Mind the Gap

Strength, Reliability and Confidence in Urban Infrastructure

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GreenBlue URBAN®
Creating healthier urban spaces in harmony with nature

Interlocking Soil Cells: Why Correct Configuration Is Critical

Creating tree-friendly urban spaces that can also withstand the demands of pavements and vehicle traffic requires more than simply placing soil cells underground. Their performance depends entirely on how they are installed. When soil cells interlock as a continuous, gap-free system, they create a predictable, high-strength structure that protects both the pavement above and the growing environment below. When gaps are introduced, that reliability disappears.

Modern soil cells are engineered and tested as interconnected systems. Their lateral strength, static load-bearing capacity, and soil-volume performance all rely on this interlocking behaviour. If cells are spaced apart, even slightly, the structure no longer behaves as designed. The installation becomes untested, and the system's ability to carry vehicle loads or resist movement can no longer be guaranteed.

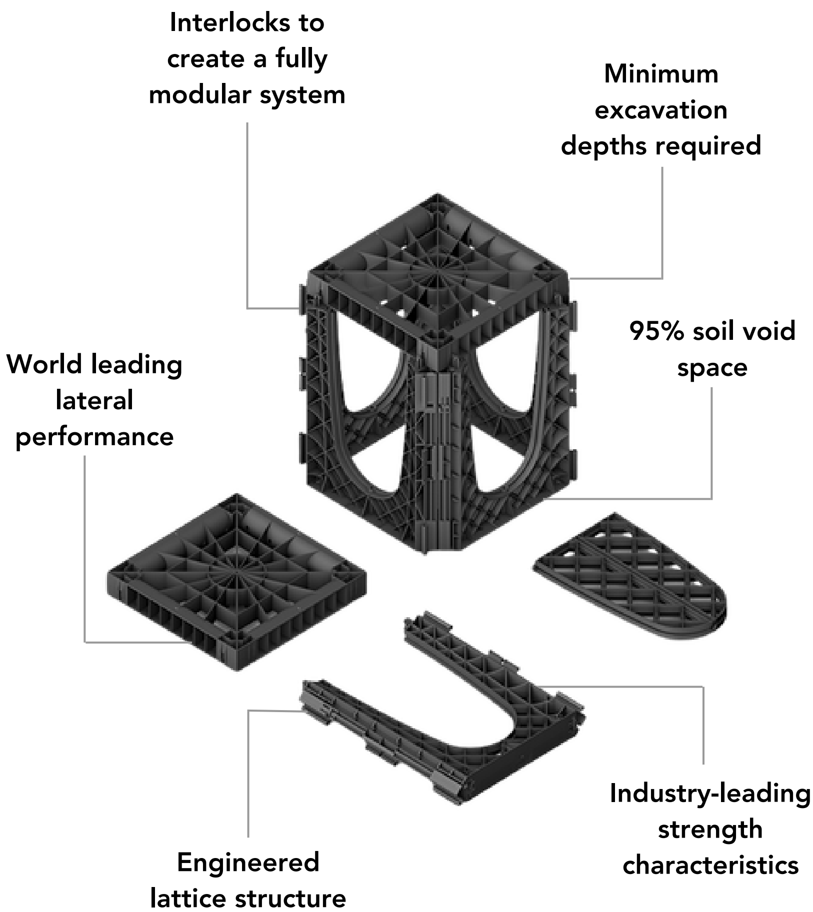
Spacing cells weakens the system in several ways. It reduces static load capacity, compromises lateral rigidity, and allows movement in the surrounding backfill. These weaknesses increase the risk of pavement deformation and structural failure. Geotextile alone cannot compensate for these gaps, and the only reliable workaround is to pour concrete over the voids, adding cost, carbon and complexity while reducing usable soil volume.

A properly interlocked system, by contrast, distributes loads evenly and maintains a stable, uncompacted soil environment. Lattice-based designs with infill panels provide superior lateral performance and better backfill confinement than column-based alternatives. They preserve more high-quality soil volume, support healthier root growth and create stronger, more resilient pavements.

RootSpace® is designed around these principles. Its tightly connected, gap-free lattice structure forms a seamless underground module that maximizes both soil provision and structural performance. This makes it ideal for high-traffic urban areas where trees and pavements must coexist without conflict.

The diagrams on the next page illustrate how interlocking systems work, the structural risks created by gaps and why lattice-based soil cells offer greater reliability.

Together, they highlight the importance of installing soil cells exactly as engineered; interlocked, continuous and uncompromised.



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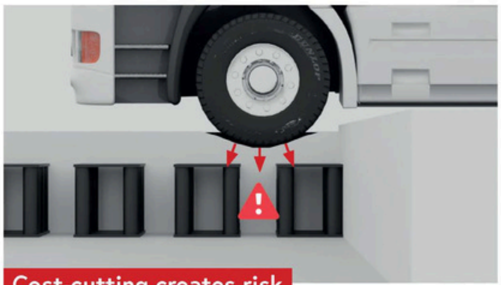
Spacing out soil cells undermines structural integrity

Dynamic loading

Superior lateral loading performance makes RootSpace ideal for areas with vehicle traffic.

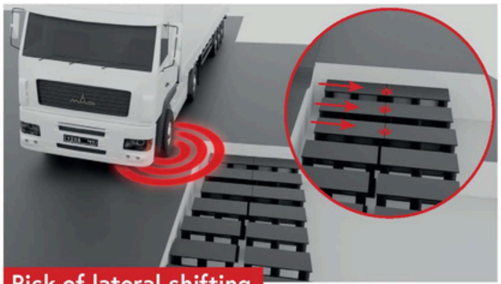
Static load bearing capacity

Properly configured, interlocking soil cells guarantee lateral structural rigidity.



