TECHNICAL RECOMMENDATION

APPLICATION [11 RUR-CEL] — **Reinforcement of Roads with Cellweb**

Geosynthetics

PROJECT	ASH COURT PARKING SCHEME, SPALDING	
DESIGNER/ SPECIFIER	SOUTH HOLLAND DISTRICT COUNCIL	Contact: **Craig Shinkin**
CLIENT/ END USER	ELDERLY SHDC RESIDENTS	

Reference:	Version:	Location:	Date:
TR15_1075_RUR_CEL_Ash Court parking scheme, SpaldingV1	V1	Ash Court, Spalding, PE11 2HH	14 January 2015

PROJECT DESCRIPTION

Construction of Cellweb reinforced additional car parking bays located in Ash Court, Spalding. Cellweb is a no dig tree root protection measure and it is recommended that no excavation be performed without prior approval and guidance from the tree officer.

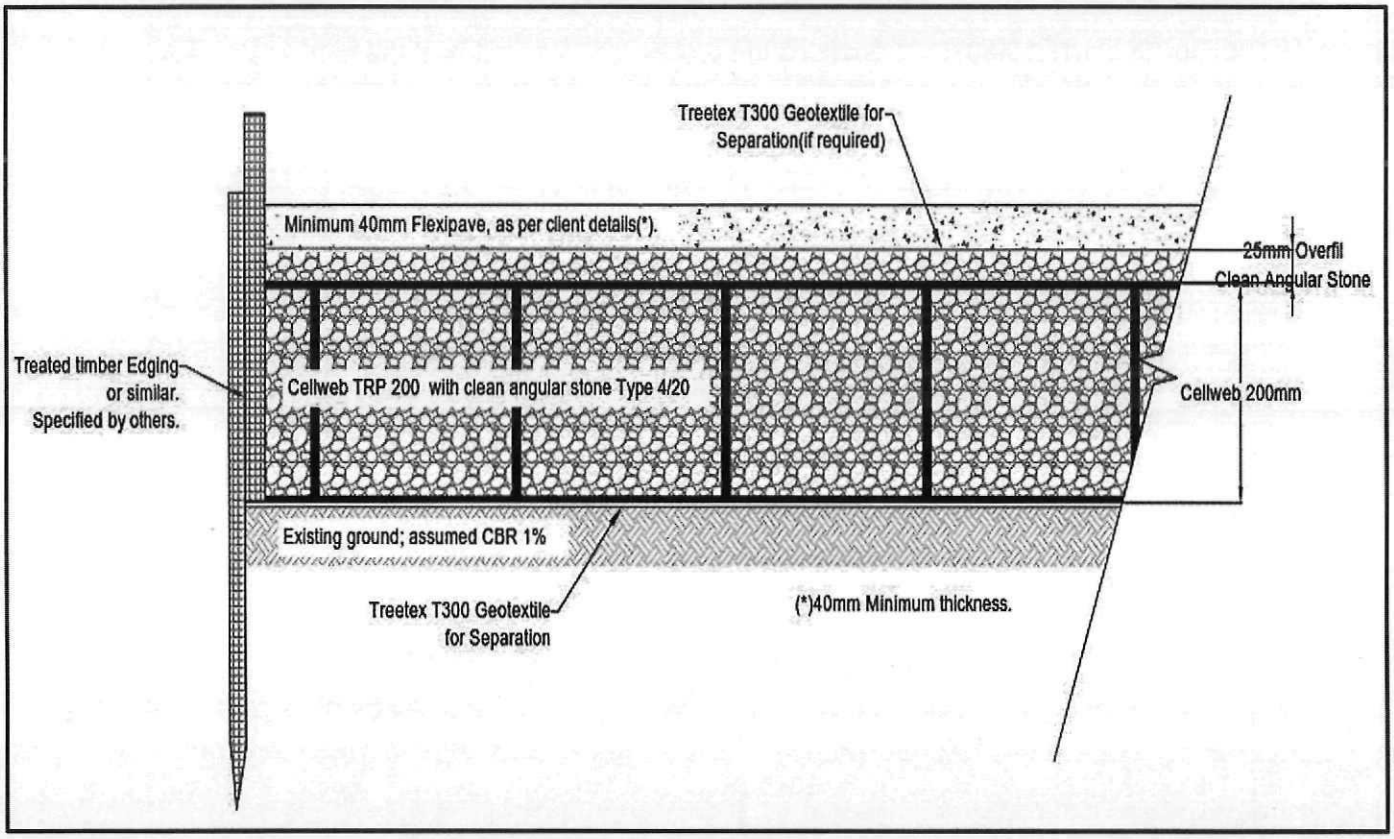
This document TR15-1075 V1 provides the preliminary calculation of the reinforced area over Tree Root protection zone, according to email sent by Craig Shinkin and Questionnaire sent on 08/01/2015.

