ROOTBOX

NEW

SYSTEM FOR MANAGING TREE ROOT SYSTEMS IN URBAN AREAS

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ADVANTAGES

Trees make cities more welcoming by reducing the heat island effect by several degrees. Urban trees require soft, well oxygenated and sufficiently irrigated soil to thrive. However, these requirements clash with the need for the root system not to interfere with underground infrastructure, and not to emerge from the ground and damage the pavement and road surfaces. On the other hand, the paving needs a strong and compact subgrade for stability.
The solution is Rootbox, an underground structure that protects both tree roots and urban infrastructure.

BEARS TRAFFIC LOADS

Soil compaction due to road loads is the main hindrance to the growth of urban trees and the primary cause of root surfacing.
Rootbox is designed to withstand SLW60/HS25 load class.
Rootbox's excellent mechanical performance adds flexibility to the design, allowing the installation depth to be increased, or brought closer to the surface.

IMPROVES ROOT GROWTH

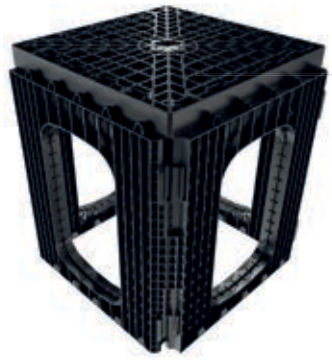
Rootbox provides tree roots have access to uncompacted soil, rich in oxygen and with an adequate water supply. The root system consequently will not need to grow upwards.
This eliminates all damage caused to roads and pavements by emerging roots, greatly reducing maintenance costs as well as the risk of accidental fall to pedestrians and cyclists.

FLEXIBLE AND MODULAR

Rootbox is composed of modular blocks that give great flexibility when designing the system in both vertically and horizontally.
The great mechanical strength of Rootbox means that independent zones can be created, consisting of even a single block: therefore, irregular geometries can be designed.
Openings in the side grids allow the passage of pipes and installations up to a diameter of 250 mm (10").

THE SOLUTION

Trees growing in cities most often need better growing condition in order to develop properly. In fact, the soil around the plant becomes compacted over time due to multiple factors including vehicle and pedestrian traffic. In the course of time, the compacted soil becomes poorly permeable and the lack of oxygen and water stress the tree.
The root system will then seek more favorable conditions in the surface layers of the soil, sometimes surfacing, damaging roads and sidewalks, as well as creating obstacles and fall hazards for pedestrians and cyclists.
Rootbox is the perfect solution to ensure the perfect environment for growth of the roots of trees and shrubs. preventing deformation and failure of pavements near trees.



TREE-LINED

AVENUES

PLAZAS

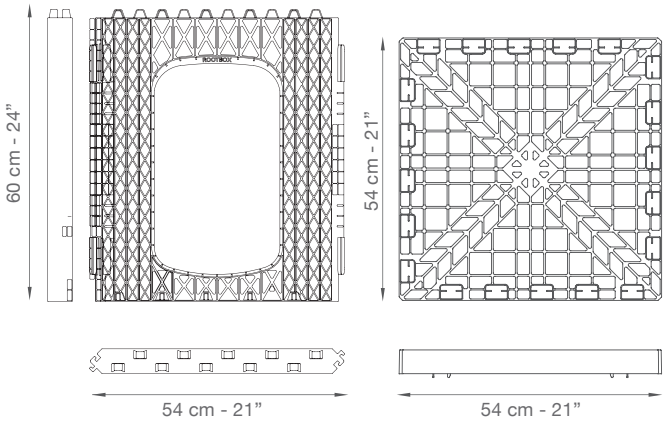
BICYCLE PATHS

PEDESTRIAN ZONES

PARKING

The elements that make up the Rootbox system are designed to be stackable, realizing in each pallet a volume of 15 m³ (530cf): handling and storage are therefore easy, quick and compact, even in built-up areas.

