

PART VI

LANDSCAPE SPECIFICATION

LANDSCAPE SPECIFICATION FOR ROAD VERGES EMBANKMENT AND ASSOCIATED OPEN SPACES

SHRUB PLANTING

This section relates to the planting and replacement of all Horticultural Plants, except Trees.

Site Preparation

Where planting is to take place on existing soil, the Contractor shall cultivate to a minimum depth of 300mm, removing all weeds, rubbish and stones greater than 25mm diameter, and all other extraneous material with special attention to the removal of broken glass and similar items hazardous to the public and dispose of at a licensed tip. A pre-planting spray of approved herbicide shall be applied in suitable weather conditions where required by the Roads Authority.

Amelioration

The Contractor, prior to planting any material, shall incorporate and evenly distribute into the soil surface an appropriate shrub fertiliser such as Fisons Tree and Shrub Planting Compost or SAI Enmag, or other approved fertiliser or compost.

Plant Quality

All plants shall be of the species, size and quality as approved by the Roads Authority. Substitution of species shall only be permitted upon submission by the Contractor of evidence that a particular species is not available. Any substitution shall be of similar species and variety to the original and shall be subject to the approval of the Roads Authority.

Plants shall be well formed and healthy with vigorous roots, have several stems originating from, or near, ground level and shall be of reasonable bushiness, well-grown, established and shall have been transplanted or pot-grown in Britain for a minimum period of 12 months prior to uplifting. All shrubs shall comply with British Standard 3936 – 1: 1992.

Where the Contractor supplies the plant material the Roads Authority reserves the right to approve and inspect the material at source. Any material rejected by the Roads Authority will be required to be replaced at the full expense of the Contractor.

The Contractor will be required to provide material, which is acclimatised to the local conditions.

Species groups shall all have securely fixed to them identification labels.

Planting

Planting shall take place during the period October - March. Planting outwith this period shall only be undertaken with the authorisation of the Roads Authority. When this occur only pot-grown material, which has been in the pot for a minimum period of one season shall be accepted.

The Contractor shall ensure that the time between lifting and collection of plant material at the nursery and the planting on site shall be kept to a minimum and whilst lying on site awaiting planting, all plants shall be covered with damp sacking to prevent dehydration of foliage and roots, kept in shade and protected from wind and frost.

Planting shall not be permitted during periods of drought, frost, or cold drying winds or when the ground is waterlogged.

The Contractor shall prepare an adequate hole to accept all plants. In the case of bare root materials, roots shall be inspected prior to placing into the planting hole. Any damaged roots shall be pruned as necessary. The plant shall then be carefully placed in the planting hole, separating and spreading roots as necessary to finish at ground level at the base of stem and back-filling around roots with soil compacting evenly in 100mm consolidated layers leaving no voids.

All containerised plants shall be thoroughly soaked prior to planting. Solid containers shall be removed and mesh or net-type containers shall be cut open on one side if not fabricated of a biodegradable material.

Following planting the Contractor shall ensure that the bed is finally raked over leaving a reasonable level finish with no footprints. The Contractor shall leave the entire site in a tidy state leaving no pots, bags or any other extraneous material.

The contractor shall be required to undertake the watering of all horticultural features being planted or replanted within this section, this being undertaken immediately after planting in, in such a manner that the whole surface of the ground receives adequate water to penetrate to a depth of 75mm and paid for at rates included in the schedule of rates.

Mulch

All Shrub beds shall be treated with pulverised bark mulch following re-planting. The Contractor shall evenly spread a bark mulch to the approval of the Roads Authority over the available area at a minimum settled depth of 75mm.

Establishment maintenance

Maintenance of newly planted areas shall be the responsibility of the contractor for a period of twelve months from the date of practical completion of the landscape works.

During the first growing season following planting, herbicide application shall be restricted to spot treatment only. Any damage resulting from this treatment in the first year shall be held as a responsibility of the Contractor who shall then undertake to replace damaged material with identical species, The following maintenance programme shall be adopted on a frequency of a monthly visit:-

- (1) All areas shall be hoed, or hand-weeded as appropriate and all rubbish, litter and weeds removed from site
- (2) Plants loosened by maintenance operations, vandalism, frost or wind, shall be firmed up.
- (3) Suckers and dead or broken twigs shall be carefully removed back to source with a sharp knife and all pruning works carried out in accordance with the species.
- (4) All areas shall be watered ensuring that the area is saturated to a depth of 75mm, as and when necessary.
- (5) During the first year establishment period of the newly planted material, the Contractor shall inspect all material and undertake to replace all material which has been damaged, diseased, vandalised, or does not meet the specification, with fresh material. This work shall be undertaken at the Contractor's expense prior to the new planting being accepted into the routine maintenance regime.