According to the information sent by the client we have:

- **Ground conditions:**
  - No data: Assumed cohesive.
  - No data, CBR = 1.0% used for calculation to take into account the soft spots.
- **Infill material for CellWeb:** 4mm to 20mm clean angular stone, Type 4/20 due to tree root protection requirement. Specification according to BS7533-13.
- **Traffic Information:**
  - Cars, vans, occasional bin lorries and fire engines.
  - Assumed maximum Gross Vehicle Weight GVW <30,000 Kg
  - Assumed maximum axle load = 80 kN/axle
- **Surface:**
  - Flexipave, as per client details. Note.-Minimum 40mm thickness.

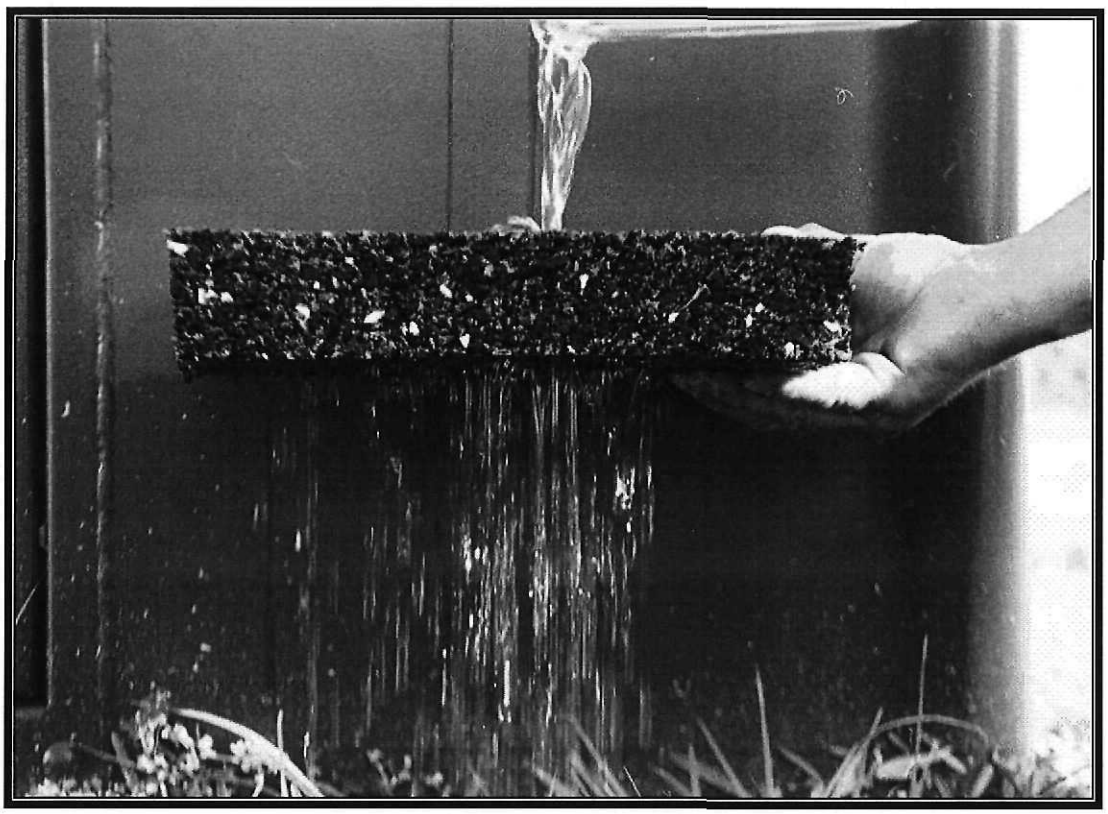
SOLUTION - PARKING BAYS	
Surface: (design by others accordingly to the appropriate standard)	**Flexipave, as per client details. Note.-Minimum 40mm thickness.**
Separation:	**Geotextile Treetex T300(if required)**
Overfill: above Cellweb: clean angular stone Type 4/20	**25mm Clean angular Stone.**
Cellweb TRP: fill with 4 to 20mm clean angular stone Type 4/20:	**Cellweb TRP:200 mm**
Subbase : 4 to 20mm clean angular stone Type 4/20	**Structural purpose: 0mm(originally 40mm reduced to 0 due to the Flexipave surface)**
	Installation purpose: variable subbase if levelling of foundation is required
Separation: beneath Cellweb or Subbase	**Geotextile Treetex T300**

