PERMIT

CellWeb

Tree Root Protection System

GEOSYNTHETICS



fig. 1

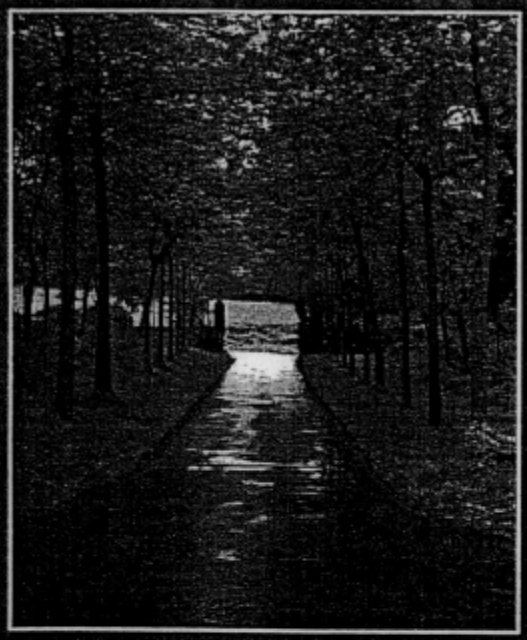

fig. 2

Problems associated with the construction of new developments around mature or any existing trees is well documented. BS5837 (1991) and later APN1 (1996) offer guidelines to those concerned with the protection of trees during the construction process.

The provision of car parking facilities and access roads around trees can lead to problems culminating in the premature loss of the tree itself unless preventative measures are taken to protect the tree roots during and after construction. *(fig. 1)*

Vehicular traffic above tree roots creates compaction of unconfined sub-soils causing oxygen depletion and even a loss of vital nutrients. Creating an impermeable surface above tree roots by installing a compacted sub base for load support also adds to these problems.

The solution is CellWeb, a three dimensional Cellular Confinement System that provides a load transfer blanket significantly reducing vertical loads on unprotected tree roots. *(fig. 2)*

Please contact:

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CellWeb

The CellWeb System uniquely prevents rutting action of sub-soils by confining infill material within the hoop structure of the panel, increasing the infills shear strength. The use of a CellWeb System increases the load capacity of granular infill by up to 50% reducing the overall construction depth required. Perforated cell walls permit through drainage and also provides frictional interlock of the infill again increasing the shear strength of the system.

A non woven geotextile filtration/separation membrane is used beneath the system to prevent migration of materials and also to aid with drainage vertically through the system.

The CellWeb panels are infilled with a clean angular gravel which provides load support and permits air and moisture transfer to the roots ensuring the long term preservation of the tree root structure. *(fig. 5)*

Surfacing materials are at the discretion of the client, however for specific advice please contact our sales office.

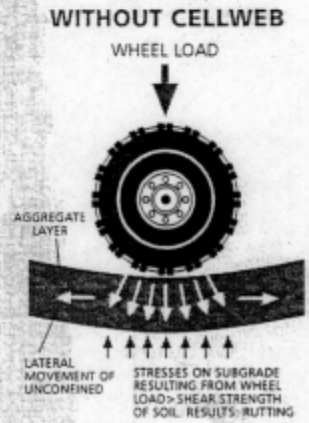


fig. 3

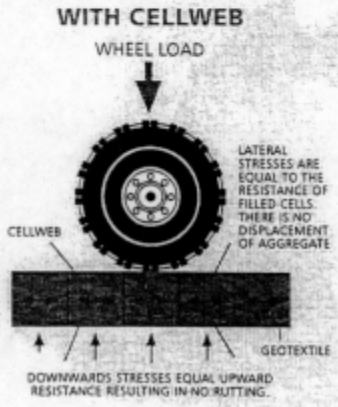
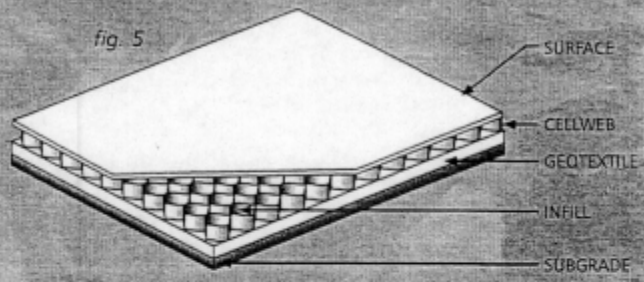


fig. 4

Benefits of using CellWeb

- Reduction in construction depth.
- Prevent compaction of sub-soils.
- Prevent oxygen/nutrient depletion.
- Environmentally friendly option.
- Fast and economic installation.
- Technical support available.

fig. 5



CellWeb is available in four cell depths; 75mm, 100mm, 150mm and 200mm.