GRASS SEEDING

This section provides the specification for all operations relating to the edging of Turfed and New Areas.

Seed Quality

The Contractor shall only use grass seed mixture as approved by the Roads Authority who shall only accept proprietary amenity and sports fine turf grass seed mixtures which contain varieties as approved and featuring in the U.K. seeds list.

Seed mixtures as approved by the Supervisory Officer shall have a germination capacity for each constituent of not less than 85% and a purity of not less than 95%.

Soil Quality

The soil is to be approved by the Roads Authority and conforming to British Standard 3882: 1994.

Seeding Preparation and Seeding

The following procedure shall be undertaken on each occasion:-

- (1) All areas shall have removed prior to cultivation all vegetation and extraneous material, where in the case of the need for replacement soil, due to chemical contamination or fungal/viral disease of turf/soil. It may be necessary to excavate and replace the topsoil to a depth of 300mm, with soil as approved by the Roads Authority. The excavated contaminated soil shall be removed from site and disposed of at a licensed tip. (A Pre-seeding application of Glyphosate based herbicide shall be applied, where possible, 6 weeks prior to preparatory work taking place. Herbicide shall be applied in accordance with the terms and conditions in the section entitled Vegetation Control).
- (2) All areas shall be cultivated to a minimum depth of 50mm to produce an acceptable tilth (any stones over 25mm shall be removed).
- (3) Where additional topsoil is needed it shall be deposited and spread in layers not exceeding 100mm. Topsoil shall conform to the above Specification Clause and shall be graded to the true specified levels, all depressions shall be eliminated, any undue compaction must be loosened and graded, all to evenly running falls and levels.
- (4) Topsoil level shall, after consolidation, be 25mm above adjoining kerbs, manhole covers and similar hard surfaces, and a minimum of 150mm below damp proof course of buildings and walls.
- (5) All areas shall be graded at minimum falls of 1 in 60 and a maximum of 1 in 2 to the contours and spot levels.
- (6) Unduly compacted areas shall be well ripped to a depth of 100mm and be loosened prior to levelling, raking and seeding.
- (7) Where necessary, provision shall be made to take surface water from damp patches and ponding areas by means of land drains, e.g. using 100mm diameter 'Wavincoil' type piping, or others as approved by the Roads Authority.
- (8) Prior to sowing the surface shall be reduced to a fine tilth as is necessary to a depth of 25mm by raking or harrowing with a chain harrow. All large stones exceeding 25mm diameter shall be removed from the surface, together with all extraneous material.
- (9) The Contractor, prior to seeding taking place, shall incorporate and work into the top 50mm of topsoil a pre-seeding fertiliser as approved by the Roads Authority. The contractor shall apply the fertiliser in accordance with the specifications detailed in the section entitled Vegetation Control,
- (10) Grass seed shall be applied at a rate of 28gm per square metre.
- (11) When the grass has established and reached a height of 50mm - 70mm it shall be lightly 'topped' with a rotary action mower gradually reducing the height, the Roads Authority may then instruct the Contractor to roll the area with a light roller, not exceeding 45kg per 300mm width.
- (12) During dry weather conditions the contractor shall make arrangements to ensure that the area is adequately watered to a depth of 75mm.
- (13) Any failure whatsoever of seed germination shall be the responsibility of the Contractor, and shall be reinstated, where the Contractor shall bear all costs incurred as a result of this operation
- (14) During early establishment periods it may be necessary to protect the seeded area by means of either post and wire sheep net or chespale fencing. At the end of the establishment period the Contractor shall dismantle and remove from site any protective fencing which was required, and fill in the closed holes with soil to the surface level and reseed.

TURFING

Turf edges and margins should be laid with whole turves of a minimum 1m length

- (11) Immediately following laying the turf, watering shall be undertaken ensuring that the area has adequate water to penetrate to a depth of 75mm. Further watering may be required, to be undertaken dependent upon weather conditions,

Watering is particularly important when turf is laid, and shall be required to be undertaken on a frequency of twice per week until turf is established, especially if dry weather is experienced.