CROSS SECTION - PARKING BAYS



KBI

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FLEXI-PAVE™ HD2000 PAVING

D M A
ENGINEERING

116 S. Tennessee Avenue Suite 201
Lakeland, Florida 33801
(863) 619-6586 Phone
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REPORT 09:13:05

Reference: Flexi-Pave in Comparison With Pervious Concrete

Flexi-Pave is a product that is fundamentally different than pervious concrete, although both are proposed as permeable surfaces. Both products have applications to which they are suited, but Flexi-Pave offers advantages when long term permeability, flexibility, strength, and resistance to tree root intrusion and freeze/thaw cracking are important.

Pervious concrete is a rigid, porous form of concrete with differing degrees of permeability. The rigidity characteristic provides strength and resistance to surface loadings. Water enters the concrete through the voids and passes to the subsurface below. The level of permeability of the pervious concrete is a function of the amount of voids in the product. Pervious concrete, with void levels and, thus, high levels of permeability are subject to cracking due to loads and freeze/thaw pressures. It will also crack due to tree root intrusion. Pervious concrete with lesser voids is more resistant to cracking, but is less permeable. The voids in pervious concrete fill with sediment, such as sand, silt, leaves, and organics over a fairly short period of time. This results in a marked reduction in permeability and negates the entire reason for selecting pervious concrete in the first place. Pervious concrete is dependent on a well compacted and stable base to minimize cracking and cannot be used over marginal material as a base without a high probability of cracking and structural degradation.

Flexi-Pave is a flexible product with excellent compressive strength for most applications. The permeability is equal to or greater than that of the subsoil below. It utilizes a base (crushed rock) that contains a void ratio equal to or greater than that of Flexi-Pave. In light load applications, when placed over a highly permeable, sandy type soil, it will pass as much water as it receives. Because it is flexible, it will not crack. Tree roots do not cause cracking but instead create a minimal rise in the slope of the surface that does not promote tripping. The product is very durable as measured by the Hamburg Loaded Wheel tester (Tx DOT 242-5). Because the product flexes, sediment that enters the Flexi-Pave tends to pass completely through the material and does not "blind" the material or cause it to have a marked decrease in permeability. Samples in field service (parking lot) for nearly four years still tested as a "highly permeable" material (Fl DOT 5-565). The product is also classified as slip resistant per ASTM D 2047.

