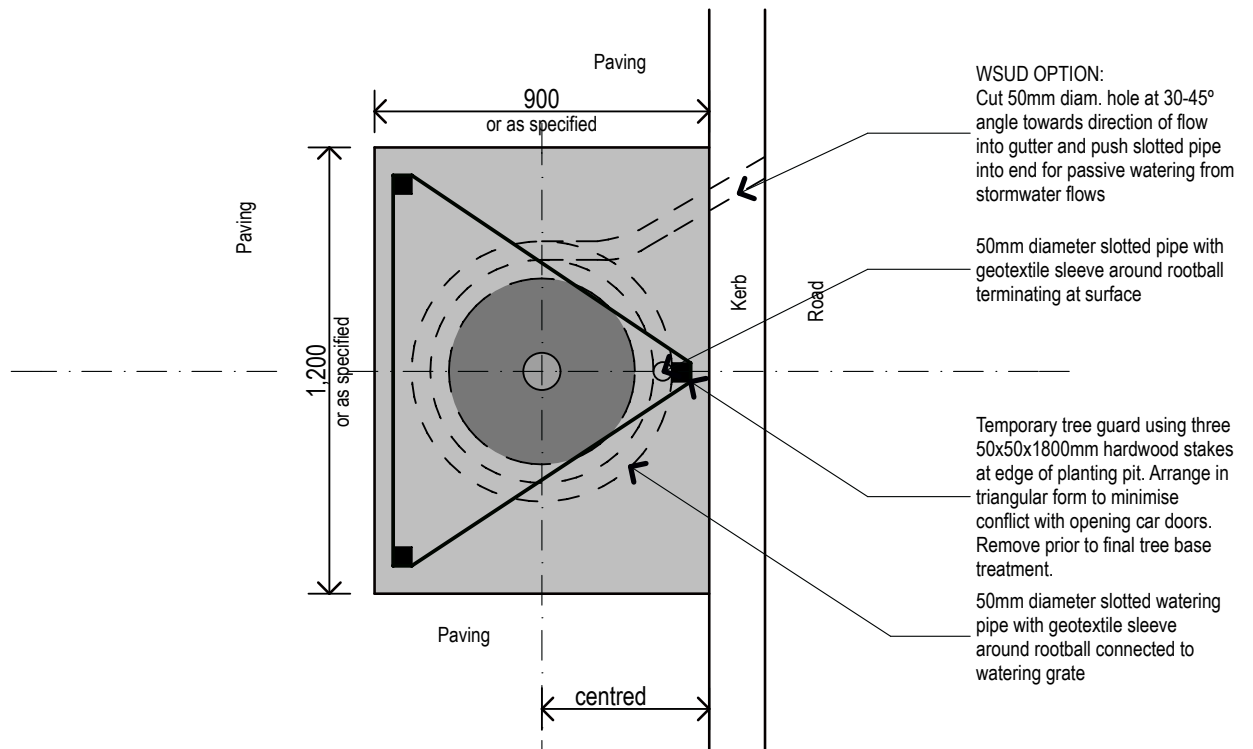
City of Sydney



TYPE 1a - PLANTING IN GRANITE PAVING WITH SETTS

City of Sydney

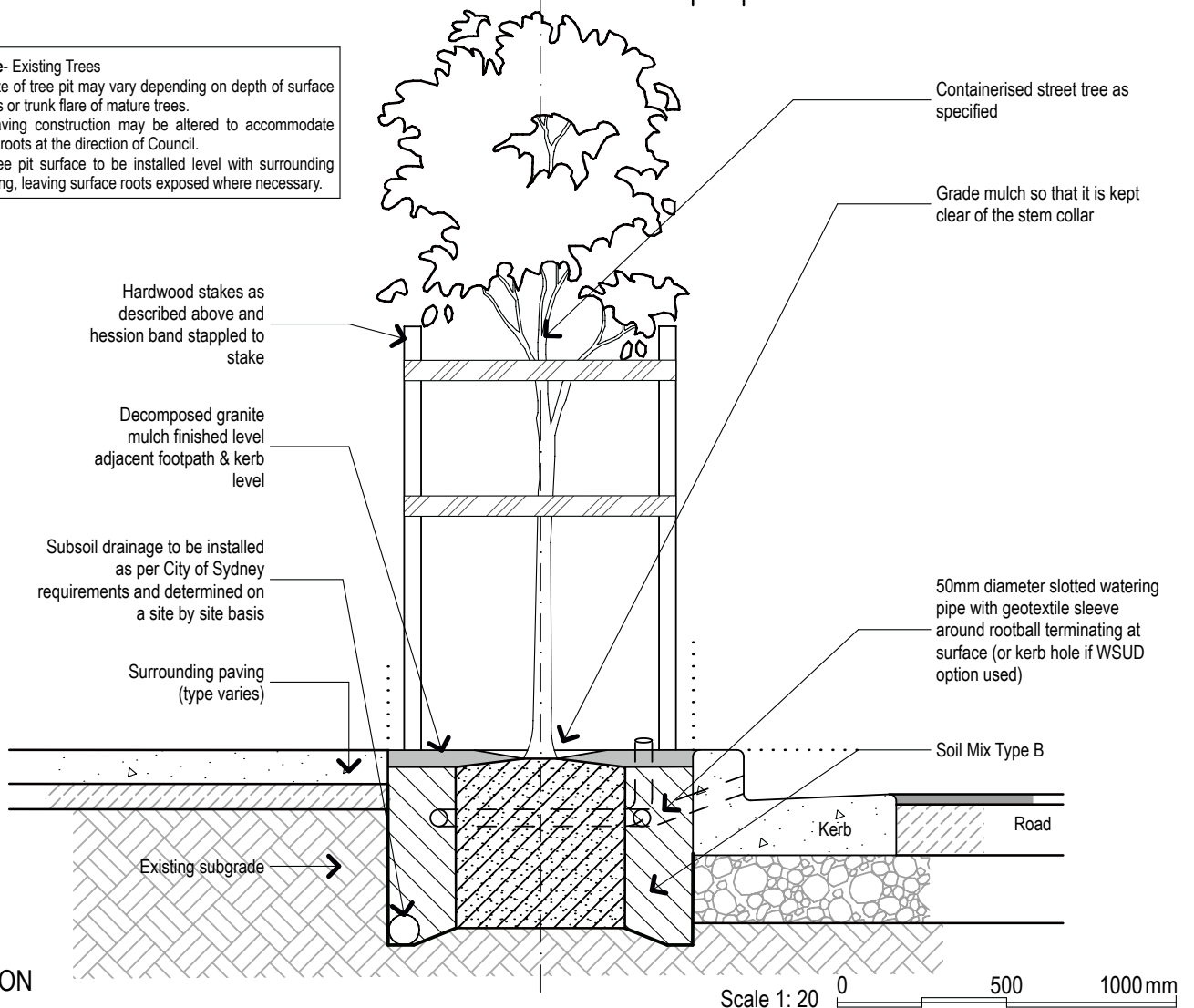
PLAN



Note- Existing Trees

- Size of tree pit may vary depending on depth of surface roots or trunk flare of mature trees.
- Paving construction may be altered to accommodate tree roots at the direction of Council.
- Tree pit surface to be installed level with surrounding paving, leaving surface roots exposed where necessary.