The cell depth required is dependant upon specific site conditions. For specification details or project specific design assistance please contact our sales office.

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TREE ROOT PROTECTION

Trees are an important part of the environment. They bring not only an aesthetic value in the form of visually softening and screening buildings, but also absorb pollution, noise and provide a viable habitat for wildlife. The preservation of healthy trees in a local amenity is therefore beneficial to both residents and the local community.

THE PROBLEM



With increased urbanisation, the requirement to build access roads, house driveways, overspill car parks and vehicle hard standings near to mature trees is ever present. Traditional methods of construction are not acceptable in these situations due to the damage which can be caused to the tree feeder roots, weakening or killing the tree. Most tree roots are present within the first 600mm of soil depth and extend from the tree a distance equal to 60-75% of the tree's height. 80% of the crushing damage caused to these roots can be done in the first construction vehicle pass over the site.

Most tree roots... extend from the tree a distance equal to 60-75% of the tree's height.

Damage to tree feeder roots is mainly caused by:



- Severance of roots during site excavations.
- Compaction of surface soils by vehicular traffic, causing reduced oxygen and nutrient exchange between the roots and surrounding soils.
- The installation of impermeable wearing courses such as concrete or tarmacadam, preventing surface water permeating to the root system below.
- Changes in water table or ground level due the installation of structural foundations.

TREE PRESERVATION ORDERS

To ensure the protection of mature trees, the majority of those located within established areas of urban development will already be subject to Tree Preservation Orders (TPOs). The principal effect of a TPO is to prohibit the;

"cutting down, uprooting, topping, lopping, wilful damage or wilful destruction of trees without the LPAs [local planning authority's] consent. The cutting of roots, although not expressly covered above, is potentially damaging and so, in the Secretary of State's view, requires the LPAs consent".

"Tree Preservation Orders: a guide to the law and good practice"
Office of the Deputy Prime Minister

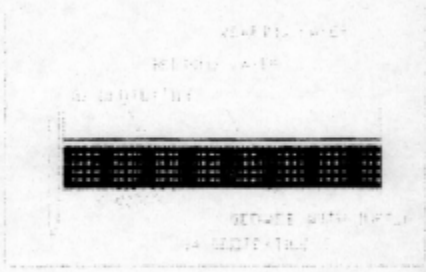
Trees may also be protected if they are within a designated Conservation Area. TPOs are administered by Arboricultural Officers within local councils, who have the responsibility for approving any proposed works. Involvement of the Arboricultural Officer at an early stage is strongly advised as failure to comply with TPOs can result in fines of up to £20,000 for each tree destroyed.

Failure to comply with TPOs may result in fines of up to £20,000 for each tree destroyed

THE SOLUTION

Where access driveways or vehicle hard standing areas are planned in areas adjacent to trees, Arboricultural Officers will normally specify a 'no dig' construction to eliminate the damage associated with normal construction methods. With this method no removal of surface soils is allowed. Instead, a permeable structural sub-base is laid directly onto the existing ground level with a permeable wearing course, such as grass reinforcement, low tack resin coated gravels or block paving, laid on top.

'No dig' construction may be accommodated with the use of perforated Geoweb in the sub-base layer. Geoweb reduces the overall depth of construction by introducing a cellular structure which dissipates downward loads by a horizontal transfer through the cell structure. This process in conjunction with the perforated cell wall also imports structural integrity to free draining aggregates which would otherwise be unacceptable in road construction. Therefore, a robust, shallow and free-draining sub-base is achieved, which allows vehicular access whilst allowing water and oxygen to permeate down to the tree roots.





Expanding and staking Geoweb panels

In accordance with British Standard BS5837: 1991 - Guide for Trees in Relation to Construction and APN 1:1996 – Driveways Close to Trees, Geoweb acts to protect tree roots in three main ways;



Infilling the Geoweb

1. **Used with the correct infill, Geoweb allows the construction of a permeable sub-base.**
2. **Geoweb enables 'no dig' construction to be used, avoiding any severance of tree roots.**
3. **Geoweb prevents the compaction of soil surrounding roots.**

The permeable wearing course to complete the system can be accommodated through Ecoblock, a grass protection or gravel retention system. The cellular construction of Ecoblock provides a fully permeable, attractive wearing course which is capable of accommodating heavy vehicle loads, whilst allowing the exchange of oxygen and free drainage of water to the sub-base.