- (12) When turf has established and reached a height of 50mm - 70mm it shall be lightly 'topped' with a rotary action mower gradually reducing the height,
- (13) Any failure whatsoever, including shrinkage, settlement, dying, scorching, of the turf establishment shall be the responsibility of the Contractor, and shall be reinstated.
- (14) During early establishment periods it may be necessary to protect the turfed area by means of either post and sheep net or chespale fencing. At the end of the establishment period the Contractor shall dismantle and remove from site any protective fencing which was required, and fill in the holes with soil to the surface level and seed or turf as specified.

TREE PLANTING

Planting Stock

All Trees are to comply with BS. 3936 'Nursery Stock' Part 1 'Trees & Shrubs' and shall be to the approval of the Roads Authority who may request to inspect and approve the material at the suppliers nursery or prior to delivery, and reserves the right to reject any material which fails to meet his specification before or after delivery or planting

Seedlings and Cuttings

1 + 0	1 year old seedling
1 + 1	1 year old seedling lined out for 1 year
1 + 2	1 year old seedling lined out for 2 years
1 + 1 + 1	1 year old seedling lined out for 1 year lifted and lined out for one further year
0/1	1 year old hardwood cutting
0/2	2 year old hardwood cutting
0/1+1	1 year old hardwood cutting lined out for 1 year
2 x	Twice transplanted tree
3 x	Three times transplanted tree
4 x	Four times transplanted tree
ZRB	Root balled hessian

Forest Transplants/Whips

Transplants and whips will be identified as follows:

Transplants	Height up to 0.8 m	(TP)
Whips	Height 0.8 m - 1.2 m	(W)

Immature Trees & Mature Trees

Immature trees for the purpose of this Contract shall be as identified as follows;

Standard	Girth 8cm -10cm	Height 2.75m - 3.0m Stem Clearance 1.8m
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Selected Standard	Girth 10cm -12cm	Height 3.0m - 3.5m Stem Clearance 1.8m-2.15m
Heavy Standard	Girth 12cm -14cm	Height 3.5m - 4.2m Stem Clearance 1.8m-2.15m
Extra Heavy Standard	Girth 14cm -20cm	Height 4.2m - 6.0m Stem Clearance 1.8m-2.15m

Mature trees are those that have exceeded 5.0 m in height and are greater in girth than 20cm.

The Contractor shall be required to remove any branches which, as a result of new growth and or leaf foliage weight overhangs any part of a road as defined in Section 151 of the Roads (Scotland) Act 1984.

The Contractor should ensure that:-

- (1) The branch or branches are cut back at least 30cms from the edge of the road; and
- (2) Any tree not listed in the Schedule which has grown to the point where they may now become a potential hazard are added to the listed Schedule on an annual basis.
- (3) All tree work that is undertaken shall be carried out to the satisfaction of the Roads Authority and to specification decided by him.
- (4) Planting should be carried out as follows, all trees being supplied by the Contractor, shall be of the species, size and a quality as approved by the Roads Authority

Site Preparation

The Contractor shall remove from site all perennial weeds, large stones, rubbish, litter and other debris, with special attention to the removal of broken glass and similar items hazardous to the public and dispose of at a licensed tip.

A pre-planting spray of an approved herbicide shall be applied in suitable weather conditions where required by the Roads Authority.

The herbicide spot treatment method is to be the normal method used before planting transplants or whips over extended areas such as road embankments or as instructed. Such planting schemes may or may not involve the use of tree-shelters.

The Contractor must ensure that with this method of herbicide application, each individual circle of treated ground is at least 1m in diameter, and since this circle defines the exact tree planting position, the Contractor must also ensure that the numbers and spacing of these circles are consistent with planting requirements as approved by the Roads Authority. Care should be taken to avoid straight lines unless otherwise stated by the Roads Authority

In conditions of high exposure, poor drainage, or where ground compaction has occurred, the Roads Authority may require the Contractor to plough. Where this is the case, the depth of furrow would be a minimum of 250mm. Distances between furrows, and the direction of furrows should be to the approval of the Roads Authority before the start of any given ground preparation/tree planting operation.

Time of Planting

Planting broadleaves should be undertaken between November and March, with preferences being given to the period before Christmas. No planting should be undertaken when the soil is frozen or snow-covered.

