GRASS & GROUND

REINFORCEMENT SOLUTIONS

TYPAR™

COMMITTED TO PERFORMANCE

TYPAR™ is a brand of Berry Global, a Fortune 500 company and one of the world's leading producers of engineered non-woven fabrics, and is committed to developing products and processes that provide a safer, cleaner, and healthier world.

TYPAR is a market leader in the design and manufacture of innovative geosynthetics, providing a unique range of performance led solutions utilizing a broad range of international brands. We excel in the innovative application of technology to create versatile, high-performance materials which are unique, cost-effective and deliver significant added value.

With a strong background and proven excellence within the civil, construction, military, horticulture and landscaping industries, Berry Global offers enhanced commercial opportunities, as well as adding value to existing customers through a broadening product portfolio.

For many years, TYPAR has focused on identifying and improving performance in key areas of environmental impact, which includes waste production, energy consumption, water resource management, and the use of recycled and degradable materials. All TYPAR materials contain recycled content up to 100% and are chemically inert.

GROUND SUPPORT & STABILIZATION

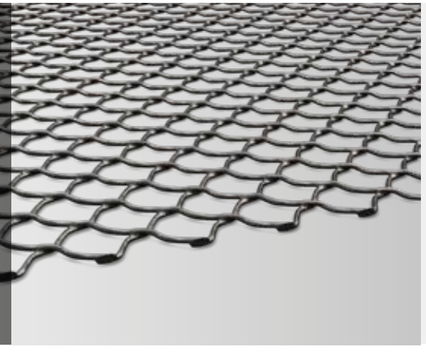
TYPAR Geosynthetics provide trusted, performance based Ground Support & Stabilization alternatives to more traditional building staples like stone, sand and asphalt. Our products are lighter and easier to install than their mineral counterparts, reducing materials required, waste created and the need for heavy construction equipment. TYPAR Geosynthetics can meet application requirements and extend the life of the projects.

PRODUCT SELECTOR

TYPAR manufactures a large range of products to reinforce, stabilize and protect grass and gravel surfaces. The chart below gives an overview of which product may be best suited for your project as determined by the existing ground conditions, the application and the frequency of use.

TURFPROTECTA™

Permanent, grassed paths, pedestrian areas, access routes and occasional use car parking on firm, well-drained ground.



APPLICATION

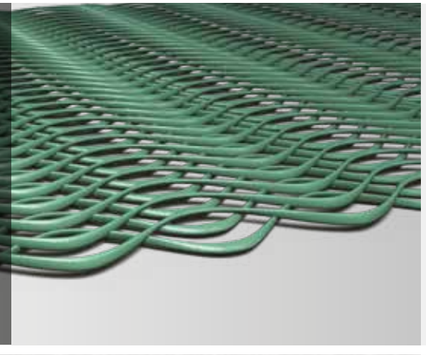
Pedestrian and occasional light vehicle usage

Light vehicle and heavy pedestrian usage

GRASSPROTECTA®

Standard Grade*
Permanent, grassed overflow car lots, wheelchair access routes, golf cart paths and heavily pedestrianized grass paths on firm, well-drained ground.

Heavy Grade*
Permanent, grassed overflow grassed car lots, access lanes, light aircraft taxiways, RV and trailer park areas and equestrian surfaces.



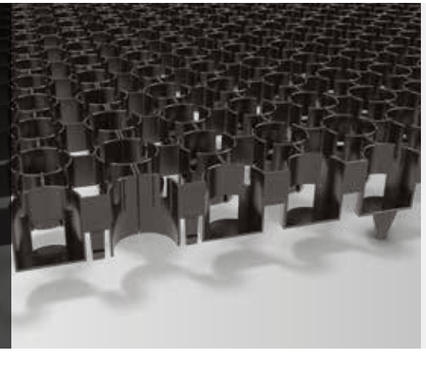
Light vehicle and heavy pedestrian usage

Standard vehicle loads up to H15 and heavy pedestrian usage.

BODPAVE® 85

BODPAVE 85 Grass
Ideal for permanent grassed car lots, helipads, emergency access lanes and other trafficked areas.

BODPAVE 85 Gravel
Ideal for permanent car lots, emergency service access lanes, gravel driveways and other trafficked areas.



Heavy vehicle loads up to H25 loading

Heavy vehicle loads up to H25 loading

TYPAVE® 25

Engineered to provide a reinforced surface for H25 loading while allowing for the beatification of a grass surface.