The Geoweb system has been used in tree root protection applications with great success for the following clients:

- **Node House - North Dorset District Council**
  A number of mature beech trees have been protected during the construction of a large residential property. This site has been closely monitored for the past 30 months by local tree officers. There have been no noticeable problems.

- **Woodfield School - Wigan Metropolitan Borough Council**
  Geoweb was used to protect the roots of trees lining an access road and in an extended car parking area.

KEY BENEFITS OF THE GEOWEB SYSTEM:

- ***'No-dig' solution***
- ***Cost effective***
- ***Fast and simple to install***
- ***Design flexibility***
- ***Environmentally-friendly***
- ***Tried and tested product***

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July 2004
A member of the Heiton Group

We can provide comprehensive technical support for our range of ground engineering products. If you have a particular application which you would like to discuss in more detail, please contact our Specification Sales Team on 01204 862222, who will be pleased to arrange for one of our representatives to contact you.

protection of trees on development sites

Please display a copy of these guide-lines prominently on site and ensure that all relevant personnel are aware of its contents.
The guidelines may be freely copied and included within contract or specification documents.

The recommendations in this leaflet are advisory, but may, be enforced, by the implementation of planning conditions or Tree Preservation Orders. Where damage is caused to protected trees following a failure to observe the recommendations, those responsible may be prosecuted and suffer heavy fines.

Further guidance on tree protection may be found in BS 5837: ~~1991~~ (Guide for Trees in Relation to Construction). 2005

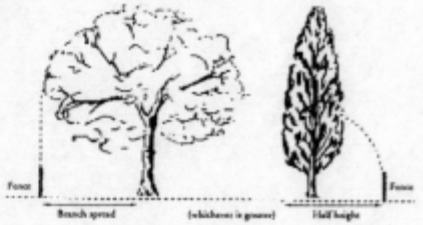


1. TREE SURGERY:

Any removal of specified trees or pruning of trees to be retained must be agreed with the District Council before hand. Where work is necessary for building operations and/or access this should be carried out in advance of other operations under expert supervision and using skilled contractors. All works must comply with the relevant recommendations of BS 3998:1989 (Tree Work). No further tree surgery should be necessary, other than possible minor remedial works agreed beforehand with the District Council.

2. FENCING AND PROHIBITED AREAS:

All trees and groups of trees to be retained must be physically protected from damage by enclosing the area covered by their crown spread (and for upright growing trees, a distance equal to half of their height) or as otherwise agreed with the Local Planning Authority.

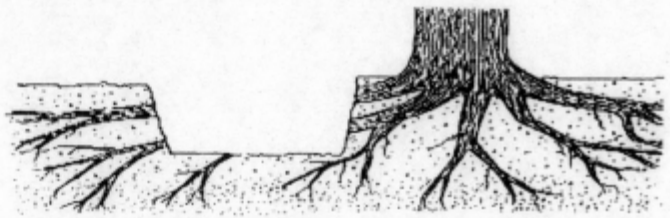


The minimum protection required is fencing at least 1.2 m high but further measures may be required, e.g hoardings braced by scaffold poles or, careful siting of site huts to form a physical barrier. All barriers must be erected prior to any other work commencing on site and no unauthorised access should be permitted within the protected areas for the duration of the works.

3. FIRES:

No fires should be lit where they might cause damage to any part of a tree or hedgerow. Take special care in windy conditions. In addition to visible scorch damage, the heat of a fire can boil the sap in trunks, branches and foliage leading to early decay and death, even where damage is not immediately apparent. If burning on site is essential, suitable areas should be located and agreed with the District Council.





4. EXCAVATIONS:

No excavations of any kind, including those for foundations or statutory services, should be carried out where damage to roots may occur, except where agreed in advance by the District Council and never within protected areas. In particular, trenches for services should be located as far away from trees as possible and aligned to minimise the extent of disturbance. At all costs, avoid excavations on more than one side of a tree and hand dig in areas where roots may be exposed.

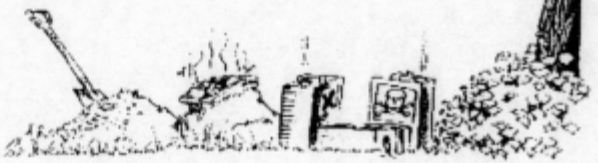


5. STORAGE OF MATERIALS:

Bulky or heavy materials, including spoil or topsoil and building materials, must not be stored beneath the crown spread of trees or within protected areas.

6. CHEMICALS AND HARMFUL MATERIALS:

No oil, diesel fuel, tar, bitumen, cement, weed-killers or any other chemicals should be stacked, spilled, mixed or applied within 10 metres of, or up slope from, the base of any tree or other protected vegetation. This is in order to prevent seepage through the soil which could cause serious damage to roots.