Summary:

Pervious concrete and Flexi-Pave are both permeable products that can withstand substantial loadings. Flexi-Pave offers advantages for identical applications in terms of long and short-term permeability, flexibility, crack resistance, trip hazard resistance and slip resistance.

CellWeb TRP®



Tree Root Protection Guaranteed

Geosynthetics

www.geosyn.co.uk

CellWeb TRP® System

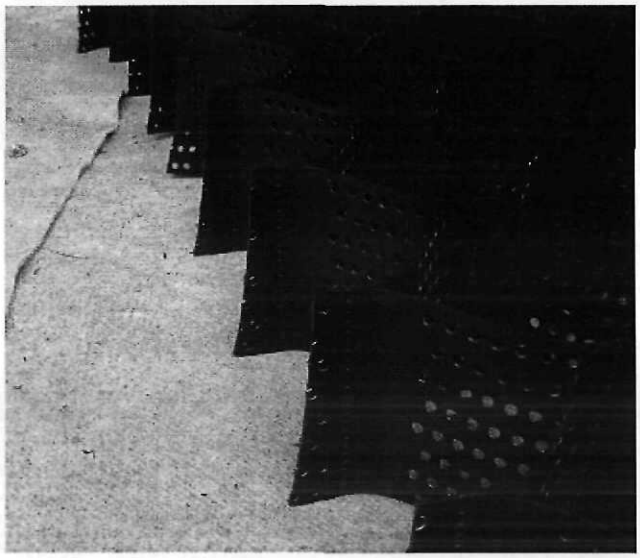
Tree Root Protection System



The Consquences Of Tree Root Damage During Construction

It is an offence to cut down, lop, uproot, top, wilfully damage or destroy a protected tree without authorisation. Trees can be protected under the Town and Country Planning Act 1990 and the Town and Country Planning (Trees) Regulations 1999. Trees are protected when they are the subject of Tree Preservation Orders (T.P.O) or within Conservation Areas, subject to certain exemptions. Retention and protection of trees on development sites is also secured through the use of planning conditions.

On a construction site all trees with a Tree Preservation Orders need to be managed in accordance with BS5837 2005 (Trees in relation to construction); failure to comply with these orders can be a costly affair as many parties have discovered.



Fishponds, Ketton

There are two offences which apply equally to trees protected by Tree Preservation Orders and those within Conservation Areas:

- Firstly, anyone who cuts down, uproots or wilfully destroys a tree, or who lops, tops or wilfully damages it in a way that is likely to destroy it is liable, if convicted in the Magistrates Court, to pay a fine of up to £20,000. If the person is committed for trial in the Crown Court, they are liable on conviction to an unlimited fine. The Courts have held that it is not necessary for a tree to be obliterated for it to be "destroyed" for the purposes of the legislation. It is sufficient for the tree to have been rendered useless as an amenity.
- Secondly, anyone who carries out works on a tree that are not likely to destroy it is liable, if convicted in the Magistrates Court, to a fine of up to £2,500. In addition to directly carrying out unauthorised works on protected trees, it is an offence to cause or permit such works.

Developers and building contractors are often completely unaware that 'compaction of soils within the Root Protection Area (RPA)' constitutes wilful damage to the tree. When vehicular or pedestrian access within the RPA is necessary, either for the construction operation or final site access, the effects of this activity must be addressed and the ground must be protected. When tracked or wheeled traffic movements are involved, the ground protection system should be designed by an engineer and take into account the loading involved.