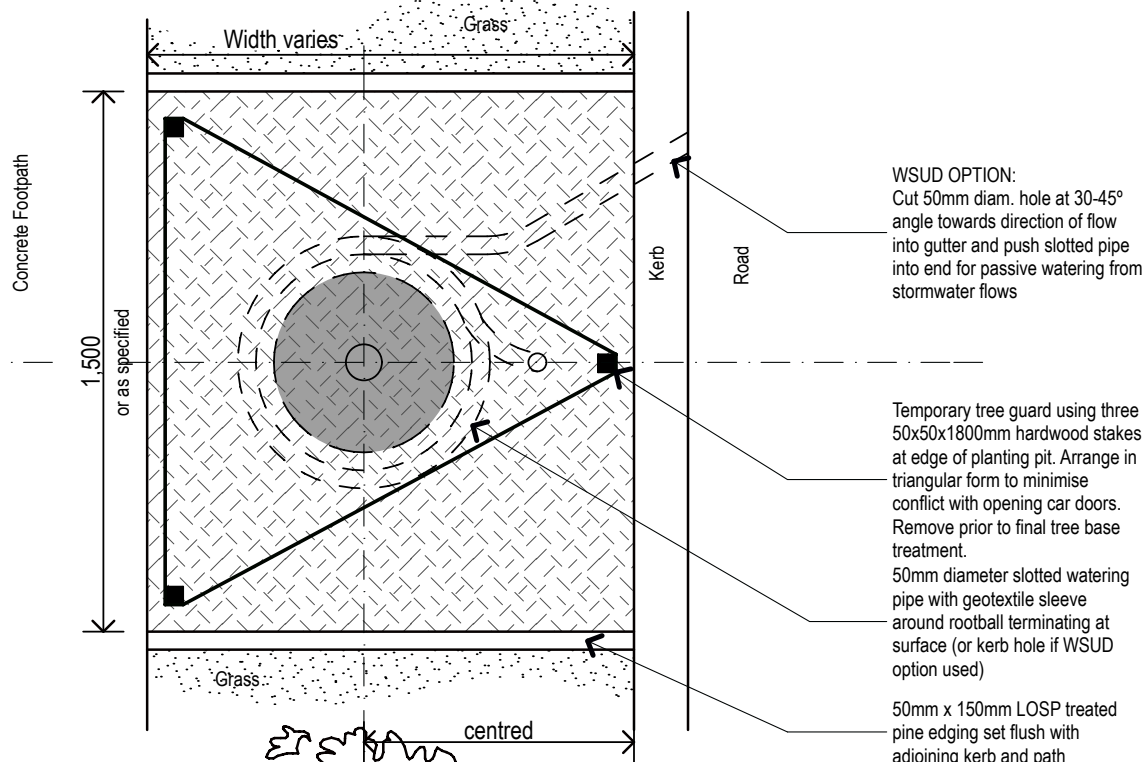
SECTION



TYPE 3 - PLANTING WITH DECOMPOSED GRANITE

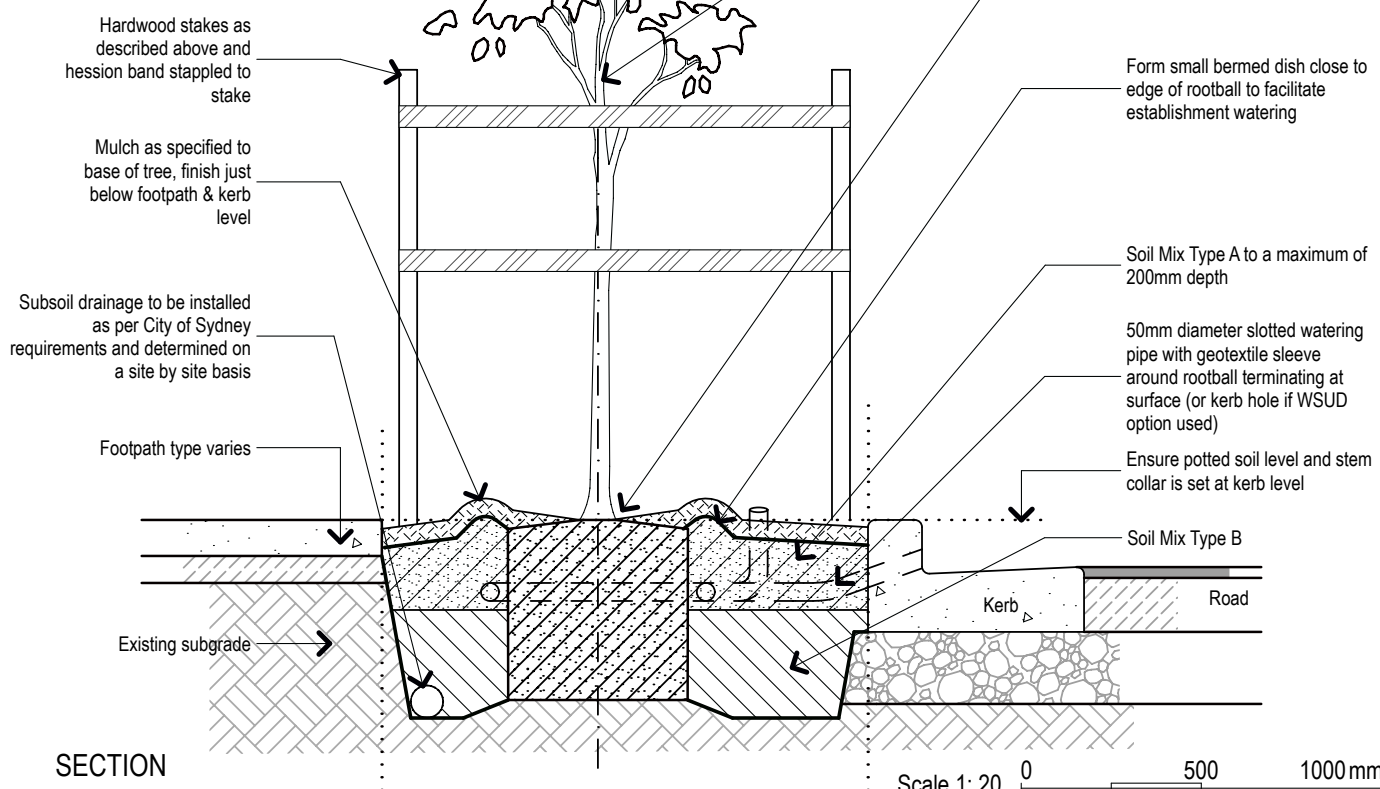
City of Sydney

PLAN



Note- Existing Trees

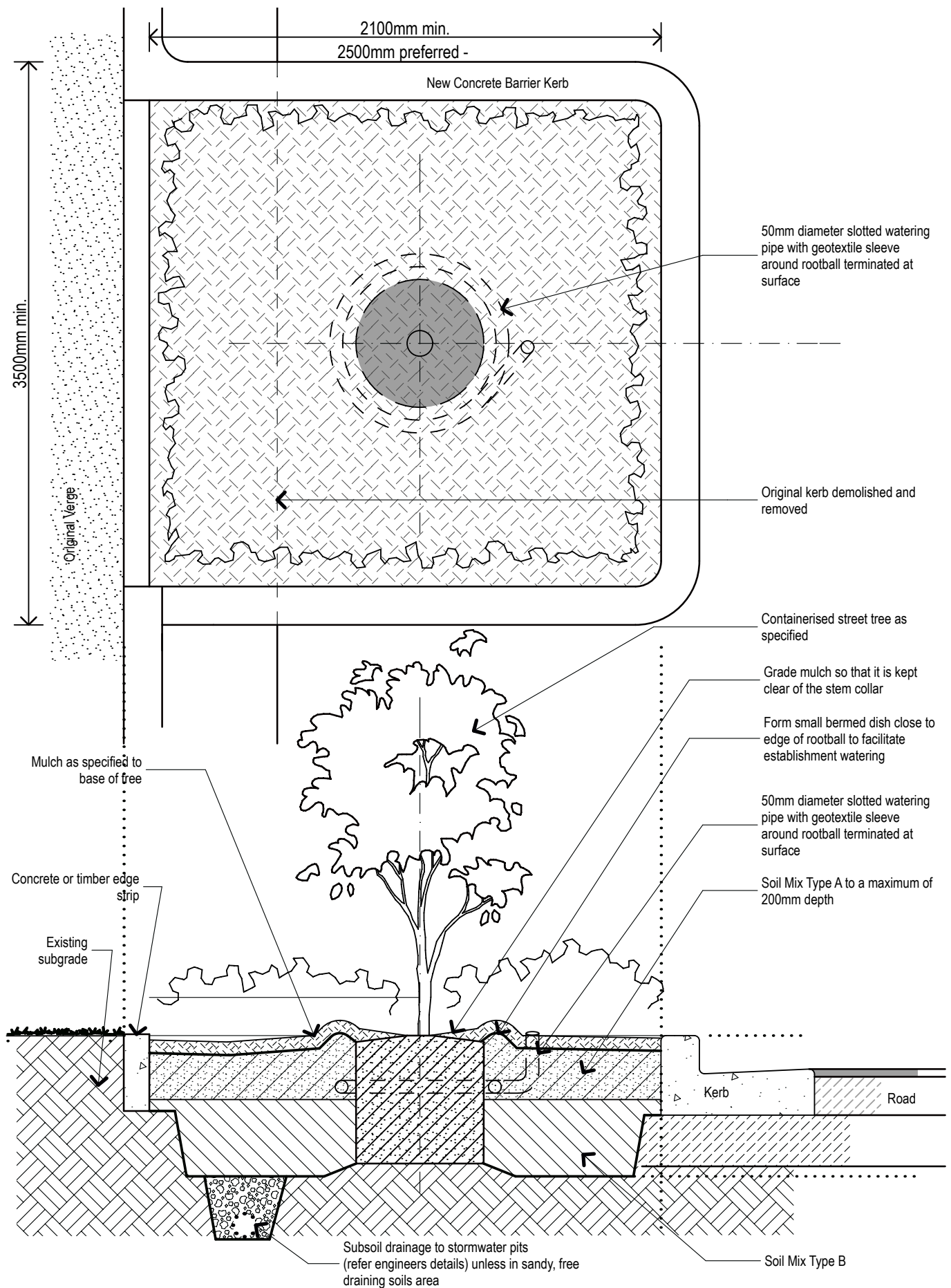
- Size of tree pit may vary depending on depth of surface roots or trunk flare of mature trees.
- Paving construction may be altered to accommodate tree roots at the direction of Council.
- Tree pit surface to be installed level with surrounding paving, leaving surface roots exposed where necessary.