Planting of Conifers is to be confined to the period after Christmas, before April - excepting frozen/snow covered ground conditions.

Only in exceptional cases will the Roads Authority accept Planting implemented outwith the biological dormant season, and when this does occur only containerised or root balled trees will be considered. Watering of each tree will be required immediately after planting.

Where bare root material is to be planted towards the end of the biological dormant season, It may be necessary to treat root systems with an approved root dip medium. Manufacturer's instructions for the preparation and use of root dip, are to be followed. Any root dip operation must be undertaken immediately following exposure of roots when removed from the storage medium.

Throughout any pre-planting preparation or any planting operation, the Contractor is to minimise the amount of time bare roots are left exposed to the atmosphere.

Planting Techniques

Pruning at planting is required for any tree, which has broken roots or branches. The cut is to be made close to the point of damage (either on the roots or the branches). When planting standard trees and advanced nursery stock, the Contractor is to seek the advice of, and adhere to the recommendations made by, the Roads Authority with respect to pruning at planting.

All transplants and whips (including those in tree shelters) are to be inspected one year after planting failures must be replaced at the Contractors expense.

Any transplants and whips (including those in tree shelters) suffering from frost-lift are to be re-firmed

Notch Planting

- (1) This is to be used for bare root transplants up to 80cm high. Unless ploughing has been undertaken, the exact planting positions will already be evident as circles of dead vegetation at least 1m in diameter resulting from a spot application of a herbicide spray
- (2) The notch planting technique is as follows:- using a straight-backed planting spade, an L-shaped notch is to be cut deep enough to take the root system. The soil is then to be levered up and a single fertiliser tablet - content and manufacturer to be approved by the Roads Authority - forced by hand deep into the cut. With the soil still levered up the tree roots are to be inserted taking care not to distort them. The spade withdrawn, the tree is then to be eased upwards until the root collar is at ground level - this should coincide with the nursery soil mark on the stem, then firm in with the heel.

Care is required to ensure that the resting position of the fertiliser tablet is at least 12cm from the vertical axis of the tree stem. Fertiliser tablets shall be Sommerford Grohi tablets or similar equal approved.

Planting with Tree-shelters

- (1) Tree-shelters shall be of Tubex or similar, equal approved.
- (2) Tree-shelters are to be 1.2m high, 80mm minimum diameter, and brown in colour. Each tree shelter should have two weather resistant ties for securing to the stake. Stakes are to be 1.5m long, 35cm square, and pointed at one end. Softwoods other than larch or cedar are to be pressure treated with an approved timber preservative. All planting stock to be used in tree-shelters should be between 45cm and 90cm in height.
- (3) Before embarking on a programme of planting using tree-shelters, the Contractor is to establish the direction of the prevailing wind. On level ground it is on the windward side of the tree shelter that the stake is to be situated, while on a slope the stake is to be situated on the uphill side of the tree shelter. On sites with a high degree of shelter from wind, stakes should be positioned on the north side of the tree shelter to avoid shading.
- (4) Either ploughing or a herbicide spot application is to be completed prior to the commencement of any planting using tree-shelters, and any deviation from this approach must first receive authorisation from the Roads Authority. Unless ploughing is involved, exact planting positions will therefore be evident as circles of dead ground vegetation due to the spot herbicide application.

The following procedure for planting with tree-shelters is to be used:-

- (5) First the stake is to be positioned vertically and hammered down so that no less than 108cm and no more than 118cm remains above ground. No portion of the stake is to be left at a height likely to protrude above the top lip of the tree shelter.
- (6) When planting, the Contractor is to ensure that the position of the planting hole in relation to the stake is consistent with the environmental factors (exposure/slope of ground) detailed earlier, and that the vertical axis of the tree's main stem is no less than 4cm and no more than 7cm from the base of the stake. Other requirements, such as the use of fertiliser tables, are detailed under 'Notch Planting'.

Pit Planting

(1) General

- (a) The pit planting method is to be used for all root balled trees, container grown trees, and any bare root tree over 90cm tall. Using a spade a hole is to be excavated large enough to take the full spread of the roots with at least 10cm clearance all round. The required minimum dimensions of the hole will depend on the size of the planting stock involved.
- (b) Broken or damaged branches should be removed back to the main branch or stem, and broken or damaged roots should be pruned back to the point of attachment to a more major root. The final soil level should coincide with the root collar, i.e., the mark of the nursery soil on the stem. For pit planting in the spring when the weather is dry, trees are to be watered generously immediately after planting.
- (c) Where trees of half-standard size and upwards are to be planted on grass, sheets or boards are to be placed around the area of the pit to protect the grass, and any excess subsoil remaining after planting is completed is to be removed to a licensed tip.

