Silva Cell

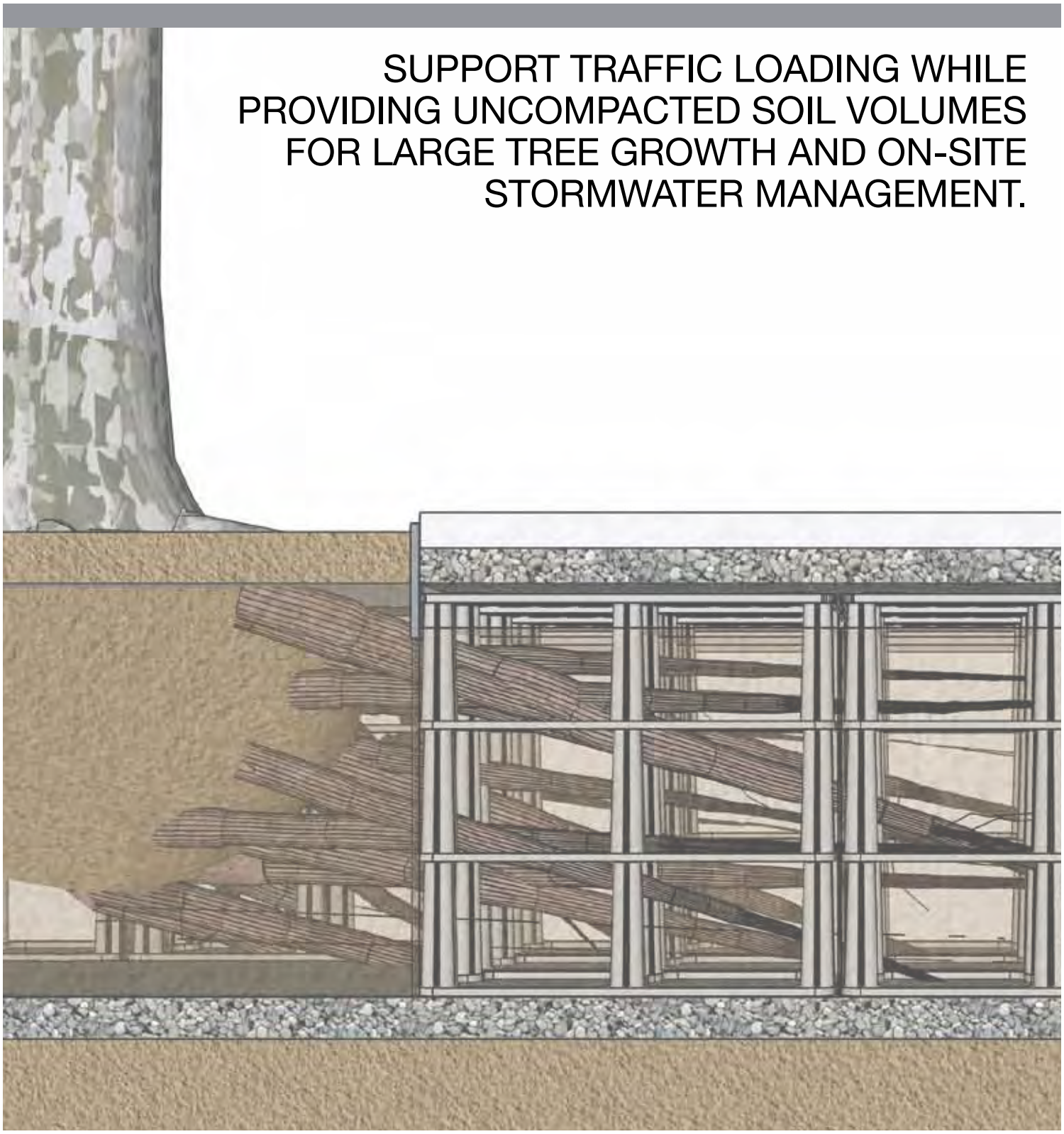
Integrated tree and stormwater system

DeepRoot®

Geosynthetics

HOW THE SILVA CELL WORKS

MODULAR DESIGN ACCOMMODATES ANY SITE

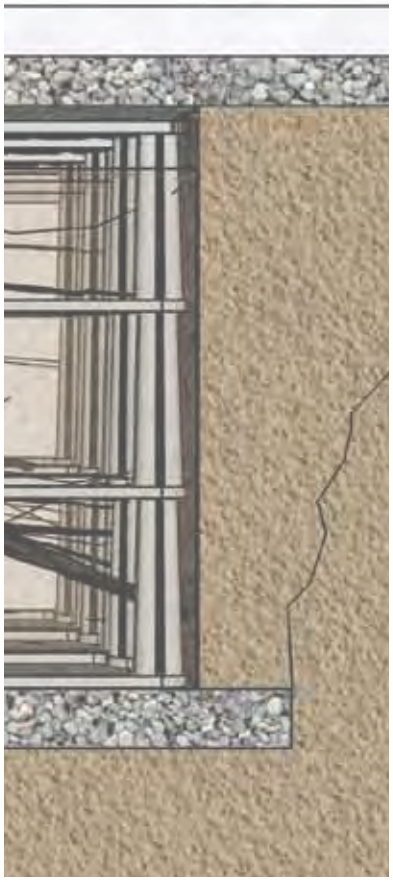


APPLICATIONS

The Silva Cell can be used in a wide variety of applications. Some of the most common are:

- **STREETSCAPES AND PLAZAS**
- **CAR PARKS**
- **GREEN ROOFS/ON-STRUCTURE**
- **GREEN WALLS**

Each of these applications can be designed for tree growth and storm-water management.



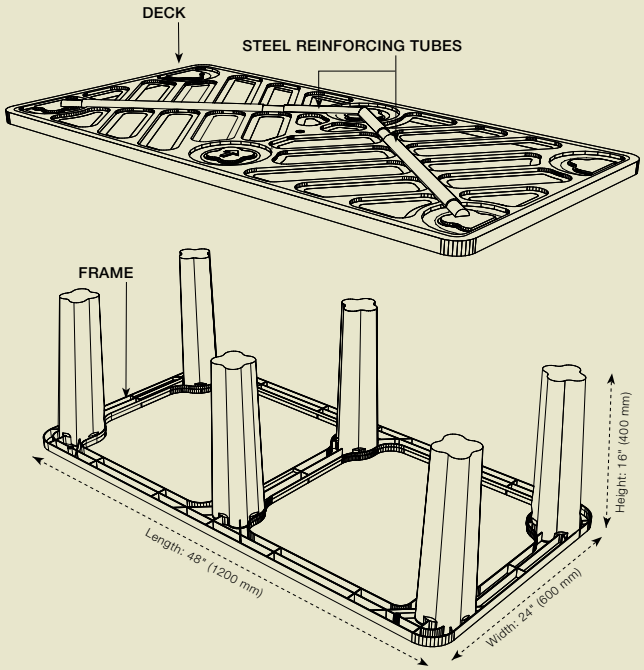
Each Silva Cell is composed of a frame and a deck. Frames can be stacked one, two, or three units high before they are topped with a deck to create a maximum amount of soil volume for supporting tree root growth and stormwater management.

Material Specifications
Fiberglass reinforced, chemically-coupled, impact modified polypropylene.
Galvanised steel tubes.

Frame Dimensions
Length: 1200 mm
Width: 600 mm
Height: 400 mm

Deck Dimensions
Length: 1200 mm
Width: 600 mm
Height: 51.5 mm

Capacity
Void capacity: approximately 92%
Soil capacity: approximately 0.28 m^3



THE SILVA CELL®

INTEGRATING TREES, SOIL AND STORMWATER FOR SUSTAINABLE DEVELOPMENT

SOIL IS CRITICAL TO THE LONG TERM SUSTAINABILITY OF DEVELOPMENT SITES.

