



Soil volumes for tree pits designed with structural soils

People have been building tree pits for over a century and deciding how big to build them has always been a trade-off between how much space the tree needs and how much can be afforded in the design. Sadly, the trees often lose out in the deal. The most limiting factor in the growth of urban trees is the lack of usable soil for root growth, and inadequate underground rooting space is one of the main contributors to the premature mortality of urban trees. Small and short-lived trees do not provide significant green infrastructure benefits, and nor do they contribute to long-term increases in canopy cover. Therefore, when designing urban spaces we need to make sure that the species that we wish to plant is provided with enough soil to be healthy and reach a degree of maturity that will deliver benefits to the local community. The minimum volume of structural soil recommended for trees of different sizes is provided in Table 1.

Table 1: Minimum requirements for tree pit specifications when using structural soils

	Mature Size of Tree*†				
	Very Small (<5m)	Small (5-10m)	Medium (10-15m)	Large (15-25m)	Massive (>25m)
Recommended minimum volume of stone-based structural soil	8m³ (6m ³ if shared)	15m³ (12m ³ if shared)	26m³ (20m ³ if shared)	36m³ (28m ³ if shared)	45m³ (35m ³ if shared)
Recommended number of air/water inlets	1 (0.5 if shared)	1 (0.5 if shared)	1	2 (1.5 if shared)	2

There is a direct relationship between the volume of below ground growing space and how a tree is likely to develop, the greater the soil volume:

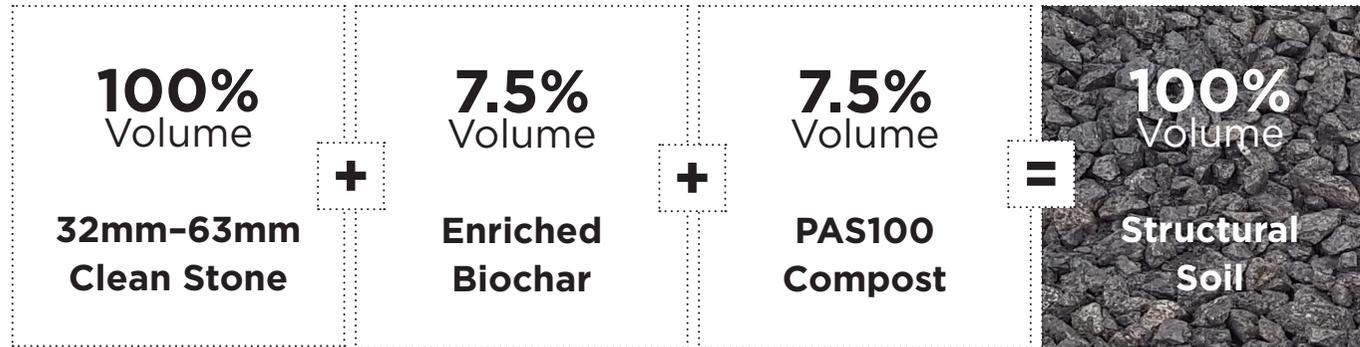
- + *the faster the tree will grow*
- + *the bigger it will become*
- + *the healthier it will be*
- + *the better it will look*
- + *the longer it can be expected to live*

TABLE NOTES

*Mature tree sizes are listed in *Tree Species Selection for Green Infrastructure - a guide for specifiers* [tdag_treespeciesguidev1.3.pdf](https://www.stockholmtreepits.co.uk/files/tdag_treespeciesguidev1.3.pdf)

†Fastigate trees will require less rooting space than trees with wide canopy shapes. As a rule of thumb, one should assume that a tree with a narrow and columnar crown form would require half as much soil volume as a tree of the same height that has a wide crown.

Structural Soil Recipe



The three elements of the mix can be mixed on site with an excavator immediately before being installed in the tree pit. The components should be mixed until they are fully blended. If the material is dry it is advised that a little water is added to the mix to ensure that the stones become coated with the biochar and compost.

The biochar and the compost fit into the void spaces between the stones and so they add nothing to the overall volume of the mix; so, for example 20m³ of structural soil would require 20m³ of clean stone and 3m³ of the biochar/compost mix. An easy-to-use spreadsheet to calculate the components required can be downloaded from the Stockholm Tree Pits website.

Stockholm Tree Pits can supply **Carbon Gold Tree Soil Improver biochar** in bulk and at a discounted rate. This is enriched biochar that improves soil structure and is proven to boost the health and vitality of trees.

The load bearing element of the structural soil needs to be a hard angular stone such as crushed granite, basalt or recycled concrete that has been screened to remove fines, for most installations this will be 32/63 clean stone. Crushed limestone can be used in the structural soil mix but it influences the soil pH and so only alkaline tolerant species should be planted in this scenario. The clean stone can be purchased from aggregate suppliers and the PAS100 compost is readily available and can be purchased from most wholesale suppliers of landscaping material.

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MATERIALS CALCULATOR

Download the spreadsheet from the Stockholm Tree Pits website to calculate the materials that you require for your project.

[stp-materials-calculator.xlsx](#)

Further guidance on the use of structural soils to grow urban trees can be found at

www.stockholmtreepits.co.uk

HERE TO HELP

We offer an expert consultancy service call us now on **07872 609 633**.

Alternatively you can email

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