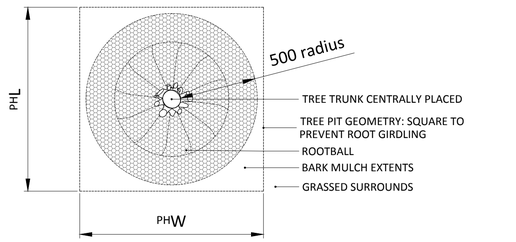
1. GENERAL TREE PLANTING PRINCIPLES

Scale 1:20

TREE SUPPORT SYSTEMS & IRRIGATION MEASURES OMITTED FOR CLARITY

TREE PIT: PLAN VIEW



TREE PIT DIMENSIONS

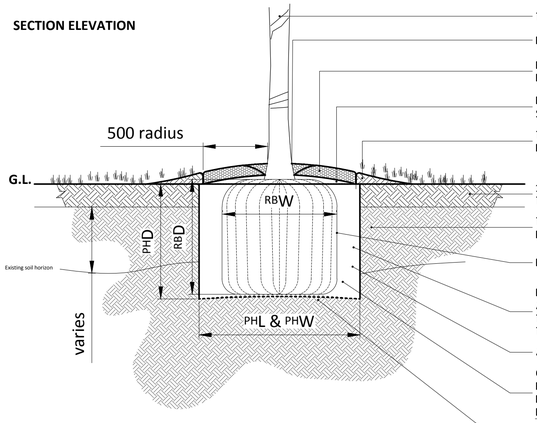
FORM	GIRTH	ROOTBALL DIMENSIONS (^{RB}Ø)	ROOTBALL DIMENSIONS (^{RB}Dp)	PLANTING HOLE DIMS (^{PH}L)	PLANTING HOLE DIMS (^{PH}W)	PLANTING HOLE DIMS (^{PH}D)
LS	6-8	400	300	700	700	300
S	8-10	400	300	700	700	300
SSe	10-12	400	400	700	700	400
H	12-14	500	400	800	800	400
EH	14-16	600	500	900	900	500
	16-18	600	500	900	900	500
	18-20	600	500	900	900	500
SM	20-25	750	750	1050	1050	750
	30-35	1000	1000	1300	1300	1000

based on: **BS 4428: 1989** & **BS 8545: 2014**, together with: **suppliers (James Coles) stated rootball dimensions**

where: ^{RB}Ø = Rootball diameter, ^{RB}Dp = Rootball depth,
&: ^{PH}L = Planting Hole length, ^{PH}W = Planting Hole width, ^{PH}D = Planting Hole depth
&: LS = Light Standard, S = Standard, SSe = Selected Standard, H = Heavy Standard, EH = Extra Heavy Standard, SM = Semi Mature

N.B. Stated tree planting hole dimensions to accomodate the rootball are a minimum. Rootball dimensions can, & do, vary: some variance is to be expected naturally between species, tree stock, suppliers and season. In the event that the rootball exceeds the stated dimensions, the contractor shall seek advice from the Landscape Architect before commencing further. Thereafter, the Landscape Contractor shall excavate the hole (in Open Ground) to the advice given in BS 8545: 2014 with the exception of tree pit dimensions which shall be varied to achieve a minimum dimension of 150mm greater** than the rootball. Tree pit depth shall generally be no greater than the existing rootball or container depth. The Landscape Contractor shall take care not to damage any underground utilities &/or services.
* where root spread is taken to be rootball size.
**Section 10.5.10 of BS 8545:2014 states that, "Tree pits should have a diameter at least 75mm greater than that of the root system." However, this does not allow adequate space for firming in around the rootball by footfall.

SECTION ELEVATION



TREE PLACEMENT: TREE PIT CENTRE

ROOTCOLLAR FLARE: SET JUST PROUD OF G.L.