Provide the basis for healthy vegetation, treat stormwater as a resource, and restore ecosystem services with the Silva Cell.

The Silva Cell is a modular framework / void former for containing unlimited amounts of healthy soil beneath paving while supporting traffic loads and accommodating surrounding utilities. The Silva Cell is filled with high-quality, uncompacted soil to grow trees and manage the rate, quality and volume of stormwater. The modular system can be easily sized to accommodate the needs of any site without compromising effectiveness or site design.

By combining on-site stormwater management with expanded rooting volumes for healthy tree growth, Silva Cells create an unparalleled ability to restore ecological function to developed areas.

INTEGRATING SOIL...

Increasing attention is being paid to soil, and the conclusion is inescapable – soil matters. A Report by the National Research Council commissioned by the United States Environmental Protection Agency concludes:

> *"Nearly all of the associated problems [of urbanised watersheds] result from one underlying cause: loss of the water-retaining and evapotranspirating functions of the soil and vegetation in the urban landscape[1]."*

The report goes on to state:

> *"Stormwater Control Measures that harvest, infiltrate, and evapotranspirate stormwater are critical to reducing the volume and pollutant loading of small storms[2]."*

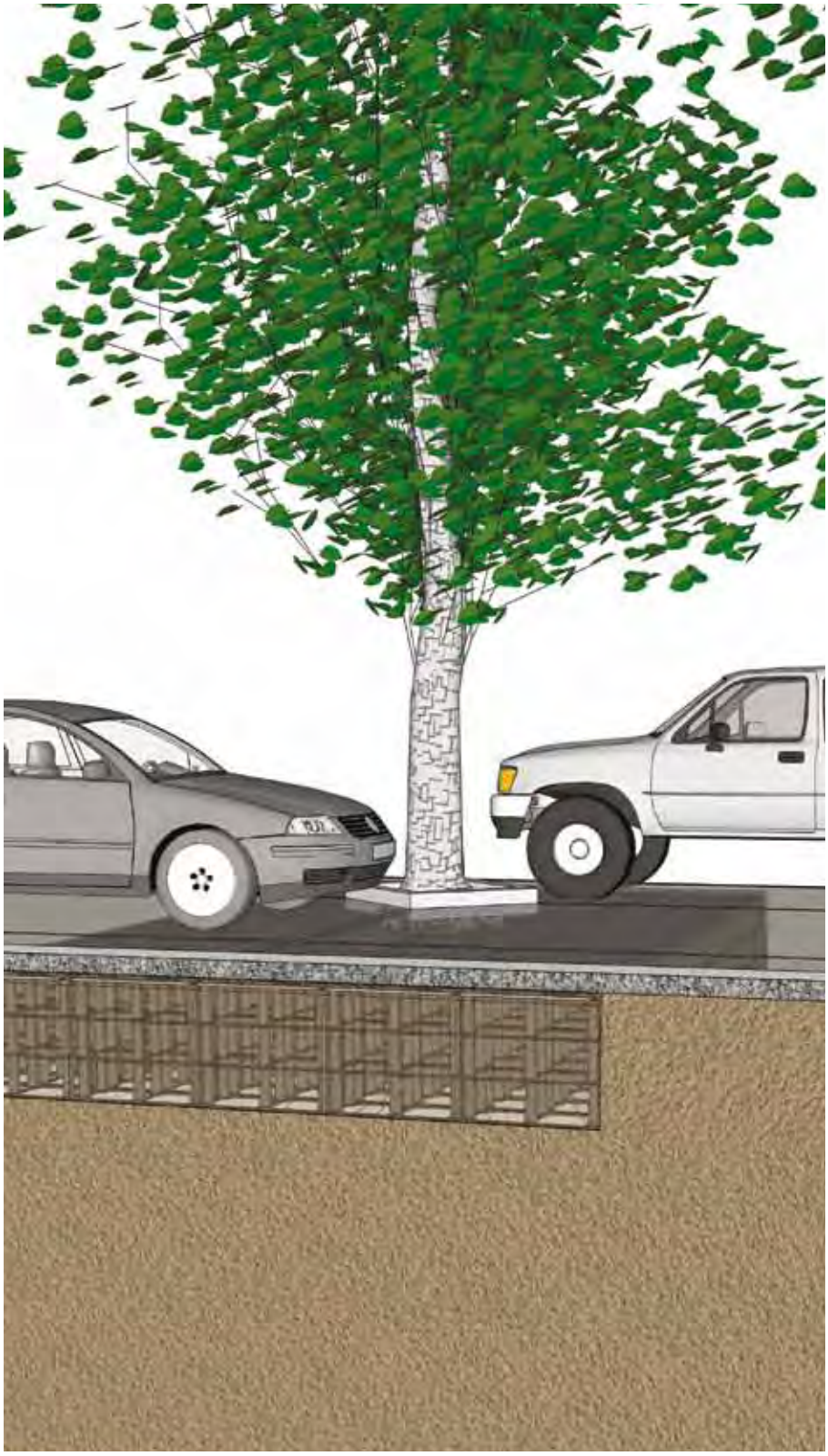
... TREES

The more healthy soil is available to trees, the bigger they can grow – and the bigger a tree grows, the more significant environmental and social benefit it provides. USDA Forest Service research shows that a tree with a 30-inch diameter removes 70 times the pollution of a tree with just a 3-inch diameter[3]. Typically, urban tree growth is stunted by limited access to soil and poor soil quality. Damaged pavements from roots are hazardous and a major cost to repair. The Silva Cell overcomes these challenges by providing unlimited soil volumes without compromising above ground surface area.

... AND STORMWATER