SECTION

TYPE 4 - PLANTING IN GRASS VERGE

City of Sydney

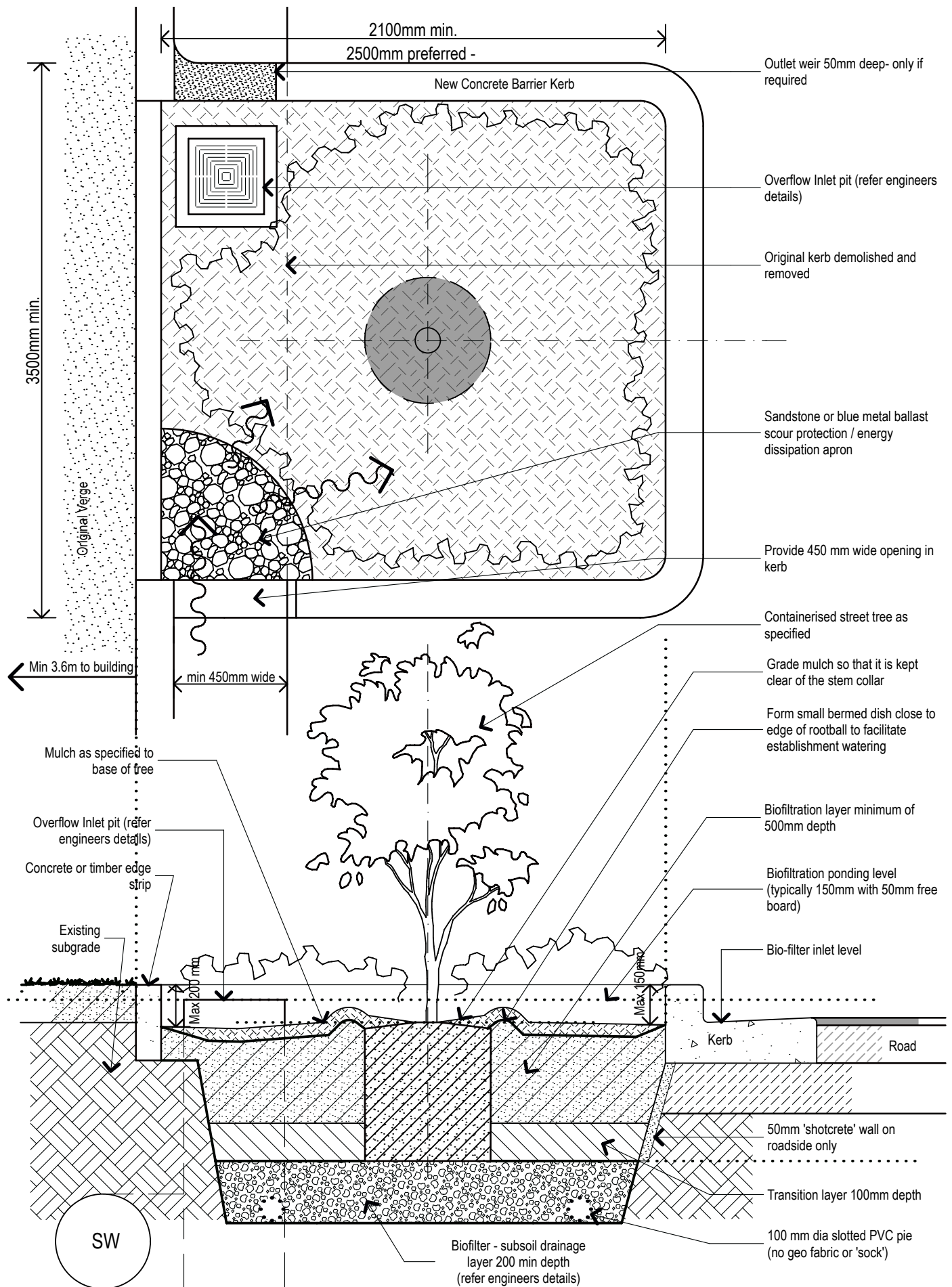


SECTION

Scale 1: 20 0 500 1000 mm

INDICATIVE DETAIL - IN ROAD PLANTING BLISTER