BARK MULCH: AMENITY, 75mm DEEP, GRADE BACK TO EXPOSE ROOT FLARE

BACKFILL LEVEL: c.30mm ABOVE G.L. TO ALLOW FOR SETTLEMENT & TO PREVENT PONDING

TOPSOIL SAUCER: CREATE FOR WATERING PURPOSES & TO RETAIN MULCH

150mm WELL DRAINED LOAMY TOPSOIL TO BS 3882

TREE PIT SIDES: RIP / FORK THOROUGHLY TO AID ROOT PENETRATION & DRAINAGE.

BURLAP / WIRE CAGE / CONTAINER: REMOVE

BACKFILL MATERIAL: SELECT 'AS DUG' MATERIAL TO MATCH ADJACENT SOIL HORIZONS WHERE SUITABLE FOR TREE GROWTH; TBC ONSITE BY CONTRACTOR. OTHERWISE: MULTI-PURPOSE TOPSOIL TO BS 3882.

AMELIORANTS: TBC ONSITE, THEREIN: AS REQUIRED

CIRCULAR TABLED SURFACE: ADJUST HEIGHT IF REQUIRED TO PREVENT OVERDEEP PLANTING & ALLOW FOR DEVELOPMENT OF EVENLY SPACED LATERAL ROOTS. IDEALLY, TREE PIT BASE SHOULD BE CONCOMITANT WITH ROOTBALL BASE.

TREE PIT BASE / FORMATION LEVEL: DISH TO PREVENT PONDING, RIPPING: NOT REQUIRED

N.B. tree pit dimensions are a function of rootball size. Rootball dimensions are dependant on size of tree specified. Refer to table.

N.B.

- BS 8545: 2014 states that, "*Sensible tree pit design begins with intention of doing as little as possible other than digging a pit, planting the tree, and using the existing soil, separated as subsoil and topsoil, as backfill. Each additional level of complexity added to the basic pit design can be related to the amelioration of a particular constraint*".
- Tree shown planted in open ground in optimal conditions with minimal site constraints.
- Tree support systems are omitted for clarity.
- Tree pit dimensions are a function of rootball size. Rootball dimensions are dependant on size of tree specified. Refer to table.

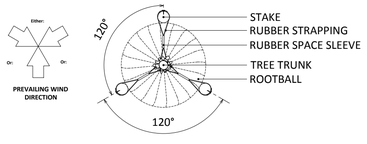
Notes
Information regarding '*Tree Planting in Open Ground, Generally* ' on this sheet is derived from " *BS 8545: 2014 Trees: from nursery to independence in the landscape - recommendations* ".

While every attempt is made to address the most salient points raised [within the BS], this list should not be considered exhaustive as it is presented in summary format only. For further information, the reader is referred back to the relevant British Standard.

2. TREE SUPPORT STRATEGY FOR TREES IN OPEN GROUND: TRIPLE STAKE AND RUBBER STRAP - (Tst)

Scale 1:20

PLAN VIEW



SECTION ELEVATION

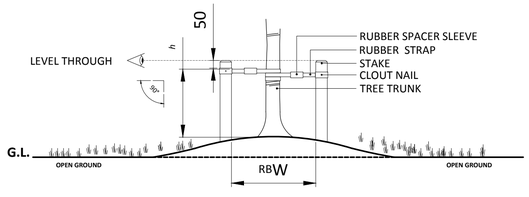


Table 1. TREE SUPPORT HEIGHTS

CLEAR STEM HEIGHT (mm)	SUPPORT HEIGHT (h) (mm)
1500	500
1750	600
2000	650
2500	850
>2500	ASK

N.B.
*According to, " *BS 4043: 1989 Recommendations for transplanting root-balled trees* ", [now withdrawn, but still current] tree support height is calculated as $\frac{1}{3}$ where *h* is the clear stem height. [No alternative to calculating tree support height is given within the latest standard BS 8545: 2014]. For these purposes, tree support height shall therefore be calculated as 6 rounded to the nearest 50mm. There is also little point in staking a 14-16cmg tree supplied with a 1m clear stem at 1m height as this prevents trunk sway. In such instances, the standard stock clear stem height size should be used to calculate clear stem height, subject to local conditions, etc.
**A clear stem height of 1.75-2m, for tree stock in the E.H. & S.M. category has generally been found to be acceptable [and is therefore supplied as such] by nursery suppliers working to the National Plant Specification. For further information regarding as supplied clear stem height, refer to Landscape Planting Plan Schedule.