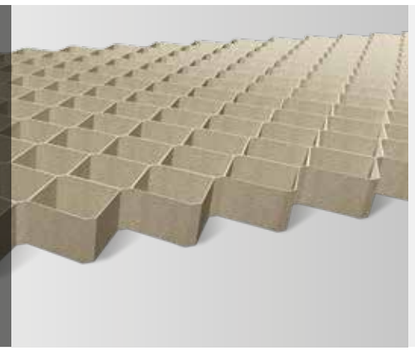
APPLICATION

Heavy vehicle loads up to H25 loading

Heavy vehicle loads up to H25 loading

TYPAR GEOCELL

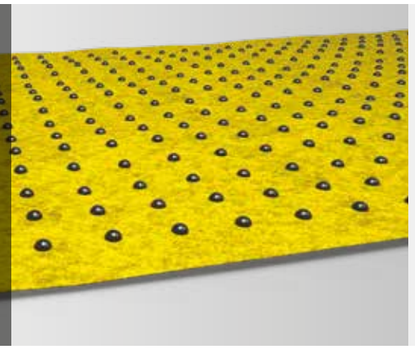
Slope protection and load support. Suitable for slopes up to 45 degrees (1:1 slope) and on horizontal surfaces to provide a stable base for traffic and an even load distribution.



Heavy vehicle loads up to H25 loading, off-road industrial machinery

BIOBARRIER®

An innovative chemical and physical barrier system combining the Non systemic stopping power of Trifluralin with the strength and durability of TYPAR



Tree or vegetation root areas

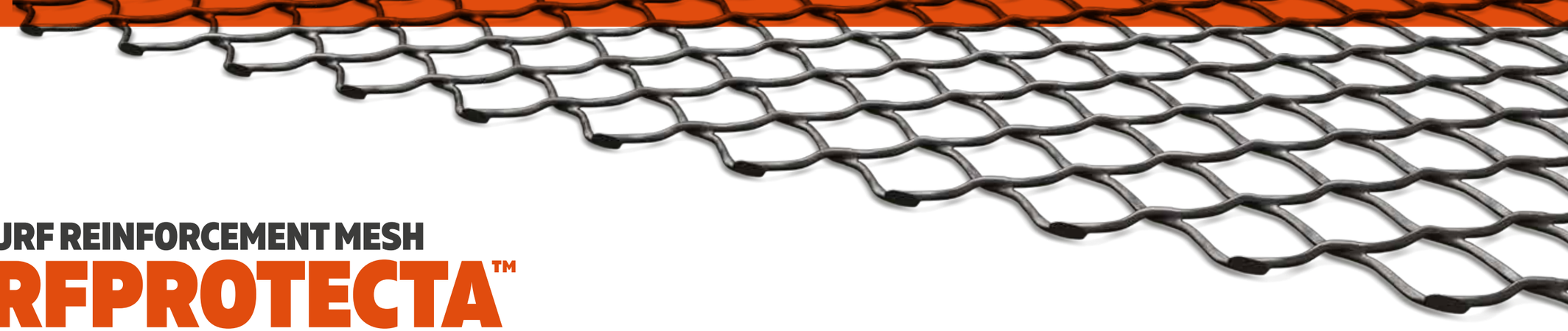
GEOTEXTILE

TYPAR non-woven, thermally bonded GEOTEXTILES utilize continuous filament technology for superior strength and uniformity, providing the ideal solution for construction and civil engineering applications.

Pedestrian and occasional light vehicle usage

Light vehicle and heavy pedestrian usage

* The suitability of a standard or heavy grade will be site specific. Please contact TYPAR to discuss with one of our technical managers.
All TYPAR grass and ground reinforcement products are suitable for use as a source control solutions in LID and NPDES applications.



TURF REINFORCEMENT MESH
TURFPROTECTA™

TURFPROTECTA mesh is a black or green, lightweight polyethylene mesh for grass reinforcement where occasional light vehicular or pedestrian use is required for car parking or access routes. Supplied in 6.56' x 98' rolls, the mesh is ideal for reinforcing grassed surfaces prone to wear and smearing which can create a muddy surface incapable of being used.