(2) Pit Planting of Bare Root Transplants taller than 90cm and Small Bare Root Whips

- (a) The pit planting of this size of material is simpler than for larger trees. Once the hole has been excavated, a fertiliser tablet, Grohi or equal similar approved should be placed so that it will be at least 12cm from the vertical axis of the tree stem. Soil should be backfilled in stages and well heeled-in at each stage, while shaking the tree gently to minimise air pockets.

(3) Pit Planting of Large Bare Root Whips (up to 2.2 metres)

- (a) Once the pit has been excavated, the base is to be broken up using a fork or spade. In some cases the use of stakes, perhaps short stakes, may be necessary.
- (b) Fertiliser tablets should be used and planting compost or peat is to be mixed with the topsoil for backfilling. Topsoil and subsoil are to be kept separate, and the planting compost or peat well mixed with the topsoil in equal proportions. The method of backfilling is as described earlier.

(4) Pit Planting of Bare Root Feathered Trees, Half Standards, and Standard Trees

- (a) Here either peat or planting compost must be used. Topsoil and subsoil are to be kept separate and the peat/planting compost mixed with the topsoil in equal proportions. If soil water content approximates the field capacity level and the sides of the pit appear glazed, they should be scored with a spade to increase permeability.
- (b) The base of the pit should be broken up with a spade or a fork, and a stake placed slightly upwind of the centre of the hole and driven in. Before positioning the tree in the pit, a small amount of the topsoil/compost (or topsoil/peat) mixture should be placed in the centre of the base of the pit and firmed gently by foot, this will assist in

properly spreading the roots. Once the roots are in place, the topsoil/compost (or topsoil/peat) mixture should be backfilled in 15cm layers, heeling-in each layer from the outside of the pit and working in towards the tree, while gently shaking the tree to minimise air pockets and ensure that the soil get right between the roots.

(5) Pit Planting of Containerised Stock

- (a) Plant as for bare root material, but remove the container and tease out the roots, especially if they are grown around the root ball. Ensure all compost of the root ball is moist before planting, except in the case of roottrainer grown stock.

(6) Pit Planting and Underground Guying of Prepared Nursery Stock

- (a) Prepared nursery stock shall have roots enclosed in a root ball to minimise the stress of being moved, and to enable the underground guying technique to be used. These trees should have received some form of root pruning while in the nursery to encourage a compact, fibrous root system.
- (b) The root ball diameter should be at least twelve times the stem diameter one metre above ground level, and the root ball depth should be at least seventy-five percent of its diameter. The root ball should be enclosed in biodegradable sheeting, held in place by 25mm mesh 20 - gauge steel wire netting.
- (c) When planting trees of this size on any grassed area, it is particularly important to adhere to the requirements for grass protection and the removal of excess soil to a licensed tip.
- (e) The pit depth should be the same as the depth of the root ball. The pit diameter should be one and a half times the diameter of the root ball, with vertical sides. The base of the pit should be broken up with a spade or fork to a minimum depth of 12cm. Excavated topsoil (excluding turf if present) should be kept separate from excavated subsoil in the proportions of 20% topsoil and 80% subsoil. The subsoil and any turf should be set aside and later removed to a licensed tip. Special care should also be taken to ensure that the planting pit is not sited close to underground services. A quantity of either peat or planting compost equal to the quantity of topsoil should be thoroughly mixed with it.
- (f) Where soil water content is high the pit should be dug an extra 120mm deep. A 120mm thick layer of gravel should then be placed at the base of the pit to improve drainage, and where the sides of the pit appear glazed these should be scored with a spade.
- (g) Once the root ball is in place, three pointed lengths of angle iron are to be positioned equidistantly around the root ball pointed end downwards, in the gap between the root ball and the pit sides. Each angle iron pin should be 1m long; the width of each face should be 50mm, and the thickness of each face 5mm. The two faces should form a right angle. Two holes of diameter between 8mm and 10mm are required and these should be positioned 7mm from the blunt end of the pin, halfway across each face.
- (h) Using a sledge hammer each pin should be driven into the ground so that there is a 15 degree angle of lean, the lower pointed end of the pin going towards the vertical axis of the tree's stem, and the upper end of the pin away from it. At this stage, the pins are not to be driven home completely - they are to be left with the holes still between 4cm and 8cm above ground level.
- (i) Wire rope, 6mm diameter, is to be threaded through all six holes so that it forms a triangular loop around the top of the root ball, and it should be long enough to give an overlap of at least 20cm. Tightening the loop by hand so that the three sections of wire rope between the pins run over the upper surface of the root ball, two U-bolts, of a size suited to the fastening together of two lengths of 6mm gauge wire rope, are to be positioned 10cm apart over the two overlapping ends, and tightened securely.