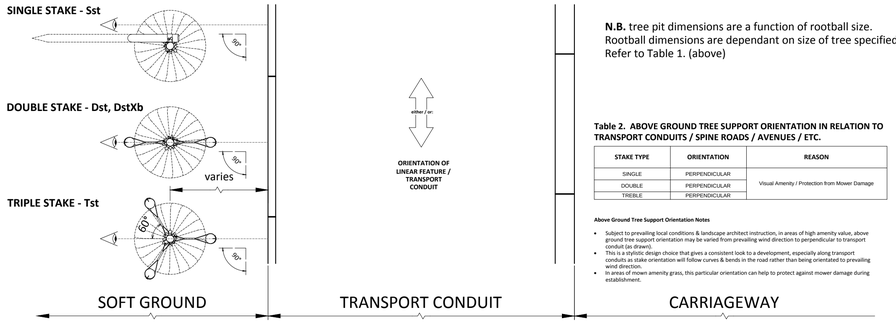
Tree Support Height Notes

- Tree support height* is dependant on the size (cmg), the overall height [of the stock specified], canopy spread, and prevailing conditions, locally.
- Stock size (cmg), together with overall height, and the need for access under the canopy, helps inform the clear stem height*.
- Tree support height needs to strike a balance between allowing the trunk to sway below the support [to promote correct stem taper down to the root flare] & the need to prevent rootball movement [to allow root establishment].
- For this reason, above ground tree support design life should last no more than the establishment phase (c.2yrs) and be removed thereafter.
- For SM trees exceeding 5m tall, possibly in the 30-35cmg+ category, or in the 20-30cmg category but with broad crowned canopies, below ground earth anchoring may be the most suitable tree support system.

3. STAKE TYPE ORIENTATION IN PROXIMITY TO TRANSPORT CONDUITS / AVENUE / SPINE ROAD PLANTING / ETC.

Scale 1:20

PLAN VIEW



N.B. tree pit dimensions are a function of rootball size. Rootball dimensions are dependant on size of tree specified. Refer to Table 1. (above)

Table 2. ABOVE GROUND TREE SUPPORT ORIENTATION IN RELATION TO TRANSPORT CONDUITS / SPINE ROADS / AVENUES / ETC.

STAKE TYPE	ORIENTATION	REASON
SINGLE	PERPENDICULAR	Visual Amenity / Protection from Mower Damage
DOUBLE	PERPENDICULAR	
TREBLE	PERPENDICULAR	

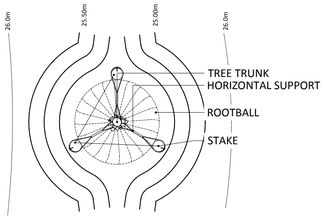
Above Ground Tree Support Orientation Notes

- Subject to prevailing local conditions & landscape architect instruction, in areas of high amenity value, above ground tree support orientation may be varied from prevailing wind direction to perpendicular to transport conduit (as drawn).
- This is a stylistic design choice that gives a consistent look to a development, especially along transport conduits as stake orientation will follow curves & bends in the road rather than being orientated to prevailing wind direction.
- In areas of mown amenity grass, this particular orientation can help to protect against mower damage during establishment.

4. SINGLE / DOUBLE / TRIPLE STAKING / UNDERGROUND GUYING ON SLOPING GROUND WHERE STAKES SET PERPENDICULAR TO CONTOURS

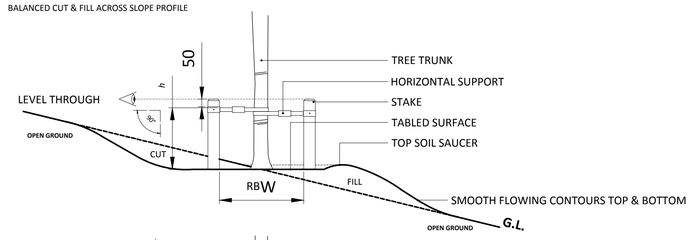
Scale 1:20

PLAN VIEW



SECTION ELEVATION

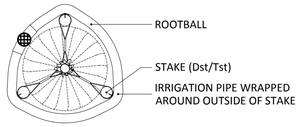
BALANCED CUT & FILL ACROSS SLOPE PROFILE