TECHNICAL DATA	SIDE WALL	UPPER GRID
Dimensions (cm/in)	60 x 54 x H5,2 24" x 21" x H2"	54 x 54 x H5 21" x 21" x H2"
Tot. assembled dim. (cm/in)	54 x 54 x H60 - 21"x21"x H24"	
Material	Graplene (Recycled Polypropylene Compound)	
Load capacity	Up to SLW60 / HS25	
Unit weight (kg/lb)	2.15/4.74	2.85/6.28
Pcs per pallet	188	188
Colour	Black	
Void ratio	94%	
Product Code	EDROTPL5460	EDROTGS5454



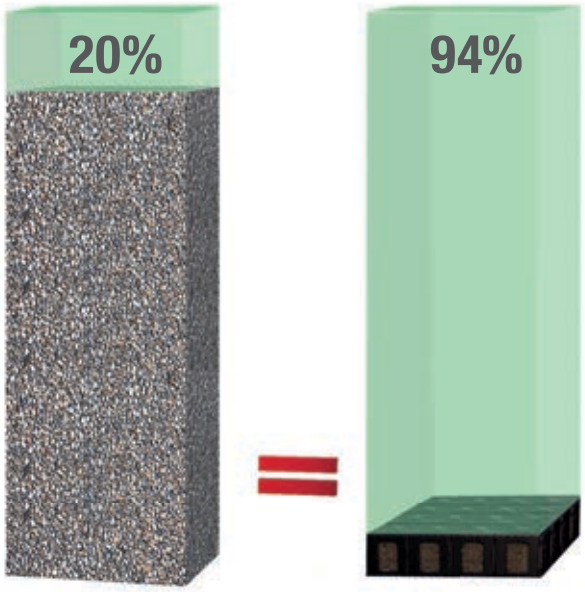
URBAN INTEGRATION

The presence of greenery in the city improves human well-being, as well as providing ecological niches for many animals and insects, and helping to reduce environmental temperature. Rootbox allows urban planners to integrate and solve many conflicting needs: it offers tree root and water management in a single solution, creating suitable space under the pavement that accomodates roots while acting as stormwater storage: in fact, the vegetated soil can absorb about 30% of its volume in water.

ROOTBOX VS. GRAVEL

The problem of urban tree planting has been known for many years, and much research has been dedicated to finding functional solutions from both agronomic and structural perspectives. Tree roots are a very extensive system that normally occupies a volume of 2 to 3 times that of the visible crown. Its function is both to mechanically anchor the plant to the soil and to nourish it with water and and nutrients present in the soil.

Over time, various types of structural plant substrate have been developed, consisting of plant soil but mainly of a significant amount of gravel or sand (Amsterdam Tree Soil), which have the function of giving the soil a supporting structure whose volume changes over time.



Clearly, the structural function comes at the expense of the available volume in which roots can develop freely (as little as 20% of the overall volume) whereas Rootbox offers both the structural advantages of structural substrate, without its drawbacks, thanks to a void ratio of 94%.

HIGH COMPRESSIVE STRENGTH

Geoplast has decades of experience in processing recycled plastic, and R&D personnel specializing in structural engineering. This technical background has enabled the design of a high-performance product. One of the main design criteria is the mechanical compressive strength necessary when installed below footways, bicycle paths, and roads subject to both light and heavy traffic.

The system can be installed in heights from 0.60 to 1.80 m (2' to 6'), supporting different types of surface covering: permeable stone or concrete pavement, concrete slabs, asphalt or other.

The other essential design criteria is a high void growth space to the plant, maximizing the agronomic efficiency.

The final result is a system that optimizes every aspect of urban tree planting. The plant grows healthier and needs less pruning and care; the roots no longer push to the surface, rendering it safer and much less maintenance-intensive.

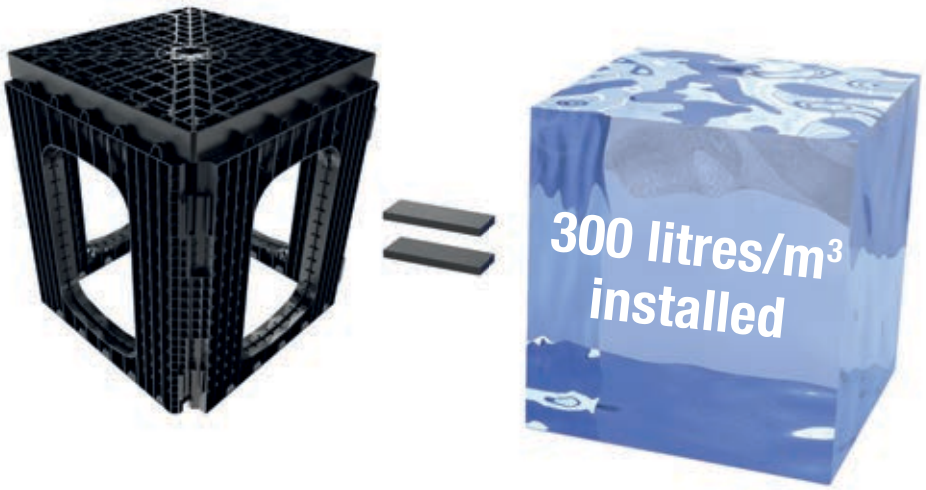
FEM analysis of the behavior of the elements and assembly under operating loads.