The Silva Cell integrates trees and soil with stormwater management, utilising the proven capacity of soils to act as an underground bioretention system. When rainfall moves across impermeable paving, it picks up pollutants. As it is channelled off-site, it deposits these pollutants in oceans, lakes, rivers and wetlands. This non-point source pollution, a leading cause of urban pollution, is significantly mitigated by use of the Silva Cell. Through soil filtration, bioremediation and evapotranspiration, the Silva Cell treats stormwater directly on-site, restoring ecosystem services and saving money while protecting one of our most valuable resources.

1. Urban Stormwater Management in the United States (a report by the National Research Council: National Academies Press, 2008).
2. Ibid. 8.
3. David Nowak, "Trees Pollute? A "TREE" Explains It All." (Proceedings of the 7th National Urban Forest Conference, Washington, D.C, USA, 1995).



The story of the Silva Cell has been one part eureka! and a thousand parts sweat and hard work. James Urban (FASLA, ISA), a renowned landscape architect and advocate of urban trees, has been critical to the development of the Silva Cell, and his vision, passion, and technical expertise have guided our design from the outset.

Our pursuit of a more sustainable world through the integration of green utilities demands affordable solutions that synthesize modern engineering needs with effective and sustainable ecological principles. The Silva Cell - which takes its name from the Latin word for forest - reflects these goals. We continue to collaborate with industry leaders to help us develop practical, earth-friendly solutions to the ecological challenges that face us.

We work with a team of highly qualified landscape architects, engineers and hydrologists for technical planning and design services. We would welcome the opportunity to discuss your potential projects and ensure that the use of the Silva Cell is optimised for your site needs.

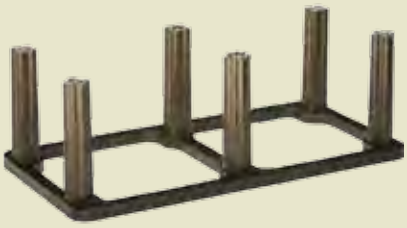
For more information on Silva Cell specifications and applications, please call us on +44 (0)1455-617-139 or visit us online at www.geosyn.co.uk

ENGINEERING AND LOADING

FRAME AND DECK FEATURES

POST DETAIL

FRAME



DECK

FRAMES CAN BE STACKED, ONE, TWO OR THREE HIGH

FRAME DESIGN FEATURES

Six rigid vertical posts protrude from the frame, providing structural support of paving and the loads it carries. Their cross-sectional shape maximises axial rigidity and prevents them from telescoping together when the frames are stacked.