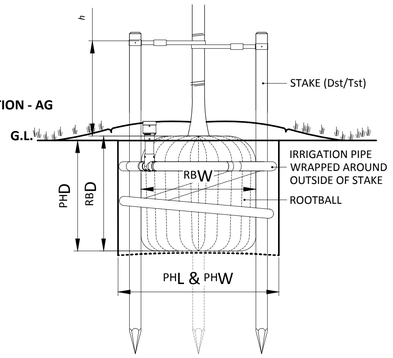
5. PROPOSED TREE IRRIGATION PRINCIPLES: FOR ABOVE GROUND (AG) TREE SUPPORT SYSTEMS

Scale 1:20

PLAN VIEW - AG



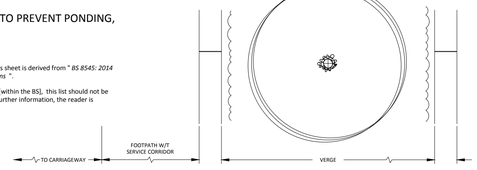
SECTION ELEVATION - AG



6. PROPOSED TREE PLANTING IN CONFINED SPACES &/OR VERGES NOT SUBJECT TO PEDESTRIAN / VEHICULAR OVERRUN BUT WITH POTENTIAL CONFLICTS TO ONE SIDE OR MORE SIDES

Scale 1:20

PLAN VIEW



SECTION ELEVATION

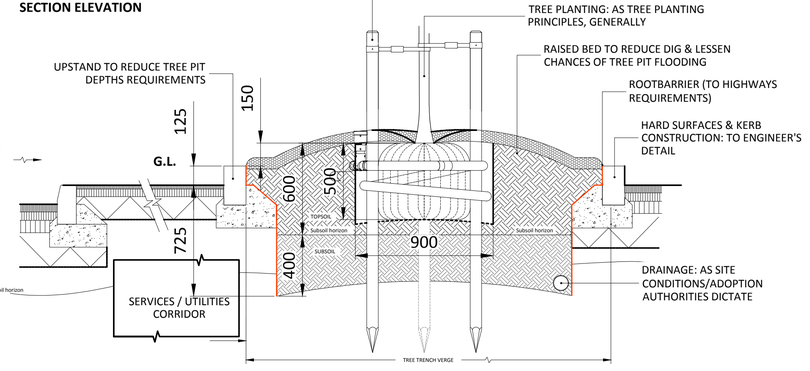


Table 3. A.N.S. TREE SUPPORT USAGE CHART

Tree Support Position	Stake Ø (mm)	Length (m)	LS 6-8	S 8-10	SSe 10-12	H 12-14	EH 14-16	EH 16-18	EH 18-20	SM 20-25	SM 25-30	SM 30-35
ABOVE GROUND	50	1.2										
		1.5										
	60	1.8										
		2.4										
	75	1.8										
		2.4										
	STAKE TYPE	Sst										
		Dst										
		DstXb										
		Tst										
	CROSSBAR	75x38x0.9m										
		100x38x1m										
	TREE TIES	Spacer & buckle										
		Rubber Belting	^{S}/$_{d}$	^{S}/$_{d}$	^{S}/$_{d}$	^{S}/$_{d}$	^{MM}/$_{d}$	^{MM}/$_{d}$	^{HM}/$_{d}$	^{HM}/$_{d}$	^{HM}/$_{d}$	^{SH}/$_{d}$
		Rubber Blocks	S	S	M	M	L	L	L	XL	XL - XXL	
BELOW GROUND	EARTH ANCHORING SYSTEMS	Medium duty										
		Heavy duty										

based on: suppliers information. Various - rubberlok cs1uk, green-tech.co.uk, tube-tom, etc.) Modifications may be required to meet challenging site conditions (anti-social behaviour, wind, etc.) and may therefore be varied at the landscape architects discretion.