Shelton Road, Shewsbury

The Solution:

Geosynthetics CellWeb TRP® System



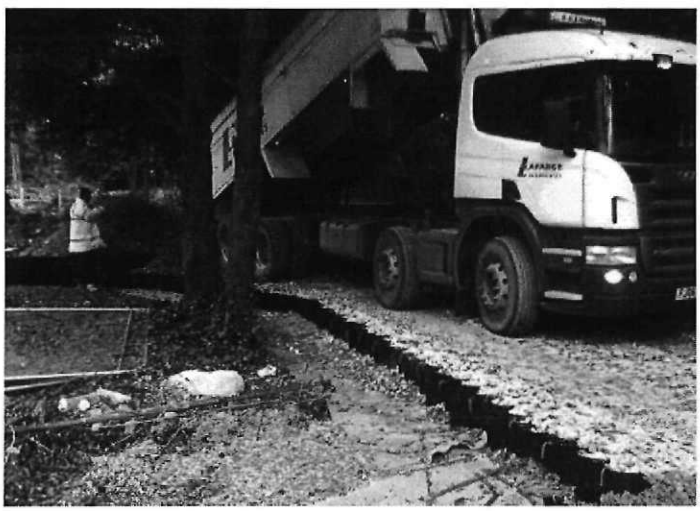
The Solution According to BS 5837:2012

"Appropriate sub-base options for new hard surfacing include three-dimensional cellular confinement systems ....."

(BS 5837 2012 section 7.4.2 Note 1)

The CellWeb TRP® Solution

CellWeb TRP® is the market leader in the United Kingdom and Ireland for tree root protection. CellWeb TRP® cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load bearing surface for vehicular traffic. CellWeb TRP® complies with BS 5837:2005 and APN 1. It provides a no-dig solution, is tried and tested having been used successfully since 1998. It is the only tree root protection system which has been independently tested and it is the only tree root protection system which is guaranteed for 20 years. See page 6 for the full terms and conditions of the guarantee.



Fishponds, Ketton

Field Trials

Geosynthetics Limited are the only company in the UK and Ireland to carry out live, completely independent field tests on the performance of a 3 dimensional cellular confinement system when used in a no-dig tree root protection system application. The results prove that CellWeb TRP® significantly reduces the compaction of sub-soils within the root growth limiting parameters established by K D Coder, 'Soil damage from compaction'. University of Georgia. July 2000. A copy of the report is available upon request.

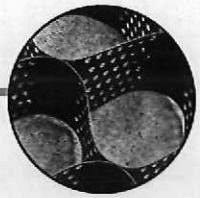
CellWeb TRP® Product Guarantee

Geosynthetics Limited prides itself on a providing a reliable, consistent service; including technical advice, on site support and installation guidance. Geosynthetics Limited provides a 20 year guarantee for the CellWeb TRP® tree root protection system. This guarantee gives the client, the tree officer and arboricultural consultant the confidence that the designed system will perform as intended without damaging the health of the tree.

See page 6 for the full terms and conditions of the guarantee.