STORMWATER MANAGEMENT

Rootbox offers a volume available for rainwater storage and infiltration of about 30% of its volume, thus equal to 300 l/m^3 (2.26 gal/cf) of the installed volume.

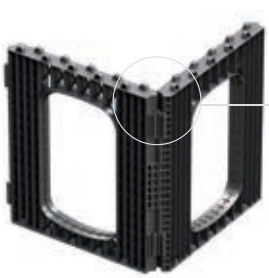
This is an important contribution to the city's drainage system, with rainwater also providing the plant with much of the irrigation it needs for its development.
Through the plant soil and tree roots, the Rootbox system participates in natural water filtration, helping to maintain groundwater pure.

In a nutshell, each Rootbox growth cell is an organic part of the system for reducing stormwater surface runoff.



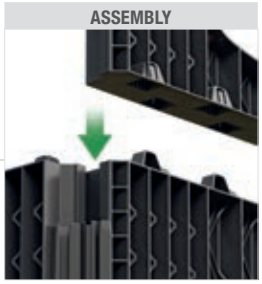
ROOTBOX ASSEMBLY

1



The vertical structure of Rootbox consists of a single universal vertical element used to create the walls of the system. The wall panel is connected by sliding the male pin into the female slot of the panel already in place: this special slide connector allows for easy and sold coupling.

2



Continue with the same connection method with the other vertical components until the Rootbox modules are formed: they are now self-supporting. Repeat in the same way until the first level of Rootbox is in place. At this stage you can begin installing the irrigation, aeration or other systems.

3

4

If applicable, install the walls of the next Rootbox levels. The upper edge of the wall panels has special ridges to ensure a secure fit and block any lateral movement. Assemble the side walls by taking advantage of the slide connectors already described.
After filling the system with plant soil, close Rootbox with the top grid, locking it in place simply by applying pressure with your hands. Once the system is closed, continue with further work.

APPLICATIONS

SQUARES AND PARKING LOTS

Squares and industrial zones are settings where trees are increasingly valued for their attractiveness and the added architectural value they bring.
The inclusion of Rootbox in the project will keep the trees healthier and their roots away from the surface.

BIKE PATHS

Cyclists using bike lanes have the expectation that they are perfectly safe for them, so it's essential to keep their surface free of bumps and roots to ensure a secure and comfortable ride.
Installing Rootbox is a smart way for local authorities to reduce maintenance costs and avoid potentially expensive liabilities.

TREE-LINED STREETS

Trees are common in boulevards, where root outcropping can cause difficulties for vehicles and be dangerous to pedestrians.
Rootbox has high compressive strength, which makes it suitable for installation below the road surface, avoiding road damage caused by tree roots and the resulting maintenance and repair costs.

INSTALLATION GUIDELINES

1. Mark out the installation area as defined by the designer, taking into account 30 cm (12") of perimeter clearance and the slope of the pit, also depending from the existing soil type.

2. Excavate to the correct design depth, then compact the bottom of the pit, if required lay a geotextile.

3. Create a gravel subgrade (10-20 mm diameter) with a thickness of 100 mm (4"), or as designed. Compact properly and make sure it is leveled.

4. Locate and mark the area of the excavation where the tree will be planted. No rootbox module shall be installed within this area.

5. Install Rootbox following the pit design and the installation instructions.
If multiple layers are planned, repeat the steps described. At this stage, do not close the structure with the top grid yet.

6. Place the tree and anchor it to the bottom of the pit if necessary (for example in case of an already well developed trunk).

7. If required by the project, install the irrigation and aeration system by inserting pipes inside the Rootbox system.

8. Wrap the system with geotextile, then fill it with specific plant soil. Compact the plant soil, weting if necessary, until it has reached the expected level.

9. Close Rootbox with the top grid, lay geotextile, and place curbs (precast or cast-in place) as per design.

10. Install the root barrier of choice in the pit and around the trunk.

11. Close the excavation with the finishing build-up, compacting, if necessary, with a plate compactor.
Carry out the finishing of the area with the planned paving (concrete pavers, synthetic concrete pavers, concrete, asphalt, etc.).

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Building beyond together

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