



CONTENTS	
Page	Description
INSTALLATION GUIDANCE	
2	3D EXPLODED CROSS SECTION
3	EXCAVATION, GEOTEXTILE & SUBBASE FORMATION
4	KERBS, GEOTEXTILE AND BEDDING LAYER
5	LAYING BODPAVE UNITS
6	PARTIAL BODPAVE UNITS, MARKERS & GRASS FILL
MAINTENANCE GUIDANCE	
7	WEEDING, MOWING, RECOVERY, SPEED AND WEIGHT RESTRICTIONS
DESIGN GUIDANCE	
8	INTRODUCTION & TYPICAL CROSS SECTION
9	MINIMUM SUBBASE THICKNESS
10	TYPICAL SOIL TYPES, PROPERTIES AND ESTIMATING GROUND STRENGTH
11	DESIGN NOTES AND DRAINAGE
MATERIAL SPECIFICATION GUIDANCE	
12	TERRAM PRODUCTS
13	TYPES OF FILL, SEED AND FERTILISER

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 our or their respective directors, officers, employees or agents in relation to the accuracy or completeness or use of the information contained herein or of any such products and any such liability is hereby expressly excluded to the maximum extent permitted by law.





INSTALLATION

1. Excavate ground to the required formation level.
2. Unroll Terram all-in-one Bodgrid geocomposite (white geotextile below, black geogrid above) or Terram standard geotextile onto the prepared subgrade with a minimum of 300mm overlap at the joints.
3. Place and compact type 3 (*) open graded granular material on top of the Terram layer to the required compacted thickness determined by the designer (minimum 100mm) to form a strong permeable subbase layer.

* Type 3 is an open graded granular material as described in Specification for Highways Works clause 805. If a higher water storage (attenuation) capacity (void ratio) is required a hard crushed angular “clean stone” such as a course graded aggregate (CGA) type 4/20 (4 mm minimum and 20 mm maximum particle size) can be used. Traditional well graded type 1 aggregate (with suitable drainage) may be used to form the subbase layer as determined by the designer. For further guidance regarding drainage options and subbase materials see design notes and material specification sections.





INSTALLATION continued

4. Install edge restraints as specified; traditional precast concrete kerbs, steel, plastic or treated timber boards/sleepers.
5. Install a second layer of Terram standard geotextile or Inbitex™ on top of the subbase with a minimum of 300mm overlap at the joints.
6. Place, compact and screed rootzone bedding layer to a uniform thickness of 50mm. See material specification section for more guidance on suitable bedding materials.

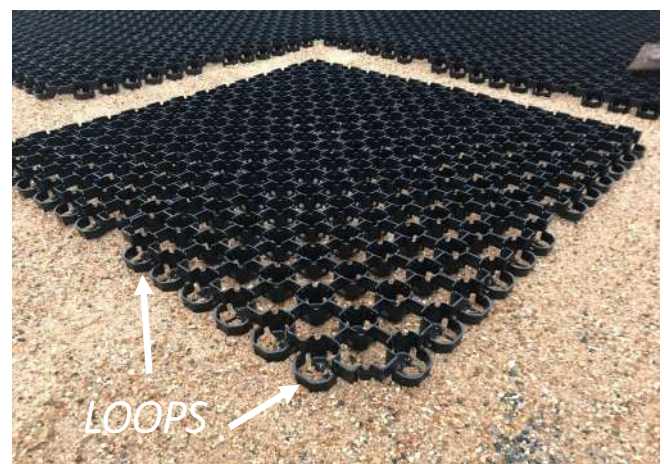
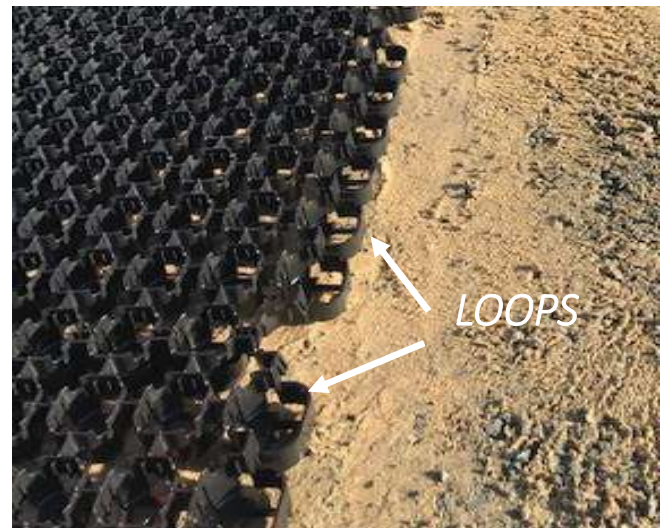