CellWeb TRP® System

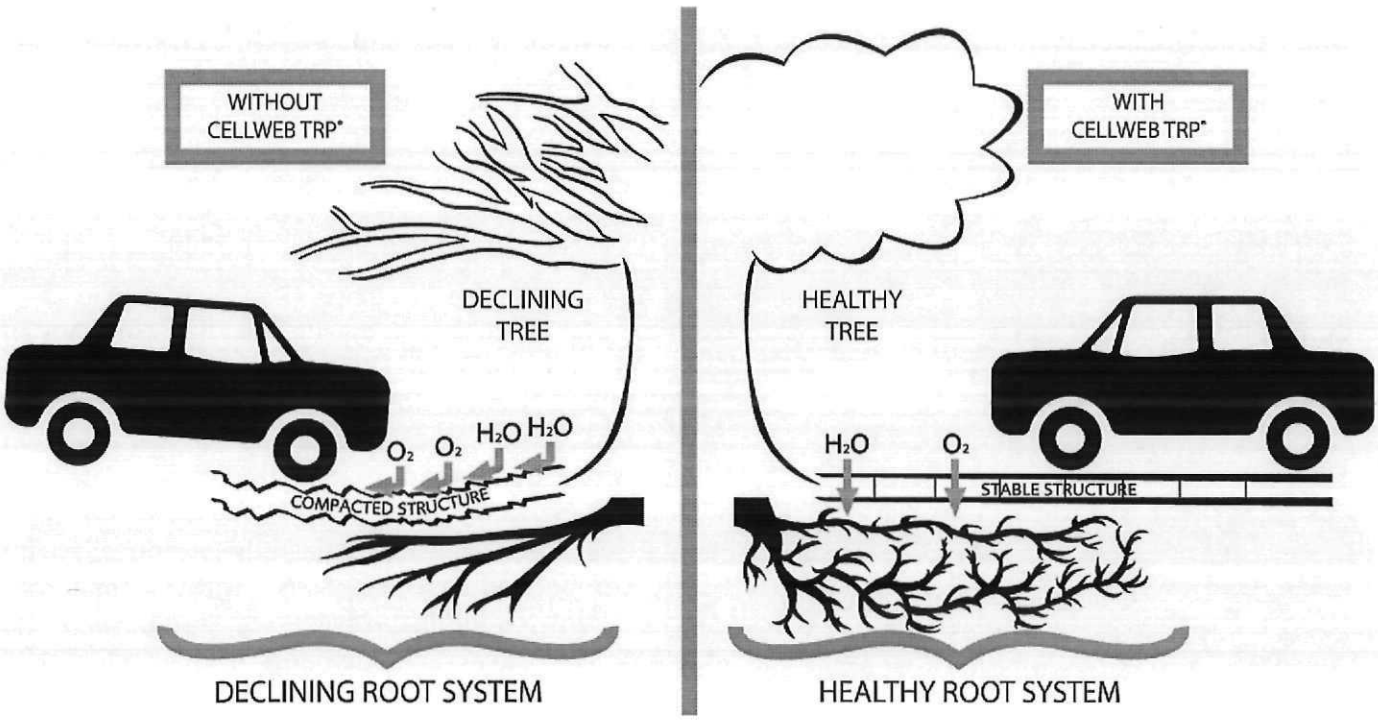
How the System Works



How CellWeb TRP® Works

CellWeb TRP® is a cellular confinement system that confines aggregate materials and makes them stronger, thus increasing the bearing capacity of the sub base materials. Research shows that CellWeb TRP® acts as a stiff raft to distribute wheel loads and reduce their magnitude at the base of the construction, thus maintaining the soil bulk density at levels that are suitable for tree root growth.

CellWeb TRP® is used around the world to provide cost effective hard surface construction over tree roots and is the system of choice for Tree Officers and Arboriculturists. For more information on this subject see CellWeb TRP® Fact Sheet No 1.



Water and Oxygen Transfer Through the CellWeb TRP® System

The CellWeb TRP® system is constructed using open aggregate infill and CellWeb TRP® has perforated cell walls. The pore spaces between the aggregate particles are greater than 0.1mm in diameter. This open structure is far more permeable than typical soils and allows the free movement of water and oxygen so that supplies to trees are maintained.

For more information on this subject see CellWeb TRP® Fact Sheet No 2.

