

White paper

# Giving existing trees room to grow in the urban environment

The innovative tree bunker system TreeParker as a solution for healthy, mature urban trees

















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Traditional tree pits compared to the TreeParker system



### The importance of mature urban trees and the challenges of a good tree pit

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#### 1 | The importance of mature urban trees and the challenges of a good tree pit



In the past decades, the pressure on urban square metres has increased more and more. Every metre in the urban environment is intensively used by above- and underground infrastructure, traffic and events. Creating a smart balance between green, grey and blue is a growing challenge and is becoming increasingly important.

#### **Remove existing trees?**

The conditions in the urban environment are far from optimal for a tree to grow old healthily. Several factors such as limited space, poor water infiltration, pollution, limited availability of nutrients and soil compaction reduce the growth and lifespan of the tree. As existing trees keep growing, they eventually run into all kinds of hurdles and obstacles that inhibit growth. Then the choice arises: will the tree be removed, will a new one be installed, or will an attempt be made to preserve the existing tree? Too often, existing trees are still removed, while this is not always necessary.

#### Soil compaction & underground infrastructure

Particularly soil compaction and underground infrastructure are problematic for urban trees, as these are the main causes of roots being unable to anchor themselves properly in the soil and limiting the supply of water, air and nutrients to the roots. This causes a weakened tree and increases the likelihood of failure or blowing over in storms or strong winds. In the end, a valuable investment is lost because a large, mature tree yields significantly more climate benefits than new plantings.

#### **EXPECTATION VS. REALITY**





#### 1 | The importance of mature urban trees and the challenges of a good tree pit



#### Mature trees vs young trees

Large, mature trees are indispensable in the battle against climate change. Mature trees absorb more CO2 than a young tree. This is because their photosynthetic activity is more intense due to their larger leaf area. Moreover, mature trees store more CO2 in the trunk and soil as they grow bigger and older. This helps reduce the greenhouse effect; one of the main factors contributing to climate change. In addition, mature trees provide more shade and create a natural habitat for flora and fauna. In this way, mature trees reduce the urban heat island effect and stimulate urban biodiversity.

#### Did you know...

...6 trees with a trunk diameter of 60 cm provide just as many green services as 143 small trees of trunk diameter 11 cm?\*

...in more than 400 tree species from around the world has been found that CO2 uptake in older trees is much higher than in young trees? So large, old trees do not simply act as carbon sinks, but actively sequester large amounts of carbon compared to smaller trees.\*\*

\*According to research from <u>iTree</u> \*\*According to research from <u>Nature</u>

#### 1 | The importance of mature urban trees and the challenges of a good tree pit



#### **Rooting space needed**

Actually, it all works very simply: the bigger the tree, the more rootable space it needs. The reverse is also true: the more rootable space the tree has, the bigger it can get. The tree crown volume is always proportional to the rootable volume (see Figure 1).

#### **Crucial factor for existing urban trees**

If there is one crucial factor in the development and health of both new and existing urban trees, it is the rootable space they have at their disposal. Roots simply need space to grow, so that the tree can stabilise and draw nutrients from the soil. If this growth is inhibited by a lack of rootable space, the tree will weaken faster, be more susceptible to diseases and pests and eventually die. Especially in the case of existing urban trees, which provide many climate benefits, contribute to the aesthetic character of a place and provide social cohesion, this is a real waste. That is why it is essential to make existing trees future-proof by giving them the right tree pit design.

#### **TREE CROWN VOLUME PRINCIPLES**

Figure 1



NORMINSTITUUT BOMEN



# The TreeParker system to create additional room to grow for existing urban trees

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## 2 | The TreeParker system to create additional room to grow for existing urban trees



To create green, climate-adaptive cities, it is important to ensure that existing urban trees have the opportunity to age healthily. If larger, existing trees fail early every time, the climate benefits that a mature tree provides are lost. The counter then starts back at 0, as another new tree has to be planted. It takes decades until a young tree equals the climate benefits of a large, mature tree.

#### Creating rootable space for existing urban trees

As existing urban trees grow larger and larger, they increasingly suffer from a lack of space. They get into conflict with underground utilities, above-ground

infrastructure and pavement. That while a harmonious balance between trees and urban infrastructure can easily be created with innovative techniques.



## 2 | The TreeParker system to create additional room to grow for existing urban trees



#### TreeParker for existing urban trees

The TreeParker tree bunker system is an innovative technique for creating an optimal rootable space for both new and existing urban trees. The TreeParker system consists of units that are attached to each other. One TreeParker unit consists of a deck, four posts and two frames. Because there is plenty of space between the posts, the TreeParker system can easily be filled with the right tree substrate for the respective tree species. As the system is applied under the pavement and strong enough to carry the heaviest traffic loads, the tree no longer suffers from soil compaction.



## 2 | The TreeParker system to create additional room to grow for existing urban trees



#### Water, air and stability for the tree

The TreeParker system not only consists of units, but also features aeration tubes, root ball anchoring\* and root guiding panels. The aeration tubes are there to provide the tree with sufficient aeration. The root ball anchoring ensures that the tree root ball is stably anchored using solid ties attached to concrete mesh or via ground anchors in the ground. The root guiding panels have the function to guide the tree roots perpendicularly downwards, allowing them to continue growing horizontally under the panel. This prevents the tree from causing root pressure in the pavement. In addition, the system is often connected to a storm drain so the tree can better absorb water and is less likely to suffer from drought.