SUITABLE APPLICATIONS

- **Paths**
- **Pedestrian areas**
- **Lawn maintenance**
- **Cart paths**
- **Occasional use car lots**

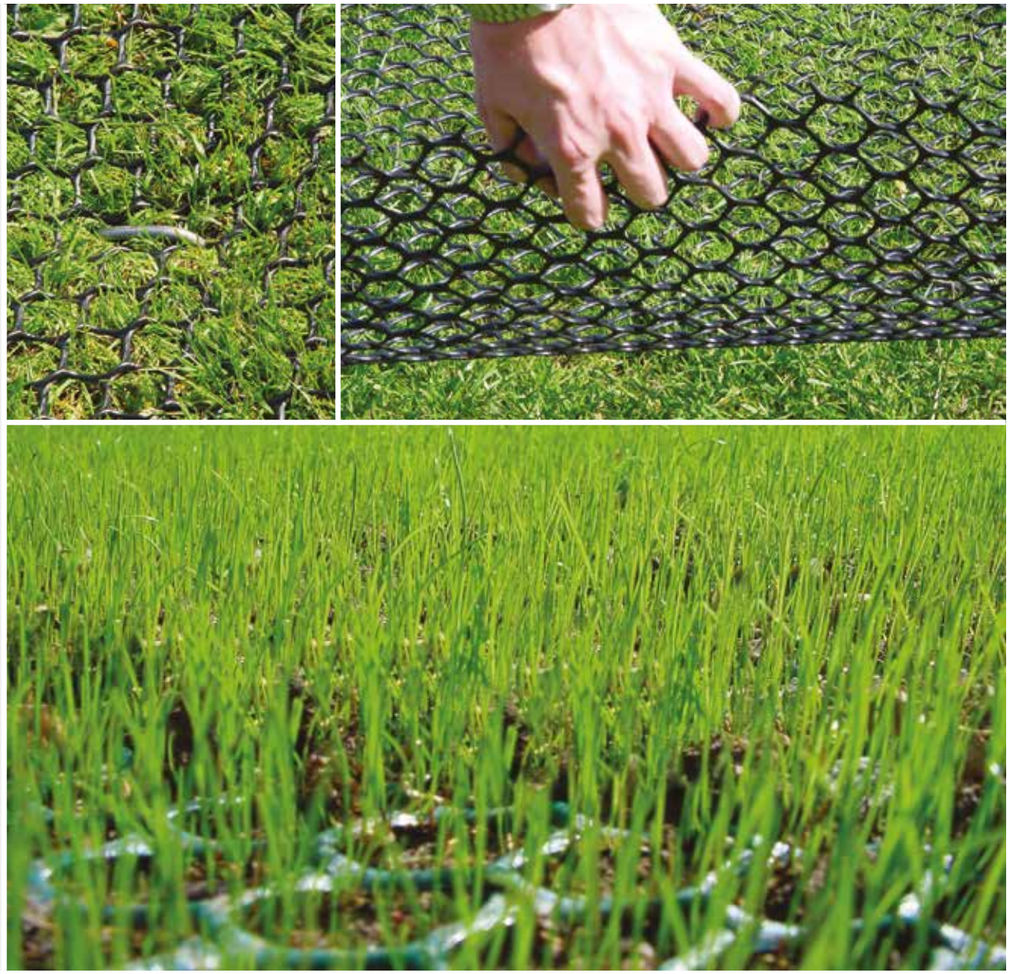
Manufactured from 100% recycled high density polyethylene, the mesh is UV stabilized and simple to install; after cutting the grass short, the mesh is unrolled and pinned to the surface using metal U-Pins.

By allowing plants to grow through the mesh apertures, the blade intertwines with the mesh filaments creating a strong, discreetly reinforced surface, limiting damage and reducing soil compaction. It is advisable to allow the grass to fully establish before the area is used to create a stronger reinforced surface (this may take only a few weeks to a few months depending on the grass growing season.) The grass can however be mowed, rolled and fertilized as usual during this period. TURFPROTECTA mesh can be installed onto existing grassed surfaces or newly landscaped areas, for both permanent or temporary applications.

It is strongly recommended that installation be carried out during the growing season to allow a strong interlock between the mesh and the grass roots.

Size	Grade	Color	Mesh Aperture	Material	Weight (lbs/ft²)
6.56' x 98.42'	Heavy	Black	0.86" x 1.06"	HDPE (100% Recycled)	0.135
6.56' x 98.42'	Heavy	Green	0.86" x 1.06"	HDPE (100% Recycled)	0.135

Fixing Pins	Material	Size (inches)	Other
U-Pins	Steel	6.7 x 2.75 x 0.23 dia	50 pack



GRASS REINFORCEMENT MESH

GRASSPROTECTA®

GRASSPROTECTA mesh reinforces grassed surfaces prone to wear, rutting and smearing. The oscillated mesh structure has been designed to increase traction and improve slip resistance by up to 97% compared to standard straight oriented meshes.