where (Form): LS = Light Standard, S = Standard, SSe = Selected Standard, H = Heavy Standard, EH = Extra Heavy Standard, SM = Semi Mature

& stake position (h): h = clear stem height / 3. (i.e. one third of clear stem height, where clear stem height is measured from root flare to closest branch). e.g. Clear stem = 200cm, Stake tying off position = 65cm (200/3 = 66.67cm rounded down to the nearest 5cm)

& Stake (Type): Sst = Single stake, Dst = Double stake, DstXb = Double stake with Crossbar, Tst = Triple stake. All to be peeled, smooth, round, softwood poles pointed at one end. To last no more than establishment (c.2 yrs).

& (Spacer & Buckle): =25mm (nom) x length required to secure

& (Belting): ^{S}d = Light duty (14-25mm x 2mm x length, standard reinforced rubber belting)
^{MM}d = Medium duty (25-35mm x 2mm x length, standard reinforced rubber belting)
^{HM}d = Heavy duty (35-38mm x 3mm x length, reinforced heavy duty rubber belting)
^{SH}d = Super Heavy duty (50mm+ x 3mm x length, reinforced heavy duty rubber belting)

& (Rubber Blocks & Spacers): S = Small (50 x 35mm, Slotted Double Round Block or spacer collar for use w/t 14-25mm belting
M = Medium (65 x 50mm, standard), Slotted Double Round Block for use w/t 25-35mm belting
L = Large (37mm Unslotted / slotted Flat Back Block 65mm x 50mm for use w/t 35-50mm belting)
XL = Extra Large (85mm Unslotted Flat Back Block 65 x 50mm for use w/t 35-50mm belting)
XXL = Extra Extra Large (150mm Unslotted Flat Back Block 150 x 90mm for use w/t 35-50mm belting

& (Earth Anchoring Systems) to include all rig^d straps, cables, cable tensioning device & deadman anchors (in made ground as required).

GENERAL TREE PIT PLANTING NOTES:

1. **SPECIFIED MATERIALS:** all to be installed in accordance with the manufacturer's recommendations and/or instruction.
2. **PLANTING GENERALLY:** Correct planting depth is critical for transplanting success, with over-deep planting identified as a common cause of failure. The Contractor shall therefore ensure that the natural root flare of the tree is clearly visible at proposed finished soiling surface. To ensure that correct final planting position / depth is achieved, the Contractor shall therefore take care to remove all:
   - soil placed above natural root flare during nursery packaging & production - rootballing, containerization, etc.
   - adventitious roots above the root flare,
   - wire encircling the main stem,
   - wire cage & burlap where possible. Otherwise, peel back and remove once the tree is in the planting pit.
3. **BACKFILL MATERIAL:** *Open ground*: select 'as dug' material to be reused taking care to match adjacent soil horizons (where suitability assured for tree growth); TBC onsite by Contractor. All 'as dug' material to conform to BS 3882:2007 General Purpose Topsoil). Remove all deleterious material arising (weeds, broken brick & large stones, etc). *Hard Paved Surfacing*: Use good quality topsoil to BS 3882: 2007 within primary rooting zone (rootcells) to manufacturers instruction. Compact to manufacturer's recommendations. Use Structural Tree Soils (Arborsoil, or equal and approved) in secondary rooting zone. Backfill loose & dry (as approx. 20% is lost by volume upon compaction) into the tree pit. Lift in layers no greater than 300mm deep, and compact to between 1.5 - 2.0 mega pascals making sure the material is dry as proper compaction cannot be achieved when wet, paying special attention to the edges of the tree pit. A calibrated Penetograph can be used by a specialist approved by the Structural Tree Soil supplier, and employed by the Contractor who installed the Structural Tree Soil, to assess and confirm the level of compaction. The corresponding graph should be supplied to both the Project Structural Engineer, the Landscape Contractor & the Contract Administrator for information, before tree planting commences.
4. **BACKFILL SOIL AMELIORANTS:** the Contractor shall satisy himself of the general suitability of the top soil supplied for long term tree growth. Reason: to ensure the long term longevity of the tree supplied. Thereafter: TBC onsite.
5. **ARISINGS:** all deleterious material arising, shall be removed offsite to a licensed tip by the Contractor.
6. **TREE SUPPORT SYSTEMS:** Unless otherwise stated, all trees in open ground &/or verges will be supported using the triple stake & strap method as identified by Detail 2 opposite.
   - Stake support (Dst, DstXb, Tst) to be placed post installation of the tree into the planting hole after first confirming that the root collar is at the correct line, level and grade. Posts are to fit snuggly against the rootball sides to better secure the tree and prevent 'rootball rock'. Posts to be set plumb and level across the top at the correct height above ground.
   - Irrigation pipes to fit around the outside of stakes.
7. **ROOT PROTECTION MEASURES:** supply & install permeable rootbarriers (Terram RootGuard, or equal & approved) to a min. depth of 600mm below ground. Installation: as per manufacturer's instruction. Finished level: top of barrier to be 10mm above G.L. Zone of Deployment: protection of hard surfacing / services lying within a min. 5m radius of the proposed tree.
8. **IRRIGATION:** Supply & fit: *Open ground*: 60mm Ø flexible polypropylene perforated drainage pipe. Wrap twice around the rootball. Proposed supplier: Greenleaf Rootrain Urban, RRURB3A (or Equal & Approved). *Hard paved surfacing*: Greenleaf Rootrain Precinct, RRPRECSC; Arborvent Double Inlet, RRARBVDISC, (or Equal & Approved).
9. **DRAINAGE:** the contractor shall satisy himself that the tree pit is adequately drained, making adequate provision to do so where so required, and as site conditions dictate (i.e. supply & fit 100mm Ø, flexible, perforated polypropylene drainage pipe. Reason: to ensure the longevity & viability of the tree supplied. TBC onsite.