The traditional way of planting trees - dig a hole and plant a tree - is history in the urban environment. Urban trees simply encounter too many hurdles and obstacles to grow old healthily. To still get the necessary rootable space to thrive among urban infrastructure, the TreeParker system is deployed. Both for new plantings and for existing trees. The following highlights some interesting case studies where TreeParker has been implemented to create optimal rootable space for existing urban trees.



**Eiffel Tower | Paris** 



#### View this project



With nearly seven million visitors a year, the Eiffel Tower is one of the most visited attractions in the world. The trees suffered a lot from the increasing number of visitors and Parisians. Because of the annually rising gravel layer, the ground became so compact that tree growth came to a halt. The need to fence off the site for security reasons and relocate access locations presented an opportunity to improve the tree pits of these trees. TreeBuilders, together with Vogt Landscape Architects, designed the two avenues along the Eiffel Tower to give existing trees a boost. That is why the TreeParker® system was chosen: it gives the existing trees around this breathtaking world heritage site extra growth capacity. Two years after the application of TreeParker®, the trees along the Eiffel Tower are in full bloom!



#### **Coolsingel | Rotterdam**

#### View this project



Coolsingel is one of Rotterdam's best-known and most important streets. The appearance and allure that the nineteenth-century promenade once had was gone. And Rotterdam wanted that back. By taking advantage of the existing green space and combining it with a new high-quality public design, Coolsingel had to offer visitors a warm welcome. At any time of day and in all seasons. The project involved existing trees. A lot had to be 'opened up', which provided the perfect opportunity to add a considerable amount of rootable volume. So the choice was more or less determined by the constraint: now is the time to work, so now is the time to do something about the tree's living conditions. Thanks to the modular TreeParker system, everything could be integrated into the work. Now Coolsingel is a true green oasis in the midst of the bustling city life.



#### Heeswijk Castle | Heeswijk-Dinther





The Weeping Ash tree at Heeswijk Castle has been standing directly in front of the 11th-century moated castle for nearly 130 years. This tree has had tough years because of work near the tree, soil compaction and debris embankment due to castle renovations. The TreeParker system offered a solution here.

A technical study of the tree and its location showed that, although suffering from ash tree mortality, it is still reasonably vigorous and worth preserving. With the TreeParker tree bunker system, the tree pit could be increased by the necessary volume, without any visible above-ground modifications. The aesthetic character of the square remained intact and the tree received the rootable space it deserves. TreeParker provided an uncompacted growth location and pavement was placed on top of the bunkers. After TreeParker was installed, the Weeping Ash tree is doing very well and has become more vital and stronger in its leaves.



#### City Square, Apeldoorn





The existing trees on City Square in Apeldoorn were growing reasonably well, but not well enough to be future-proof. As these trees determine the atmosphere and appearance of the square and provide many climate benefits, such as cooling, air purification and CO2 absorption, the decision was made to preserve the trees. With a vision on the future, it was important to offer these trees new extra rootable volume.

With existing trees, there is always the

question what the underground situation is between roots and utilities and what exactly is present in the soil. By applying the modular TreeParker system, much more customisation was possible to create a suitable underground construction. In the coming years, the trees can find more nutrition and water and grow old healthily among all the grey infrastructure. The TreeParker system has ensured that the trees have a future-proof growing site.



#### Village Square | Massemen





On the village square of the Flemish village Massemen (municipality of Wetteren), stands an ancient linden tree, also known as the 'village linden'. The age of the tree is estimated to be 450 years. In 2016, this unique tree was crowned as 'Tree of the Year'. An ancient tree is unique and irreplaceable and has since then been given extra care and attention. The tree not only contributes to the aesthetic value of the square, but also enhances social cohesion and offers significantly more climate benefits compared to young trees. During the underground investigation, it was discovered that the tree pit and root system were limiting factors for the health of the veteran linden tree. The tree had barely 40 m<sup>3</sup> of strongly compacted, poor, and nutrient-deficient soil available, while it required at least 100 m<sup>3</sup> of rootable space. The TreeParker system was implemented to provide this historic tree with the necessary rootable space. In this way, the beautiful linden tree has been made future-proof and will continue to endure for generations.



## The role of the TreeParker system in the future of healthy, mature urban trees

The TreeParker system plays a essential role in the future of healthy, mature urban trees. It replaces the traditional, ineffective method of planting urban trees for a modern, effective planting technique.

#### Problems the TreeParker system solves:



Soil compaction



- No room to grow
- Root suffocation



Dehydration



Instability



Root pressure



Soil incompatibility

\*This applies when the TreeParker system is connected to a storm drain, so that the system can infiltrate (rain) water and the tree will be able to absorb the water more easily.

#### TreeParker...

...gives trees room to grow.

- ...is applicable for both new and existing trees.
- ...provides oxygen through aeration tubes.
- ...provides water supply through infiltration possibilities.
- ...provides stability through root ball anchoring.
- ...prevents root nuisance by implementing root guide panels.
- ...provides infiltration possibilities for the right soil composition.



# Giving existing trees in your city or public space the chance to grow old healthily?



www.treebuilders.eu