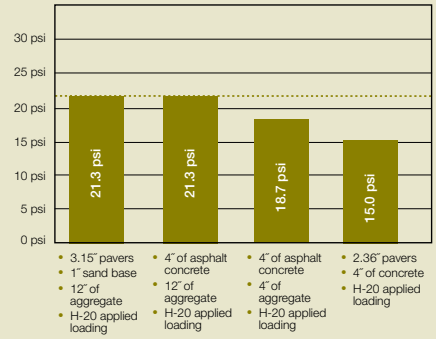
Their rounded edges prevent significant stress concentrations, meaning that paving supported by the Silva Cell does not settle due to compressive forces. The bottom portion of the frame is relatively pliable, allowing it to conform to irregularities in the earth without breaking or suffering loss of strength.

DECK DESIGN FEATURES

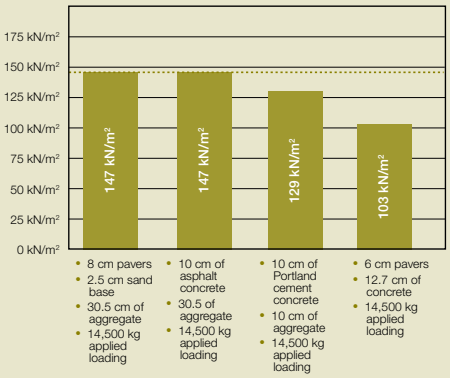
The deck is a rigid platform with six recesses positioned to rest securely on the six posts of the frame. Openings on the deck allow ample room for air and water to penetrate and nourish the enclosed soil. Two diagonal channels on the upper portion of the deck house galvanised steel tubes that prevent deformation of the posts and help eliminate plastic creep.

SUMMARY OF TOP DECK STRESSES UNDER VARIOUS AXIAL LOADING SITUATIONS

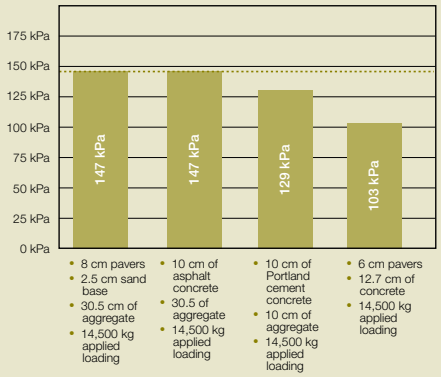
UNITED STATES



UNITED KINGDOM

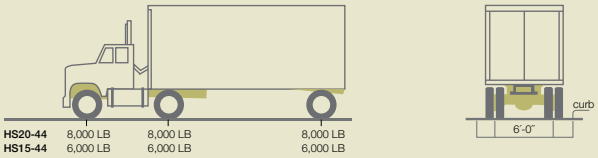


EUROPE / CANADA



- - This line represents the maximum allowable stress that can be applied to the deck and it also represents a factor of safety equal to 1.50 when compared to the ultimate stress value.

TYPICAL H-20 REAR AXLE LOADING



The Silva Cell can support vehicle loading up to AASHTO H-20 rating of 32,000 lbs. (14,514 kgs) per axle. This rating refers to the ability of a roadway to safely accommodate 3-4 axle vehicles, such as a large semi-truck and trailer.

The charts and associated paving conditions listed here are represented in our standard product details and specifications which enable the Silva Cells to support traffic loads up to H-20 standards. Loading standards vary worldwide and your particular project may have different needs. Please consult with Deep Root to review and optimise the use of the Silva Cell to your project requirements.

Load testing was provided by TRI environmental. Applied stress values were determined using Sigma/W, a finite element program. Self-weight of materials above deck of Silva Cell is included in the reported top deck stress value.

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