Inbitex™ is a licensed trademark of Forterra (Hanson) Building Products Ltd



INSTALLATION continued

7. Start in the corner of the longest straight edge (kerb) leaving a 25mm expansion gap around the perimeter.
8. Place pre-connected set of four Bodpave units (1m x 1m) with the loop connectors facing outwards as a “leading edge” towards the remainder of the prepared bedding layer. Apply firm pressure so that the ground spikes are pressed fully into the bedding and the base of the units sit flat on the bedding layer surface.
9. Connect adjacent Bodpave units together by slotting the edge half cells down into the edge loops. Progress in rows (LOOPS ALWAYS LEAD) locking units in place with firm pressure over the snap-fit clips. If separation is required, clips can be dislocated using careful, firm hand or screw-driver pressure or by gently twisting the pavers.





INSTALLATION continued

10. Cut Pavers to fit around obstructions and at the end of rows using a fine toothed hand or circular power saw. Partial units should be fixed using snap-fit clips and additional UV resistant nylon cable ties.
11. **Install snap-fit markers as required before filling Bodpave units.**
12. Once all Bodpave units have been installed, fill pavers with rootzone brushing away any surplus off the surface so that the tops of all the Bodpave units are visible. A single pass of a light vibrating plate compactor may be used to consolidate the pavers and settle the rootzone fill further so the finished level is a minimum of 5mm below the top of the units. Do not overfill or over compact.
13. The rootzone infill should be seeded with a lawn mixture containing plenty of hard wearing amenity perennial rye grass (Turf PRG) and some fescues to bind the sward and Bodpave units together, a pre-seeder fertiliser followed by frequent watering. A light top dressing may be applied to just cover the seed and to provide adequate germination conditions. Do not overfill the paver cells.
14. Once seeded the area should be cordoned off to protect the young grass from traffic damage and allow the root sward to fully develop which may take 8+ weeks or 3-4 cuts during the growing season.



MARKERS





MAINTENANCE

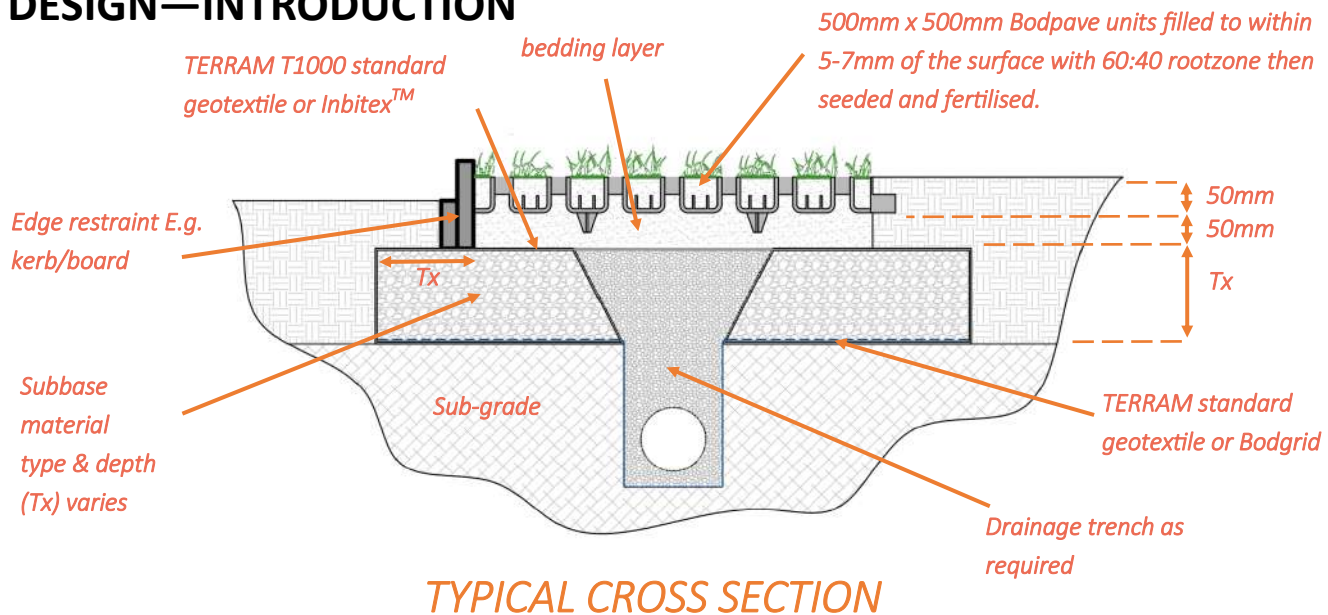
A grass filled Bodpave surface should last for many years with the usual maintenance required by a lawn. Maintaining a healthy grass filled Bodpave surface is dependant upon many factors including a successful initial installation, the frequency and intensity of traffic loading, sufficient irrigation, sunshine and regular growth recovery periods. The following maintenance should be considered:-