Notes

Issue: Drawn by David Jarvis Associates Limited (CROWN COPYRIGHT. ALL RIGHTS RESERVED 2011 LICENCE NUMBER 0100031). This drawing is for information purposes only - Do not use this drawing for Construction.

Drawing Information: Information on this drawing is provided in the context of .dwg information provided by: Hunters Architects (Site G.A. plan) & WSP Engineers (Car park G.A).

Scaling: Do not scale this drawing. Use given dimensions only.

Construction Design Information: to Engineer's design, detail & specification.

Setting out: refer to Engineers for information regarding setting out. In the event of discrepancy, refer to the appointed Engineer in the first instance.

Construction Information: all detailed design (including, but not necessarily limited to), bond patterns, kerbing, edging, tactile crossing demarkation, construction build-up, levels, drainage etc., to be provided by an appropriately qualified structural/highways engineer to be appointed by the client for presentation to [and subsequent discharge from] the relevant supervising authority and/or body.

Planting: Plant species are selected and located in line with consideration of the site conditions, NHBC guidelines and discussions with the Local Authority and design team. All plants and planting procedure to conform to the David Jarvis Associates Limited Landscape Specification that will accompany the Construction issue drawings. No species or plant location is to be varied without prior consent of the Landscape Architect.

Foundations: Developers / Contractors to ensure that all foundations (buildings and external walling) are designed and constructed so as to take into account, at the time of maturity, any existing or proposed trees, hedgerows or other vegetation on the application site or existing vegetation on land adjoining the site at the time of construction and any trees felled or hedgerows removed on or adjacent to the site during the previous 15 years. For this purpose the developer / contractors will submit all relevant details to the authority dealing with the Building Regulations Certificate.

Drawing Revision

Rev	Date	Description
A	12/11/2015	Client name change.
-	02/10/2015	First Issue.

Drawing Status

PLANNING

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Project

KINGSMERE, PHASE 1 LOCAL CENTRE

Drawing Title

TREE PLANTING IN SOFT GROUND & VERGES, GENERALLY

Scale	Sheet Size	Date
1:20	A1	OCT 2015

Drawing No. **2226/LC/D006** Revision **A**

0 400mm 1000mm 2000mm