- **High level of reinforcement – up to 8 tons per axle (imposed load)**
- **Ideal for permanent or temporary applications**
- **Fast and cost effective installation compared to plastic paving grids**
- **No excavation or soil removal necessarily required**
- **Low slip risk PTV value of >40**

GRASSPROTECTA mesh is supplied on 6.56'x 65.6' and 3.28'x32.8' rolls in two thicknesses (0.45" and 0.55") as determined by the application and manufactured from partly recycled UV stabilized polyethylene (minimum 20% recycled polymer).

Installation is simple; after cutting the grass short the mesh is unrolled and pinned to the surface using metal U-Pins.

When grass grows through the mesh apperatures, GRASSPROTECTA mesh allows the grass to intertwine with the mesh filaments creating a strong, discreetly reinforced surface capable of withstanding vehicle loads, limiting damage and reducing soil compaction.

GRASSPROTECTA mesh can also be installed onto newly landscaped areas and seeded as required. TYPAR strongly advises that newly installed GRASSPROTECTA mesh areas should be left unused until the grass has grown through the mesh apertures ensuring a strong interlock with the grass and mesh filaments is achieved – normally after a few weeks during the growing season and the surface has undergone several mowing cycles. If the surface is used immediately grass growth may take a longer period of time to establish, thus limiting the effectiveness of the product.

GRASSPROTECTA mesh can be used in source control applications as part of a LID/LEED system and is the perfect alternative to impermeable paved surfaces where natural grassed traffic lanes and driveways are preferred, where planning restrictions are applied or cost savings are being considered.

Grade	Nominal weight (lbs/ft²)	Thickness (inches)	Tensile Strength (kN/m) (MD)	Roll size (ft)	Material
Standard	0.245	0.45	0.245	3.25' x 32.8'	Recycled/Virgin HDPE Blend
Standard	0.245	0.45	0.245	6.56' x 65.6'	Recycled/Virgin HDPE Blend
Standard	0.245	0.45	0.245	6.56' x 32.8'	Recycled/Virgin HDPE Blend
Heavy	0.41	0.55	0.41	3.25' x 32.8'	Recycled/Virgin HDPE Blend
Heavy	0.41	0.55	0.41	6.56' x 32.8'	Recycled/Virgin HDPE Blend
Heavy	0.41	0.55	0.41	6.56' x 32.8'	Recycled/Virgin HDPE Blend

SCOUR PROTECTION

GRASSPROTECTA SERIES

GRASSPROTECTA™ is composed of High Density Polyethylene, with 20% recycled content, and designed with a 50% open space structure to accommodate a lush, uniform vegetated surface when established. With proper installation, the reinforced transition zone will visually appear as a grassed or natively vegetated surface, while reinforcing the soil against erosion equivalent to Class 1 Rip-Rap stone.

APPLICATIONS

- Vegetated Erosion Control
- Stormwater Pipe Outfall
- Conveyance Channel
- Slope Stabilization
- Streambank and Shoreline Reinforcement
- Dam and Levee Overtopping Stabilization
- Detention Pond Emergency Outflow Weir
- Vegetated Shoreline Access
- Maintenance Vehicle Access Stabilization
- Canoe & Small Craft Launch

In combination with surface armament, GRASSPROTECTA™ acts as a stabilization layer for maintenance vehicle access, stabilizing the surface to prevent rutting in low lying, saturated areas when mowed or accessed.

BENEFITS

- Multiple Product Applications and Use
- 20% Recycled Content
- 50% Open Space for Lush Vegetative Cover
- Flexible to Conform to Undulating Surfaces
- Slip Resistant Oscillated Mesh
- Roll-out for Fast Installation
- Exceeded TRI Env., Inc. testing capability
- Replace up to Class 1 Rip-Rap

Lock-Disc Anchors

Specially designed soil anchors are used to fix GRASSPROTECTA ™ to the surface and maintain stability under high sear values (>12.3 lbs/sf) even under non vegetated soil conditions. Refer to the GRASSPROTECTA™ installation guide for Scour Application instructions.

Scour Protection Performance	
Shear Value with TRM	>12.3 lbs/ft^2
Velocity Value	>23 ft/sec

POROUS PAVING GRIDS FOR GRASS

BODPAVE® 85

BODPAVE 85 porous pavers are a modular, interlocking cellular and porous paving system for ground reinforcement. It can be installed with either a grass or gravel filled surface. Manufactured from UV stabilized 100% recycled HDPE, BODPAVE 85 pavers are strong, chemically inert and non-toxic, enabling it to provide a durable, safe and sustainable eco-friendly surface for trafficked areas.