CellWeb TRP® and Pollution

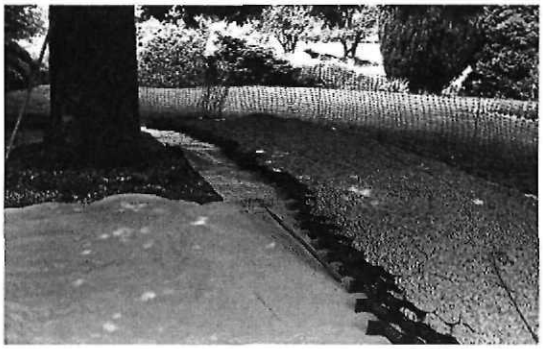


How CellWeb TRP® Deals With Pollution

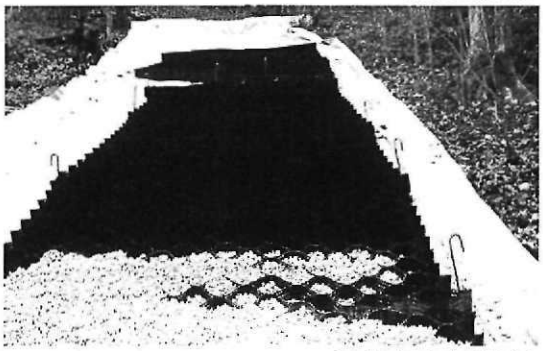
Where possible a permeable pavement system should always be constructed above the CellWeb TRP® system. The effective removal of pollution from runoff by permeable pavements is well known. Worldwide research has shown runoff that has passed through permeable pavements has low concentrations of pollutants.

Small spills of oil will be dealt with within the joints between the paving blocks and in the aggregate used within the system. However, large catastrophic spills are a different matter.

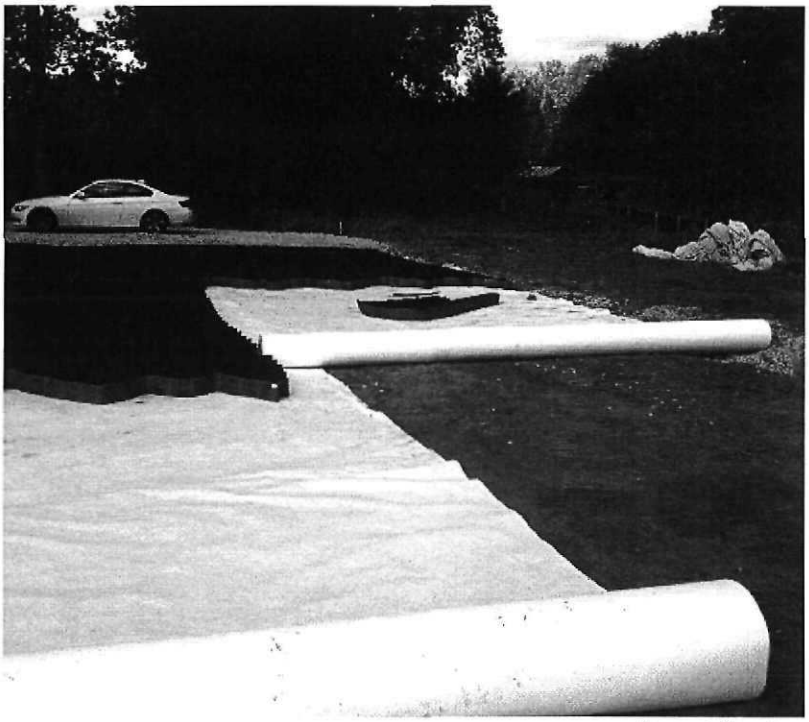
For more information on this subject see CellWeb TRP® Fact Sheet No 3.



Castle Gardens



Ambleside Lake District



Harcourt Aboretum

The Treetex® geotextile used in the CellWeb TRP® system has two functions. Treetex® separates the sub base aggregates from the soil beneath and it traps oil within its structure and allows it to degrade aerobically within the pavement construction. The structure, thickness and weight of Treetex® creates the perfect environment for this to happen. Most importantly tests prove that Treetex® will absorb 1.7 litres of oil per square metre, this is 4 times more effective than standard geotextiles.

Treetex® is an intrinsic part of the CellWeb TRP® system; and must be in conjunction with the CellWeb TRP® in order to guarantee the success of the system.

Please see page 6 for full details of the guarantee.

Geosynthetics CellWeb TRP® System:



A Proven No Dig Solution

Advice, Design and Product Selection

Geosynthetics Limited has been supplying the CellWeb TRP® system since 1998 and has vast experience in its application. No two contracts are the same and we understand the factors that need to be taken into account to specify the correct CellWeb TRP® product.