- (j) Wooden battens, approximately 3cm x 10cm x 25cm are then to be positioned between the upper surface of the root ball and the wire rope, so that when the pins are driven home the pressure points of the wire rope are not directly against the root ball, and the rope is prevented from cutting into it.
- (k) The battens in place, the angle iron pins can then be driven home. No part of the pins or the wire rope/batten assembly should remain above ground level, but care should be taken not to drive the pins down too far or the wire rope may break. Care is also required to ensure the tree is vertical. It will often be necessary to drive in one pin further than the others to achieve this. Once the tree is firmly secured in a vertical position, all accessible wire mesh on the root ball's upper surface immediately surrounding the trunk should be removed with wire cutters.

Note Normal wire or bolt cutters should not be used to cut wire rope. Wire rope must be cut to length either by burning with a blow-torch, or by cutting with a special wire rope cutting tool.

- (l) The topsoil/peat, or topsoil/compost mixture should then be used to fill in the gap between the root ball sides and the sides of the planting pit. This backfilling should be in stages, each stage being well heeled-in. Finally, a shallow layer of the mixture should be spread and firmed down on top of the root ball so that no part of the wire mesh, guy rope, U-bolts, battens, or angle iron pins remains visible. However, care should be taken to avoid, or at least minimise the amount of mixture above the nursery soil mark on the stem.
- (m) All root ball trees are to be inspected one year after planting and replaced prior to handover for maintenance purposes.

Staking

(1) General

- (a) Tree stakes are to be peeled softwood poles without projections, pointed at the base, and pressure treated to BS 1282 to 8.5 kg/m³ minimum net dry salt retention.
- (b) Tree categories requiring staked support at planting include all bare root feathered trees, half-standards, and standard trees. Special staking techniques may be relevant to large whips or root balled/containerised trees. Generally speaking root balled trees in the Advanced Nursery Stock category (BS 5236) should be planted using the underground guying technique detailed earlier.
- (c) Where the required above ground height of the stake is less than 40cm, the stake should be driven into firm ground at the base of the planting pit to a depth of at least 40cm. Where between 40cm and 80cm of stake is required above ground, and then more than 80cm is required above ground.

(2) Planting with a Single Stake

- (a) When planting a tree to have staked support, the pit planting method is to be used.
- (b) Where the tree is bare root requiring the support of a single stake, the stake is to be placed slightly upwind of the centre of the pit then driven into the ground to the required depth, the tree should then be positioned and backfilling completed as described under 'Pit Planting'. Finally the tree should be fixed to the stake using either a single tie, or two ties, and galvanised flat-head nails.
- (c) The minimum depth to which the stake is to be driven into the ground, and the question of whether a single tie or two ties should be used, are variables dependent on the required above ground height of the stake. The objective is to minimise this above ground stake height, and also to minimise the length of time the tree remains dependent on any form of artificial support, while providing an adequate protection

from the elements until roots are firmly established. To this end, and taking the vandalism factor into account, the following procedures should be adopted.

- (d) When planting bare root half-standards or standard trees, stakes will be required to provide support up to a point just below the lowest branch. Two ties and spacers are needed. The upper tie should be placed around the tree just below the lowest branch and fixed securely to the stake, leaving a gap between the tie and the top of the stake of not more than 25mm. The lower tie should be positioned one fifth of the way up from the ground to the upper tie.

(3) Maintenance of Staked Trees

- (a) All staked trees should be inspected by the Contractor at the end of the first year's growing season and all dead or diseased trees replaced prior to handover. All stakes and ties should be checked and replaced or adjusted as required.
- (b) Bare root half standards and standard trees i.e. all staked trees, are to have the above ground height of staked support reduced three years after planting. After severing the upper tie the stake should be cut not more than 25mm above the lower tie. Protective material should be placed around the bark while the cut is being made, and the lower tie replaced if damaged, weathered, or if increased stem girth is causing excessive pressure.