APPLICATIONS

- **Car/Bus Parking Lots (Grass or Gravel)**
- **H25 Emergency Vehicle Access Roads**
- **Aircraft Taxiways and Helipads**
- **Walkways and Handicap Paths**
- **Golf Cart Paths**
- **Driveways and Residential Parking**

BODPAVE 85 pavers are a cost effective solution to worn and rutted grassed areas, displaced gravel and for source control of surface water run-off. BODPAVE 85 pavers have been manufactured to offer a high load bearing performance, providing structural integrity and a positive mechanical interlock.

BENEFITS

- **Load bearing up to 230 psi @ .25" deflection.**
- **Manufactured from 100% recycled polymer.**
- **Environmentally friendly, aesthetically pleasing and free draining natural grass or gravel surface.**
- **Contributes to 15 points under LEED projects**

The unique design of BODPAVE®85 pavers resist lateral movement, improves traction and allows expansion and contraction while promoting optimum grass growth, root protection and surface stabilization.

Paver dimensions	Nominal cell size	Quantity per unit	Nominal weight (lbs/ft²)	Load bearing capacity @ 2" deflection (psi)	Material	Color
19.7" x 19.7" x 2" + 1.37" integral ground spike	2.64" plaque and 1.81" round	4 grids	1.27	230 (standard profile design)	Recycled HDPE	Black Green
Marker Color	**Dimensions**	**Polymer**				
White	0.75' x 23'	HDPE				

POROUS PAVING GRIDS FOR GRAVEL
BODPAVE 85

BODPAVE®85 pavers should be installed onto a well prepared, free draining, firm and relatively level sub-base (typically a Class 5 or reduced fines Class 7) using either a reduced-dig system or by employing a full sub-base construction.

The panels (a pre-assembly of four pavers) connect together and are then filled with either a sand:soil rootzone and seeded or turfed for a grass surface, or filled with an angular aggregate for a gravel surface as determined by the application. Construction profiles for each application will be determined by the specific site conditions and load bearing criteria. Detailed design literature and technical support are available to download online from www.typargeosynthetics.com

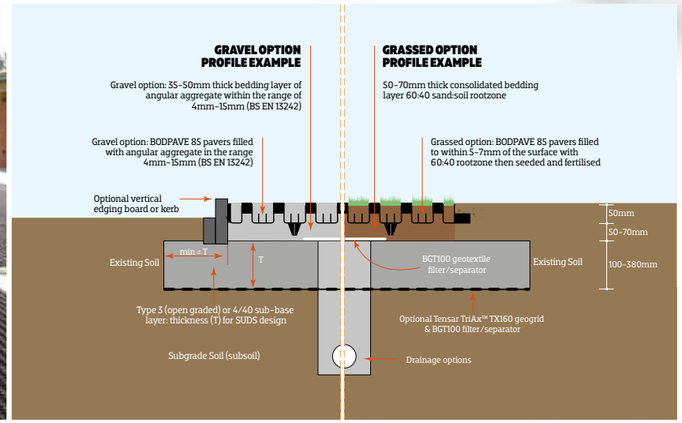
All BODPAVE 85 paver applications must be provided with sufficient and adequate drainage facilities in order to function as intended. Failure to ensure this may compromise overall performance.

The open cell structure provides high surface water infiltration and is suitable for source control within a LID/LEED profile.

Plastic markers are available for marking parking bays and lines within areas of the BODPAVE 85 cellular paving system. The markers are designed to clip positively into the plaque shaped cells of the BODPAVE 85 pavers and can be fitted in various orientations to create solid or dotted lines and 'T' or 'L' shapes for parking bay heads, aisles and junctions.

They can be permanently fixed in place by applying a suitable high strength plastic (HDPE) glue or an outdoor frame sealant to the underside of the marker. If required, the markers can be reduced in size to create single-cell or double-cell sized units by cutting accurately along the lines between each textured square/pyramidal section. It is recommended that these are bonded into place to resist displacement.

Paver dimensions	Nominal cell size	Quantity per unit	Nominal weight (lbs/ft²)	Load bearing capacity @ 2" deflection (psi)	Material	Color
19.7" x 19.7" x 2" + 1.37" integral ground spike	2.64" plaque and 1.81" round	4 grids	1.27	230 (standard profile design)	Recycled HDPE	Black Green
Marker Color	**Dimensions**	**Polymer**				
White	0.75' x 23'	HDPE				



FLEXIBLE POROUS PAVING
TYPAVE® 25

TYPAVE 25 by TYPAR is a new US manufactured porous paver made from recycled plastic material to meet LEED credits. The plastic paver is engineered to provide a reinforced surface for H25 loading while allowing for the beatification of a grass surface.