City of Sydney

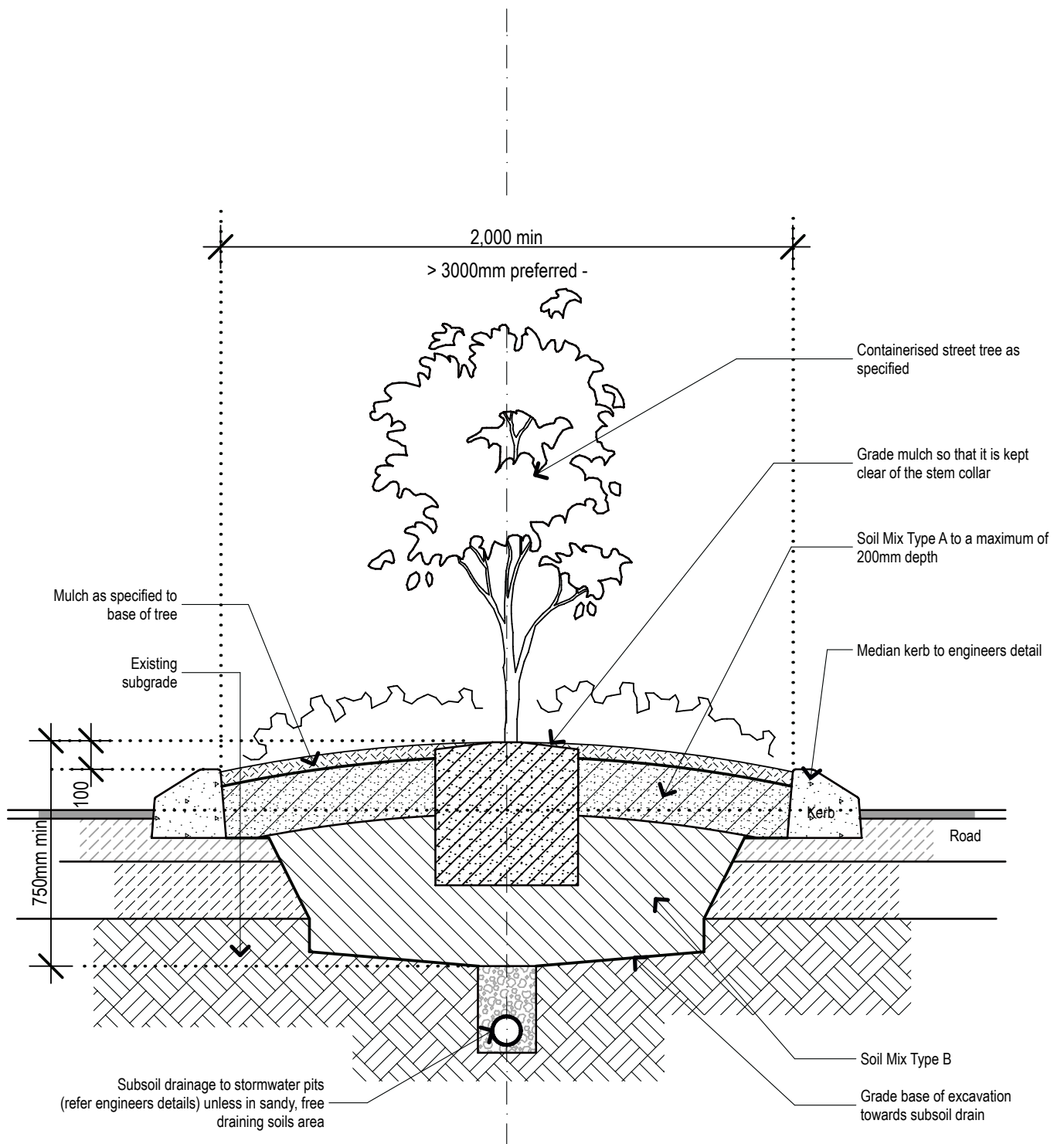


SECTION

Scale 1: 20 0 500 1000 mm

INDICATIVE DETAIL - IN ROAD PLANTING (WSUD)