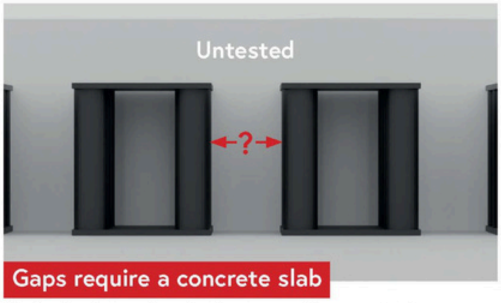
Cost-cutting creates risk

Gaps between soil cells undermine structural integrity, creating a static load risk for vehicles.



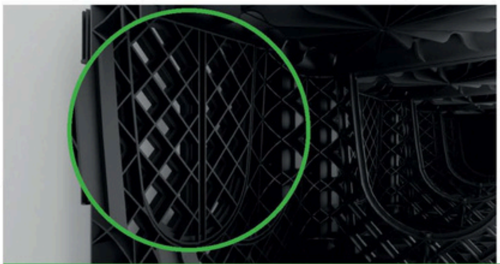
Risk of lateral shifting

Gaps between cells also negatively impact lateral loading capacity.



Gaps require a concrete slab

Untested spacing between cells prevents robust calculations and creates risk. Geotextile isn't enough – the only robust solution is a concrete slab across the gap, increasing carbon, complexity and cost.



Prevent backfill and increase rootable volume

Infill panels in a lattice system prevent backfill movement and maximize the volume of uncompacted soil. They're also stronger than column-based systems.

Remove gaps to stay safe

Soil cells are designed and structurally modelled as interlocking systems. This is the only way to maximize uncompacted soil, prevent pavement heave and protect traffic.

Enhanced Performance

With its lattice design and tightly connected cells, RootSpace creates a seamless, gap-free soil environment for superior strength and root growth.

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Comprehensive Testing of RootSpace®

As part of GreenBlue Urban's commitment to continually improve products and solutions, we recently commissioned Lucideon, an independent materials testing and analysis laboratory, to investigate the structural properties of the RootSpace soil cell system. Highways engineers are particularly concerned about the ability to withstand vertical, lateral, and dynamic loading. For testing, Lucideon was supplied with RootSpace soil cell components assembled into various module sizes.

Testing Overview

These tests aimed to assess the structural integrity and load-bearing capacity of RootSpace under different configurations and infill conditions. The results provide valuable insights into the performance of RootSpace in our urban infrastructure, including pavement support and underground conveyance and storage systems. RootSpace was tested in various configurations, as outlined in Table 1. The samples, constructed by Lucideon's technicians, included different series (600 and 400) with varying heights, lengths, and widths.

Table 1: Test Samples for RootSpace® Support System Geocells

System Type	Sample Size (inches)	Sample Construction	Infill Used
G2 400	19.7 x 19.7 x 18.7	1 x 1 x 1	N
	39.4 x 39.4 x 18.7	2 x 2 x1	N
	39.4 x 39.4 x 39.4	2 x 2 x 2	N
	39.4 x 39.4 x 39.4	2 x 2 x 2	Y
G2 600	19.7 x 19.7 x 26.6	1 x 1 x 1	N
	39.4 x 39.4 x 26.6	2 x 2 x1	N
	39.4 x 39.4 x 50.2	2 x 2 x 2	N
	39.4 x 39.4 x 50.2	2 x 2 x 2	Y

Some also considered infill panels to assess their impact on structural performance. Each sample underwent Uniformly Distributed Load (UDL) testing to determine its compression strength and deflection characteristics. The testing program involved conditioning all samples in the air at the test temperature for at least 24 hours. Subsequently, each sample was subjected to a constant rate of compression using a servo-assisted hydraulic loading machine, with load and deflection measurements monitored throughout testing. A pre-load was applied for five minutes to allow the specimen to set before continuous loading until failure occurred. The compressive load was applied at a constant rate of 0.5 kN/m²/s.

Key Findings

The test results, presented in Table 2, provide insights into the performance of RootSpace under different configurations and infill conditions. Variations in maximum load (Fmax) and deflection at maximum load highlight the influence of series type and infill panels on structural integrity and load-bearing capacity. Load-deflection and load-time curves further elucidate the behaviour of RootSpace under compression, offering valuable data for urban infrastructure planning and design.

Table 2 - Test Results for RootSpace® Pavement Support System Geocells

Sample Type	Sample Size (in)	Sample Construction	Infill Used	Height After Pre-Load (in)	Maximum Load Fm (p/sf)	Deflection at Fmax (in)
G2 400	19.7 x 19.7 x 18.7	1 x 1 x 1	N	18.7	2416.4	.453
	39.4 x 39.4 x 18.7	2 x 2 x 1	N	18.7	8076.4	.669
	39.4 x 39.4 x 39.4	2 x 2 x 2	N	39.4	7243.1	.839
	39.4 x 39.4 x 39.4	2 x 2 x 2	Y	39.4	9358.8	.807
G2 600	19.7 x 19.7 x 26.6	1 x 1 x 1	N	26.6	2345.4	.688
	39.4 x 39.4 x 26.6	2 x 2 x 1	N	26.6	7199.2	.607
	39.4 x 39.4 x 50.2	2 x 2 x 2	N	50.2	7635.7	.648
	39.4 x 39.4 x 50.2	2 x 2 x 2	Y	50.2	9335.8	.745

NOTE: The results given in this report apply only to the samples that have been tested.

Real-World Assurance

Lucideon's comprehensive evaluation of RootSpace underscores their effectiveness in optimising urban infrastructure. The test results highlight the structural integrity, load-bearing capacity, and versatility of RootSpace in diverse urban applications. In particular, the lateral loadbearing characteristic proved to be the strongest in class, with an assembled system highly resilient to any sideways forces.