TYPAVE 25 paver's structure is constructed with Quick-Snap integral joints between sections creating a strong monolithic structure that can be staked into the ground removing the chance for shear or slip.

The shipping mechanism was designed into this product fitting perfectly on a 48 x 48 pallet with double stacking to make the most efficient shipping reducing both the cost and carbon foot print . Once installed the porous plastic paver performs the reinforcing structure for fire access lanes, drive lanes and parking lots while keeping the aesthetics of grass. With the open cell structure, TYAPR 25 creates a permeable reinforced surface suitable for traffic while allowing water to permeate into the sub-soil beneath.

APPLICATIONS

- **Fire Access Lane**
- **Utility Access**
- **Emergency Access**
- **Parking Lots**

BENEFITS

- **Grass or gravel surface reinforcement**
- **Quick-Snap Technology with hands free connections**
- **6,560 psi load support**
- **Up to 2X more connections**
- **Made in the USA from recycled materials**
- **Ship up to 75% more per truckload vs. the competition**
- **Anchoring capability**

Paver Dimmensions	Cell Depth	Quantity per unit	Load bearing Support	Material	Color
46" x 46" x 1" 2000 sq ft per pallet	1"	4 grids	6560 PSI	Recycled Plastic	Black

CELLULAR CONFINEMENT SYSTEM

TYPAR GEOCELL

The TYPAR GEOCELL cellular confinement system utilizes the strength and permeability of a geotextile to create a 3-dimensional cellular confinement system. Manufactured from dark grey PP/PE bicomponent fiber geotextile, the cell walls are permeable to water, air and nutrients, increasing stability and vegetative performance. The TYPAR GEOCELL system ships in compacted panel form and expands into a honeycomb formation to the desired shape and dimension on-site. The unique, lightweight, flexible material conforms to surface variations to improve ease of installation while resisting impact damage. A variety of infill materials, including native soils and recycled aggregates, may be used to reduce waste material and overall construction costs.

TYPAR GEOCELL for Slope Protection

The cellular structure of the TYPAR GEOCELL system improves resistance to erosive forces on steep, unstable, or slopes exposed to severe hydraulic or mechanical stresses. Variable cell depths and diameters provide cost-effective options for protection up to 1:1 (45 deg) slopes.

TYPAR GEOCELL for Load Support

TYPAR GEOCELL cells transfer downward forces laterally, reducing loads on underlying soils. The cellular confinement system is an ideal solution for providing stabilization over poor soil conditions, reducing constructed profile depth and cost, protecting soil and roots from compaction, and providing site access for light, heavy, and industrial vehicles.

Product	Panel Size	Cell Diameter	Cell Depth	Weight	Material	Application Method
TYPAR Geocell 250/100	16.4' x 23'	10"	4"	37.5lbs	Non-woven PP/PE	Pedestrian/Light Vehicle Load Support & Slope Protection
TYPAR Geocell 250/150	16.4' x 23'	10"	6"	55lbs	Non-woven PP/PE	Light Vehicle Load Support & Slope Protection
TYPAR Geocell 350/100	16.4' x 23'	13"	4"	24lbs	Non-woven PP/PE	Slope Protection
TYPAR Geocell 350/150	16.4' x 23'	13"	6"	37.5lbs	Non-woven PP/PE	Slope Protection
TYPAR Geocell 220/200	20' x 10'	8"	8"	44lbs	Non-woven PP/PE	Heavy Vehicles Load Support

Product	Material	Size
Fixing Pin	Steel Rod	22" x 4" x 0.32" dia

ROOT & WEED CONTROL SYSTEM

TYPAR BIOBARRIER®

The BIOBARRIER root and weed control system manages roots through the slow, controlled release of Trifluralin, a non systemic herbicide that has been used in food crop production for more than 40 years. Nodules containing Trifluralin are through-injection-molded to 4 osy, durable TYPAR GEOTEXTILE fabric, creating a continuous chemical and physical barrier against roots without impeding the flow of water, air or nutrients. Roots growing into the zone of inhibition are stopped, not just redirected, encouraging the plant to send energy to unimpeded areas of the root system, promoting healthy plant growth.

BIOBARRIER Root Control System

Used vertically, the BIOBARRIER root control system protects adjacent structures from root damage. Guaranteed protection for 15 years reduces the chance of injury and potential liability, as well as the costs associated with preventative maintenance and damage repair.