1. Regular mowing of the grass during the growing season (Spring/Summer/Autumn) and removal of clippings.
2. Application of a suitable fertiliser in Spring and Autumn.
3. Irrigation during hot and dry conditions.
4. Removal of fallen leaves, sticks and other debris from the surface as needed.
5. Weeds - ideally removed by hand or using a biodegradable weed killer once or twice a year.
6. Rotation of areas subject to seasonal traffic with frequent growth recovery periods. A minimum of 3 days per week without any traffic is recommended during the growing season, a longer recovery period may be required if the grass is in poor condition.
7. If Bodpave units are damaged consult with Terram for advice on repair.





DESIGN—INTRODUCTION



Terram Bodpave™ is the original interlocking cellular porous plastic paving grid system for ground surface stabilisation. Typical applications include car and light vehicle parking, pedestrian walkways, golf buggy paths, cycle paths, driveways and residential parking. The porous surface makes Bodpave units ideal for use within a source control permeable paving SUDS (Sustainable Drainage System). Most Bodpave installations will require a new subbase (pavement foundation layer) to be constructed. The thickness and type of granular material used to form the subbase will generally depend on the following factors:-

1. Strength of the underlying ground (subgrade) measured in CBR* %
2. Water permeability of the underlying ground (subgrade) k measured in m/s
3. Type of underlying ground (subgrade) E.g. clay/silt/sand/gravel/rock
4. Type of vehicle traffic (HGV/LGV/car/cycles/pedestrian)
5. Frequency of traffic (occasional/regular)

*California Bearing Ratio test

A comprehensive ground investigation survey with suitable testing is highly recommended to ensure the subbase for a Bodpave surface is suitably strong and sufficiently durable for the anticipated use. **This design guide can be used for estimating ground conditions and producing preliminary pavement designs but it is not a substitute for site specific ground investigation works and a detailed pavement design by a suitably qualified civil engineer.**

Inbitex™ is a licensed trademark of Forterra (Hanson) Building Products Ltd



DESIGN continued

TABLE 1 MINIMUM SUBBASE THICKNESS (Tx) WITH BODGRID

SUBGRADE CBR* %	Cars/ light vehicles (#)		Coaches/Heavy goods/emergency vehicles (#)		Overlap (mm)
	Thickness (mm)	Bodgrid	Thickness (mm)	Bodgrid	
1	300	GC30	400	GC30	600
2	150	GC30	250	GC30	500
3	125	GC30	175	GC30	450
4	125	GC30	150	GC30	400
5+	100	GC30	125	GC30	300

TABLE 2 MINIMUM SUBBASE THICKNESS (Tx) WITHOUT BODGRID

SUBGRADE CBR* %	Cars/ light vehicles (#)		Coaches/Heavy goods/emergency vehicles (#)		Overlap (mm)
	Thickness (mm)	Standard geotextile	Thickness (mm)	Standard geotextile	
1	450	T2000	600	T2000	600
2	225	T1500	375	T1500	500
3	200	T1000	300	T1000	450
4	200	T1000	225	T1000	400
5+	150	T1000	200	T1000	300

* California Bearing Ratio test

Regular tight turning of vehicles, “dry” steering and channelised traffic may cause damage to the Bodpave units and compaction of the rootzone fill restricting grass growth. Vehicle manoeuvring, frequency of use and the provision of regular grass growth recovery periods should be carefully considered at specification/design stage. Terram Bodpave™ 85 and Truckpave™ pavers are generally recommended for occasional overrun or regular HGV traffic respectively. If construction traffic axle load exceeds 60kN (6 Tonnes), minimum subbase thickness over TERRAM Bodgrid should be 200mm.