7. PLANT AND VEHICLE ACCESS:

Special care must be taken when using plant or vehicles close to trees to avoid damaging overhanging branches and to avoid compacting the ground, especially in wet conditions, as this will damage roots. Plan access routes and working space carefully to avoid disturbing ground on more than one side of a tree and use tracked vehicles or lay sleepers, to spread the load.

8. CABLES, WIRES, SIGNS, FENCING

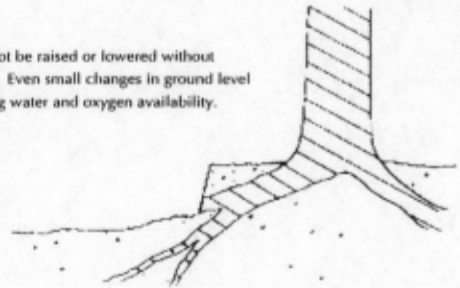
Trees must not be used as convenient supports for any of these items. They may cause damage resulting in breakage or decay. Under no circumstances should trees be used as anchors for winches as this may cause instability.

9. GROUND LEVEL CHANGES:

The soil level within the area of the root spread of a tree must not be raised or lowered without expert advice or the agreement of the Local Planning Authority. Even small changes in ground level can cause serious damage to trunks of trees and roots by altering water and oxygen availability.

10. WATERCOURSES:

It is important not to alter, divert or culvert existing watercourses or ditches which are adjacent to trees as this may cut off the water supply to their roots.



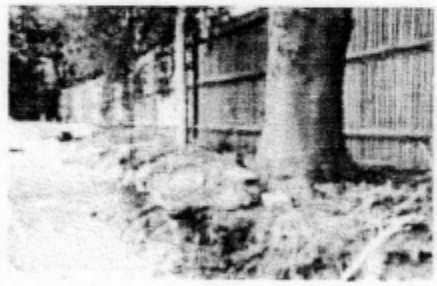
11. EXPOSED ROOTS AND ACCIDENTAL DAMAGE:

If, despite taking precautions, roots or branches over 50 mm diameter are damaged during works, then cut back damaged or torn areas cleanly to sound wood, backfill to cover exposed roots as soon as possible and obtain expert assistance for tree surgery where necessary. The District Council must be notified of any accidental damage as soon as possible.

CellWeb™

Tree Root Protection System





Potential loss of existing tree due to poor construction techniques.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.



Glynebourne Wood.

Pedestrian path to recreational woodland built using a CellWeb™ foundation which was covered with DuoBlock and then filled with woodchip to create a porous surface.

Product features



CellWeb™ comprises an expandable cellular mattress that is then filled with a clean stone sub-base and above a Treetex T300 Geotextile.

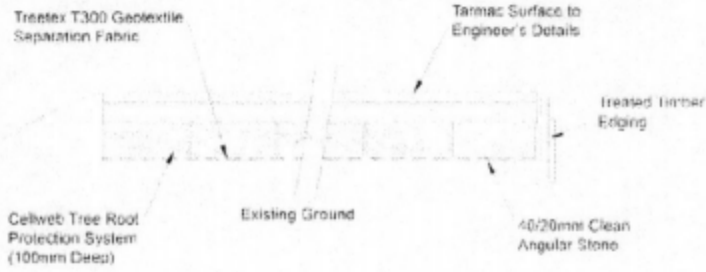
The honeycomb-like structure is made of robust high-density polyethylene (HDPE) that is simply stretched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CellWeb™ this is achieved without compaction and without reduction in permeability.

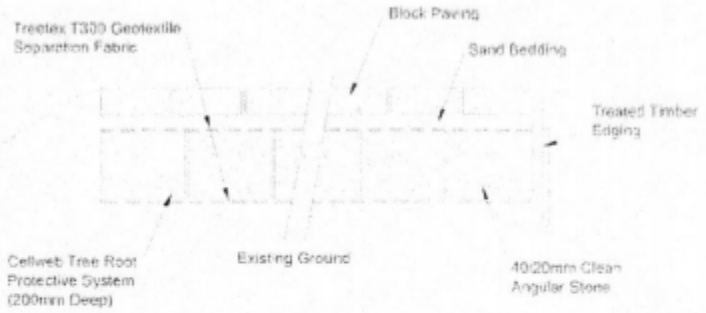
Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to nearby tree roots. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CellWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CellWeb™ significantly reduces surface rutting, increasing the long term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CellWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CellWeb's green credentials.