BIOBARRIER Weed Control System

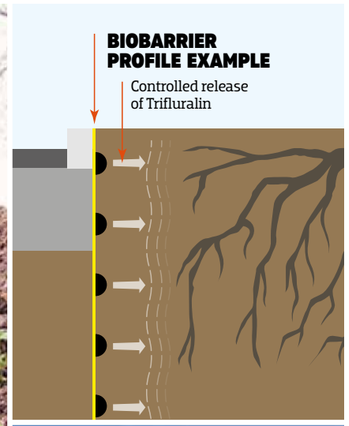
Installed horizontally below 3" of stone/wood mulch, the BIOBARRIER weed control system blocks weed establishment using two layers of defense: chemical and physical. Guaranteed for 10 years, weeds are unable to develop a strong root system in the mulch layer while ornamental tree and shrub roots expand unimpeded below the Trifluralin emitting fabric layer, eliminating unwanted competition and maintenance costs.

BIOBARRIER Surround System

Tree roots seek out air and moisture in the soil, causing expensive damage to underground infrastructure, septic lines, municipal pipes, swimming pools, and more. BIOBARRIER'S unique geotextile design lends it the flexibility to surround infrastructure, extending the life of your investment by providing protection from root damage for a minimum of 15 years.

Weed Control Width (In)	Roll Length (ft)	Color	Material	Guarantee
29, 39, 58.5	20, 100	Yellow	TYPAR Geotextile	15 years*
Root Control Width (In)	**Roll Length (ft)**	**Color**	**Material**	**Guarantee**
12, 19.5, 24, 29, 39, 58.5	20, 100	Yellow	TYPAR Geotextile	15 years*

*Guaranteed for up to 15 years, see website for details.



SEPARATOR/FILTER

TYPAR GEOTEXTILE

Made in the USA, TYPAR GEOTEXTILES boast over 40 years of proven performance in separation, stabilization, and filtration applications. The continuous filament, thermally bonded design provides a higher strength:weight ratio than standard non-woven construction fabrics and maintains consistent permeability rates regardless of soil type or compaction. TYPAR GEOTEXTILE'S unique characteristics make it the ideal solution for road reinforcement, industrial yard stabilization, subsurface drain applications, erosion control, landfill separation, mulch underlayment, and septic system projects.

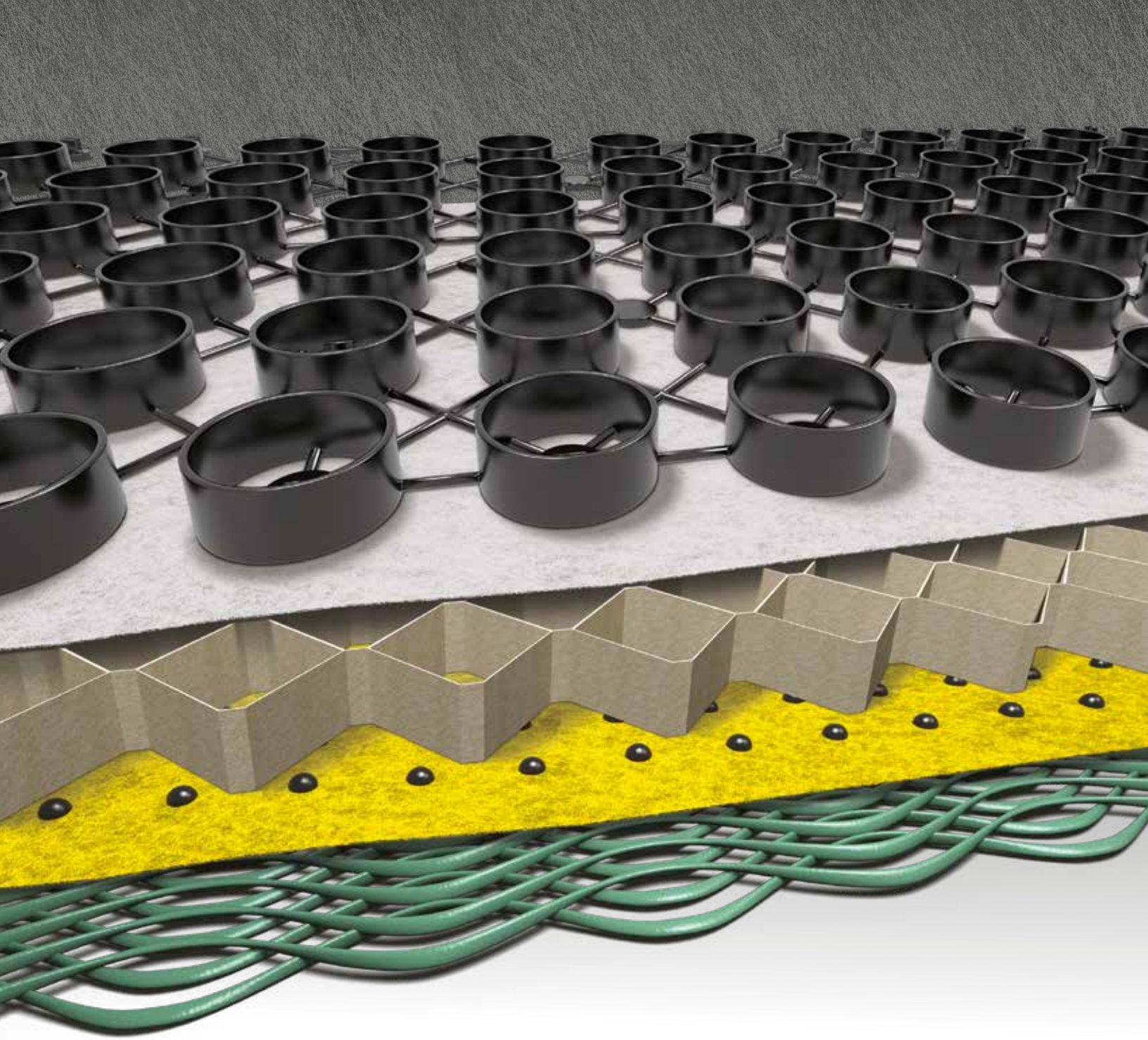
Tough over time, TYPAR GEOTEXTILES preserve the original design, reduce construction and maintenance costs, and increase a project's longevity!