TERRAM Bodgrid



TERRAM standard geotextile





DESIGN continued

TABLE 3 FIELD GUIDANCE FOR ESTIMATING SUBGRADE STRENGTH

Consistency	Indicator			Strength	
	Tactile (feel)	Visual (observation)	Mechanical (test) SPT	CBR %	Cu Kn/SQM
Very Soft	Hand sample squeezes through fingers	Person standing will sink >75mm	<2	<1	<25
Soft	Easily moulded by finger pressure	Person walking sinks 50-70mm	2-4	~1	~25
Medium	Moulded by moderate finger pressure	Person walking sinks 25mm	4-8	1-2	25-40
Firm	Moulded by strong finger pressure	Utility truck ruts 10-25mm	8-15	2-4	40-75
Stiff	Cannot be moulded but can be indented by thumb	Loaded construction vehicle ruts by 25mm	15-30	4-6	75-150

TABLE 4 TYPICAL SOIL TYPES AND PROPERTIES

Soil Type	Plasticity Index %	CBR% Depth of water table below formation level		Typical range for coefficient of permeability K (m/s)	Infiltration
		>600mm	<600m m		
Heavy clay	70	2	1	10^{-10} to 10^{-8}	No
	60	2	1.5		
	50	2.5	2		
	40	3	2		
Silty clay	30	5	3	10^{-9} to 10^{-8}	No
Sandy clay	20	6	4	10^{-9} to 10^{-6}	Partial
	10	7	5		
Silt	Non-plastic	2	1	10^{-8} to 10^{-6}	Partial
Poorly graded sand	Non-plastic	20	10	10^{-7} to 10^{-6}	Partial
Well graded sand	Non-plastic	40	15	10^{-6} to 10^{-4}	Total
Well graded sandy gravel	Non-plastic	60	20	10^{-5} to 10^{-3}	Total

CLAY



SILT



SANDY GRAVEL



This field guide is provided as an aid to assessing the mechanical stabilisation requirements in commonly encountered site conditions. TERRAM accepts no responsibility for any loss or damage resulting from the use of this guide.



DESIGN NOTES

1. Minimum subbase thickness (Tx) can be selected from table 1 or 2 with ground strength and permeability estimated from tables 3 and 4 in the absence of any site specific ground investigation report.
2. If the Terram **Bodgrid** layer is omitted, then the total subbase layer thickness (Tx) must be increased by 50%. A Terram standard geotextile separation layer should be specified with lower subgrade strength (CBR value) requiring a more robust grade in accordance with BS8661:2019 (see table 2).
3. Bodpave units are an ideal surface for source control porous paving SUDS (Sustainable Drainage Systems) with a permeable subbase; **DoT Type 3** (Type 1x) porous/open graded granular material as described in Specification for Highways Works clause 805. If a higher water storage (attenuation) capacity (void ratio) is required a hard crushed angular “clean stone” such as a course graded aggregate (**CGA**) **type 4/20** (4 mm minimum and 20 mm maximum particle size) can be used. The type of SUDS design (attenuation, total or partial infiltration) will depend upon the underlying ground conditions and not all sites are suitable for infiltration. Weak and low-permeability cohesive subgrades are generally unsuitable for infiltration (permeability coefficient $k < 10^{-6}$ m/s). Clays with a low plasticity index (<20%) will reduce in strength when saturated; a full attenuation system with an impermeable membrane directly on top of the subgrade is recommended (See table 4). Specific advice on suitable drainage and construction over very weak ground (CBR <1%) is available from TERRAM.
4. Alternatively traditional ‘**DoT Type 1**’ well graded granular material may be used for the subbase provided that an adequate drainage system is installed. Typical drainage details; 100mm diameter perforated pipe drain laid at minimum gradient 1:100, bedded on gravel in trench backfilled with SHW Clause 505 ‘**Type A**’ drainage aggregate (or **CGA type 4/20**), covered or wrapped with **Terram T1000** standard nonwoven geotextile and leading to a suitable outfall or soak-away. Drains placed down the centre or along the edge of access routes up to 5m wide. Wider areas may require additional drains at 5m - 10m centres.
5. The subbase must be covered with a layer of **Terram T1000** standard or **Inbitex™** nonwoven geotextile to prevent settlement due to mixing of the bedding & subbase layers and to provide filtration & pollution control.
6. Rootzone bedding and paver fill must be a free-draining, structurally sound propriety blend of sand:soil or sand:compost such as used in sports/golf construction & normally identified as a 60:40 or 70:30 ratio blend. The use of site-won materials or in-situ self-blending is NOT recommended without taking further advice. Following initial seeding, the grass will require several weeks to establish during the growing season (Spring/Summer/Autumn). The root sward may take 8+ weeks or 3-4 cuts of the grass to fully establish and will require regular irrigation. The area should not be trafficked during this time. See table 6 for specifications of fill materials, seed and fertilisers.
7. The final pavement and drainage design should be undertaken by a suitably qualified civil engineer and based on specific site conditions.
8. Maximum advised gradient for traffic applications is 12% (1:8) 7^o, Bodpave units have specific fixing points for **steel upins** if required for steep slope applications.