- **No excavation – Soil structure remains undisturbed; risk of root damage minimised.**
- **Porous infill – Allows tree roots to conduct moisture and gas exchange.**
- **No compaction – No need to compact the infill to achieve a load-bearing structure.**
- **Lateral stability – Structure remains rigid to vertical loads.**





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Wide product range

Large stock holding

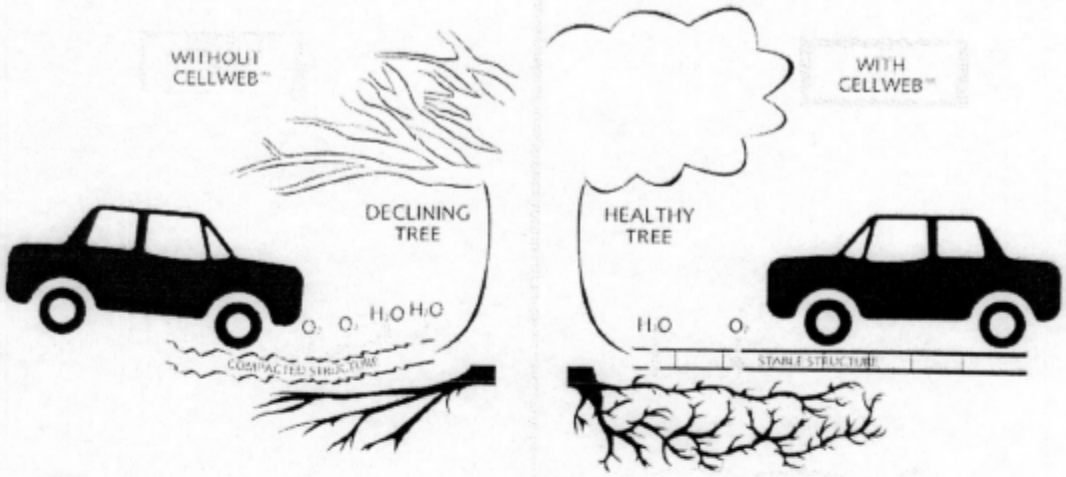
Next day delivery

Hydrological benefits

Water is a shrinking resource in the urban environment. As the extent of the built environment increases, more and more ground is being covered by impermeable hard surfaces that repel rainwater runoff, preventing it from reaching the roots of vegetation, and in particular trees. Rapid water runoff stretches the capacity of stormwater drains and frequently results in drainage management issues that are rarely resolved in favour of adjacent trees.

Using CellWeb™ mitigates these issues by promoting both the vertical and the lateral movement of water, whether the system is installed above or below ground. The 'pores' that are created by the spaces between the infill stones and the cell perforations even allow water to flow to adjacent tree roots that are effectively 'trapped' under areas of impermeable hard standing. CellWeb™ therefore helps to promote root growth and allows roots to continue to grow within areas of hard surfacing.





DECLINING ROOT SYSTEM

HEALTHY ROOT SYSTEM

Design service

Onsite support

Geosynthetics



Design & installation

Final surfacing

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

Call the Geosynthetics sales team on 01455 617 139 for more advice on surfacing options and other products and systems.

Advice and product selection

Geosynthetics Limited has been supplying the CellWeb™ system for many years and has acquired solid 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 right CellWeb™ product.

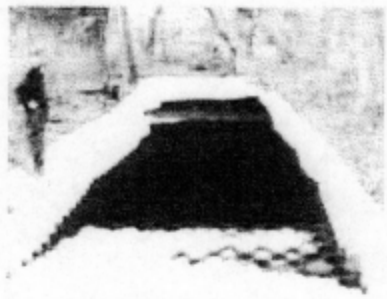
We provide a FREE consultation, design and advisory service to find the solution that is most cost-effective and beneficial for your site. Our service includes product selection, CAD drawings and full instructions to help you from project conception to completion.

Call our sales office on 01455 617 139 for specification details and project-specific design assistance.

CellWeb™ in action:
Access road for the Lake District National Parks Authority.



Site before construction pictured above.



Installation of the CellWeb™ system.



Four years later.

Technical specification

Product Specifications

Properties	Standard Cell
Material	Virgin HDPE
Wall thickness	1.25mm
Seam welding	Ultrasonic to 100% of seam length
Cell depth	75, 100, 150, 200 and 300mm
Width of expanded panel	2.56m
Length of expanded panel	8.1m
Cell diameter (expanded)	259 x 224mm

Certified Quality

CellWeb™ is manufactured in accordance with the ISO 9001 Quality Management System in a comprehensive range of cell diameters and depths.

Geosynthetics Ltd

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Geosynthetics

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