BENEFITS

- **Ideal for separation, stabilization, and filtration**
- **Higher strength:weight ratio**
- **Durable - 40+ years of proven performance**
- **Up to 20 percent recycled content**
- **Superior uniformity**
- **Consistent permeability even under compaction**
- **Filtering that prevents clogging**
- **Made in the USA**
- **Isotropic fabric provides stability and strength in all directions**

AASHTO Class M288			-	-	-	-	3	2	2	1	1
			TYPAR 3151	TYPAR 3201	TYPAR 3301	TYPAR 3341	TYPAR 3401	TYPAR 3501	TYPAR 3601	TYPAR 3801	TYPAR 3100
Mechanical (Marv)[1]											
Grab Tensile Strength	ASTM D4632	lbs	35	60	120	117	140	186	248	329	386
Grab Elongation	ASTM D4632	%	60	60	60	60	60	60	60	60	60
Trapezoidal Tear Strength	ASTM D4533	lbs	15	25	35	41	64	61	85	86	95
Puncture Strength	ASTM D4833	lbs	10	15	25	41	45	56	75	90	105
CBR Puncture	ASTM D6241	lbs	-	-	-	155	227	305	400	584	654
Endurance (Marv)[1]											
UV Resistance @500 hrs	ASTM D4355	%	-	-	-	70	70	70	70	70	70
Hydraulic (Marv)[1]											
Apparent Opening Size[2]	ASTM D4751	US Sieve	35	60	120	117	140	186	248	329	386
Permittivity	ASTM D4491	sec^{-1}	60	60	60	60	60	60	60	60	60
Water Flow Rate	ASTM D4491	$gal/min/ft^2$	15	25	35	41	64	61	85	86	95
Physical (Typical)											
Unit Weight		oz/yd^2	1.6	1.9	3.0	3.4	4.0	5.0	6.0	8.0	10
Roll Diameter		in	7	7	8	8	9	10	10	12	-
Length		yd	100	100	100	100	100	100	100	100	-
Width		in	151	151	151	151	151 / 187	151 / 187	151 / 187	151 / 187	187
Roll Area		yd^2	419	419	419	419	419 / 519	419 / 519	419 / 519	419 / 519	100
Roll Weight Gross		lbs	50	58	87	97	113 / 142	138 / 175	165 / 209	218 / 275	-

Notes: (1) Minimum average roll values (MARV) in the weaker principal direction (2) 095 Max. ARV



Product data sheets, case studies, installation guides and project information are available on request or can be downloaded from typargeosynthetics.com Please contact our sales team for reference projects or for further advice.

The information contained herein is, to the best of our knowledge, accurate in all material respects. However, since the circumstances and conditions in which such information and the products mentioned herein can be used may vary and are beyond our control, no representation or warranty, express or implied, of any nature whatsoever is or will be made and no responsibility or liability is or will be accepted by us, any of our affiliates or their respective directors, officers, employees or agents in relation to the accuracy or completeness or use of the information contained herein or any such products and any such liability is expressly disclaimed.

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