MATERIAL SPECIFICATIONS

TABLE 5 Terram products

TERRAM BODPAVE™85	
Dimensions	500mm x 500mm x 50mm + 35mm ground spike
Compressive strength	<400tonnes (4000kN)/SQM (gravel filled)
Connection strength	7kN/Lm
Material	100% recycled plastic
Coverage	4 units/SQM
White markers	215mm x 70mm
Inbitex™ nonwoven geotextile	
Standard roll dimensions	4.5m wide x 100m long
Tensile strength kN/m	8.5
Elongation	30%
CBR puncture resistance kN	1.6
Oil absorption and removal	<400g/SQM_year
TERRAM nonwoven standard geotextile	
Standard roll dimensions	4.5m x 100m long
Grades	T1000/T1500/T2000
BS8661 Classification	1 /2/ 3
Tensile strength kN/m	8.0/12.5/14.5
Elongation	60%
CBR puncture resistance kN	1.5/2.25/2.75
TERRAM BODGRID GC30	
Standard roll dimensions	4.8m wide x 50m long
Tensile strength kN	30
Tensile elongation	7%
Functions	Separation, filtration, stabilisation



Bodpave™85 unit



Bodpave™85 marker



Inbitex™



*Standard
geotextile*



Bodgrid

Inbitex™ is a licensed trademark of Forterra (Hanson) Building Products Ltd

How else can we help? Get in touch with us

+44 (0) 1621 874200 info@terram.com www.terram.com

As part of its continued improvement process Terram® Ltd reserve the right to change the properties listed on this data sheet without prior notice. Terram® is a trademark of Berry Global, Inc. or one of its affiliates.



MATERIAL SPECIFICATIONS

TABLE 6 Fill materials, seed and fertiliser

Rootzone (Bodpave surface fill and bedding layer material)	
Description	Proprietary mix of high quality, free draining sand and compost
Blend ratio	60:40 or 70:30 sand:compost
Particle size range	0 to 2mm
Example	Green-tree rootzone supplied by Green-Tech
Comments	Site won topsoil is not suitable
Grass seed	
Description	Low maintenance hard wearing amenity mix
Varieties and suggested blend	50% amenity perennial rye grass (Turf PRG) 25% creeping red fescue 25% smooth stalked meadow grass
Application rate	35-50g/SQM (new grass) 25g/SQM (overseeding)
Example	John Chambers Grass Seed Parks supplied by Green-Tech
Fertilisers	
Description	Pre-seeder fertilizer to encourage early grass growth enhancing seed establishment and improving root development
Example	Pre-seeder Fertiliser 8-12-8+3MGO+ZN supplied by Green-Tech
Description	Spring Summer fertilizer
Example	ICL Sportsmaster Spring Summer 9-7-7 Fertiliser supplied by Green-Tech
Subbase (3 options)	
Description	Option 1 —well graded granular DoT Type 1 (with filter drains)
Aggregate size	0 < 63mm
Grading to BS EN 13242 or 12620	Gc 75/32 1/31.5 (SHW Clause 803)
Description	Option 2 —permeable open graded granular DoT Type 3 (Type 1x)
Aggregate size	0 to 40mm
Grading to BS EN 13242 or 12620	Gc 80/25 1/40 (SHW Clause 805)
Description	Option 3 —clean stone, course graded aggregate type 4/20
Aggregate size	4 to 20 mm
Grading to BS EN 13242 or 12620	Gc 90/15 4/20



rootzone



~~Site won topsoil~~



Fertiliser



Grass seed mix



Type 1



Type 3 (1x) - permeable



CGA type 4/20 (Clean stone) - permeable

UNCOMPACTED

COMPACTED