City of Sydney



SECTION

Scale 1: 20 0 500 1000 mm

INDICATIVE DETAIL - IN ROAD MEDIAN PLANTING

City of Sydney

Part D - Technical Guidelines

8. Existing Street Tree Protection Measures During Construction

8.1 Staff Training and Induction

All staff working on the contract shall be adequately inducted to ensure they are aware of the following tree protection requirements.

8.2 Trunk Protection

Trunk and major limb protection shall be installed to any tree within 5 metres of the work site prior to any delivery of machinery or works commencing, and shall remain in place for the duration of the works. It shall consist of wrapping of each tree trunk and any major branches within the work area with hessian or similar material to limit damage, then space planks (50mm x 100mm or similar), at 100mm intervals, and fixed against the trunk with tie wire, or strapping. The trunk protection shall not be fixed to the tree in any instance, or in any fashion, e.g., no nails or screws are to be used.

8.3 Trenching and Excavation Near Trees

During any trenching or excavation works, the use of mechanical equipment must stop if tree roots greater than 50mm diameter are encountered. Approval must be sought from the Council Street Tree Coordinator (ph 9265 9333) to cut any root greater than 50mm diameter. Excavation shall be done by hand, or other approved non-destructive method, in any area known to, or suspected of having roots larger than 50mm diameter.

8.4 Pruning

The Contractor shall not undertake pruning of any branch of any street tree without permission. If pruning or small branches or limbs are required for machinery access, or any other reason, contact the Council's Street Tree Coordinator.

8.5 Kerb Removal Adjacent To Trees

Existing sections of kerbs adjacent to any street tree shall not be removed without approval from the Street Tree Coordinator. Removal of kerbs adjacent to mature trees can cause trees to become unstable and fail.



Figure 88- Proper tree protection is essential to avoid unnecessary damage to trees during construction activities (Photo: Arterra)



Figure 89- This illustrates the minimum trunk protection measures expected by the Council for street trees adjoining construction sites. (Photo: Arterra)

Part D - Technical Guidelines



Figure 90- Where access is required through an identified tree protection zone the ground surface shall be protected through appropriate boarding and mulch or gravel placed above the existing ground surface to protect the roots and limit soil compaction. (Photo: Arterra)

8.6 Signs - Tree Protection

Temporary signs, or any other items, shall not be fixed or attached to any street tree.

8.7 Stockpiling and Storage of Materials

Fuel or any type of liquid waste shall not be stored or disposed of at the base of any street tree.

8.8 Damage to Trees to be Retained

Any damage sustained to any street trees is to be immediately reported to the Council's Street Tree Contract Coordinator, to determine the appropriate response for maintaining the health and structural integrity of the tree/s.

Should any damage occur to Council's trees and not be rectified by the Contractor to a satisfactory standard, as directed by Council's Street Tree Coordinator, Council will undertake the necessary works, which may include the full replacement of trees, and all associated costs will be recovered. Damage to street trees may also result in a prosecution being sought under Sections 626 and 629 of the Local Government Act for an offence where such damage occurred wilfully or negligently. Significant financial penalties can be imposed for such offences.



Figure 91- Groups of street trees within a grass strip may also require tree protection fencing installed to protect the trees and the ground surface around them. (Photo: Arterra)



Figure 92- Where ground is uneven or the site is subject to strong winds the fencing may be held securely by wiring to strategically placed star pickets driven into the ground. (Photo: Arterra)

Part D - Technical Guidelines



Figure 93- Where tree trunks are low branching and difficult to protect with other methods, water filled barricades and fencing may also be applied. (Photo: Arterra)



Figure 94- Younger trees that are too small to apply trunk protection shall be fenced as above to protect the roots, foliage and trunk during construction periods. (Photo: Arterra)



Figure 95- Hand excavation or other non-destructive methods such as water jetting and vacuum extraction to excavate around tree roots. (Photo: Arterra)



Figure 96- Non-destructive excavation methods can allow services to be installed across verges without the need to sever important and structural tree roots. (Photo: Arterra)