We provide a free consultation, design and advisory service to find the solution that is most cost effective and beneficial for your site. Our service includes product selection, engineering calculations, CAD drawings and full instructions to help you from project conception to completion.



Fallbarrow Park, Windermere:
Prior to CellWeb TRP® Installation



Fallbarrow Park, Windermere:
CellWeb TRP® Installation



Fallbarrow Park, Windermere:
Completed CellWeb TRP® Installation

Final Surfacing

The benefits of the CellWeb TRP® system can only be maintained if a suitably porous final surface is selected. An ideal surfacing is the Golpla grass reinforcement and gravel retention system, a visually attractive surface that has the advantage of being fully porous. Alternatives include block paviors, porous asphalts and loose or bonded gravel.

Always Use CellWeb TRP®

The CellWeb TRP® system is the only research backed system of its kind in the UK with a 100% success rate. CellWeb TRP® has been specifically developed for the Tree Root Protection market. The system is supported by 15 years of data and thousands of installations making it the system of choice for the majority of Tree Officers and Arboriculturists in the UK.

CellWeb TRP® is uniquely identifiable. It is manufactured with a bright green panel on each side. When installed the green panels are laid adjacent, creating a green band across the construction.



Woodcock Hall, Yorkshire

CellWeb TRP® Product Guarantee

Geosynthetics

We hereby guarantee CellWeb TRP® against the death of any tree caused by a failure of CellWeb TRP® which its installation was intended to protect for a period of 20 years starting from the date of this guarantee.

Conditions of Guarantee

1. The details set out below must be correct in all respects.

2. We can only guarantee CellWeb TRP® where its installation has been carried out to high standards. Therefore our guarantee will only be applicable where:

(a) we have provided the designs in relation to the installation,
(b) the installation has been carried out by suitably proficient contractors,
(c) the installation has been carried out strictly in accordance with the installation specification/method statement available at the time of the installation,
(d) CellWeb TRP® has been incorporated into the installation above (and where specified as necessary, below) a Treetex® T300 Geotextile (or such updated replacement product as we may recommend), and
(e) the installation has been carried out using pins and panel staplers purchased from us or using similar products which are of the same or a higher quality.

3. If you experience any problems with the installation, you must tell us immediately. You must allow us onto the site at all reasonable times so that we can inspect the site and the installation to determine whether the CellWeb TRP® as failed.

4. As we need to determine whether the CellWeb TRP® has failed or whether the tree has been killed or damaged by another cause, you must not allow anyone else to examine the installation before we have the opportunity to inspect it as damage could be caused to the installation by any other inspection. If you do let third parties onto the site or you or your agents interfere with the installation this guarantee will lapse.

5. Your use of the surface and the traffic flow over the installation must be (and at all times have been) in accordance with the information provided to us at the time of the design of the installation. We can only provide designs based on the information you give to us and will have recommended the relevant CellWeb TRP® product according to that information.

6. This guarantee is for the benefit of the landowner of the site from time to time provided that you give us notice of the new owner on any transfer of ownership. We suggest you provide a copy of this guarantee to your solicitor when transferring the property.

7. Where a tree which was intended to be protected by the installation dies and we conclude that this was caused by a failure of CellWeb TRP® then we shall:

- replace the dead tree with a tree as close to the dead tree (as available generally in the marketplace) as possible subject to a maximum replacement cost of £10,000; and
- replace the CellWeb TRP® which has failed (but not any other part of the installation where the CellWeb TRP® has not failed) subject to a maximum replacement cost of £50,000.

8. Our total liability to you under the terms of this guarantee shall be limited to our obligations set out above and our liability to you for any other losses you may suffer is excluded to the fullest extent permitted by law. For the avoidance of doubt, we shall have no liability to you whatsoever for any damage to trees or a CellWeb TRP® installation caused by anything reasonably beyond our control, including for instance pollution.

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