(4) Stakes on Bare Root Feathered Trees/Large Whips

- (a) When planting bare root standard selected trees, and in certain circumstances large bare root whips, staked support may be required with these sizes of trees, a short stake for a single year may be adequate, or alternatively for feathered trees requiring support further up the stem a double stake may be required

(5) Double Stakes/Angled Stakes

- (a) The requirement for double stakes or angled stakes may be required where the location the trees are in would be an unusual one. However, where the Contractor is intending to plant selected standard trees, containerised trees, or root balled trees below Advanced Nursery Stock size (trees in the Advanced Nursery Stock Category will normally be planted using the underground guying technique). He is required first to inform the Supervisory Officer who will assess the particular planting stock and planting site involved, then specify the particular staking technique to be adopted.
- (b) For a double stake, the two stakes are to be driven firmly into the ground on each side of the tree, far enough away from roots to avoid damaging them. A crossbar is then to be nailed or wired to within 50mm of the tops of the stakes, and should be horizontal. The height of the crossbar would be one third of the height of the tree. When the tree stem is attached to the crossbar with an approved tie and spacer the crown of the tree should not be displaced from its unattached position.
- (c) Where an angled stake is specified, its angle with the tree should be approximately 45 degrees, the stake should be positioned on the leeward side of the tree, and it should be attached to the tree at approximately one third of its height using an approved tie and spacer
- (d) The Roads Authority may require the Contractor to use double or angled stakes for the following reasons:
- (e) Firstly, if the material to be planted has roots containerised or root balled, then staking through the roots is avoided. Secondly, where feathered trees require above ground support above the level of the lowest lateral branches, damage to these lower branches is avoided. Thirdly, on exposed sites, angled stakes may greatly increase root stability; and finally, on hillsides or steep slopes, angled stakes may have a much firmer anchorage on the uphill side of the trees.

- (f) Trees supported by double or angled stakes are to be inspected, and have ties replaced or stakes removed with the same regularity as for all staked trees.
- (6) Above Ground Guy Wire supports
- (a) In exposed situations, and perhaps after a storm, it may be necessary to support trees between 3.0m and 4.5m in height with above ground triple guy wires. This method is not suitable where members of the public may trip over the wire ropes, and it should be noted that staking the guy wires in grass may make cutting of the grass around the tree more awkward.
- (b) Each of the three guys should form a 45-degree angle with the stem and the ground. The guy itself should be seven strands 3mm galvanised steel cable with the loop around the stake and the loop around the tree securely fixed with U-bolts. The loop around the tree should be sheathed in protective rubber hose piping. Each guy should have a compression spring to provide limited flexibility and reduce the strain on the anchor stakes. Each guy should also have a raddisseur for periodic adjustment to remove excess slack or tension. The point of attachment on the tree should be a branch crotch approximately one third up the trunk.
- (c) Trees supported in this way should be inspected and have raddisseurs adjusted each spring, and also after any storm. This form of support is likely to be long-term.
- (d) Stakes should be pointed and pressure treated, measuring 5cm x 5cm x 70cm with a small notch cut 3cm from the end to take the guy. These should be driven into the ground at a 45 degree angle, the lower pointed end towards the vertical axis of the trunk. Only the top 5cm or 6cm of stake with the notch away from the tree should be left above ground. Guy wires should be marked with streamers to alert the public to their presence.

Protection

The Contractor may be required by the Roads Authority to provide any of the following protective measures - normally at the time of planting -

Treeshelters	- See under 'Planting with Treeshelters'
Spiral Guards	- For whips, feathered trees, half standards, and standards.
Split Tubes	- For whips, feathered trees, half standards and standards. Especially vole protection.
Plastic Mesh Guards	- Cut from a roll and secured by a cane through the mesh.
Field Guards/Stockades	- Protection from sheep, horses, cattle.
Mammal Repellent Spray	- To comply with 'The Control of Pesticides Regulations 1986.
Fencing Around	- See section entitled 'Fencing'. Any Plantations fence protecting a newly planted area of trees is to be inspected each autumn for the first three years following planting and all repairs as necessary executed by the Contractor.