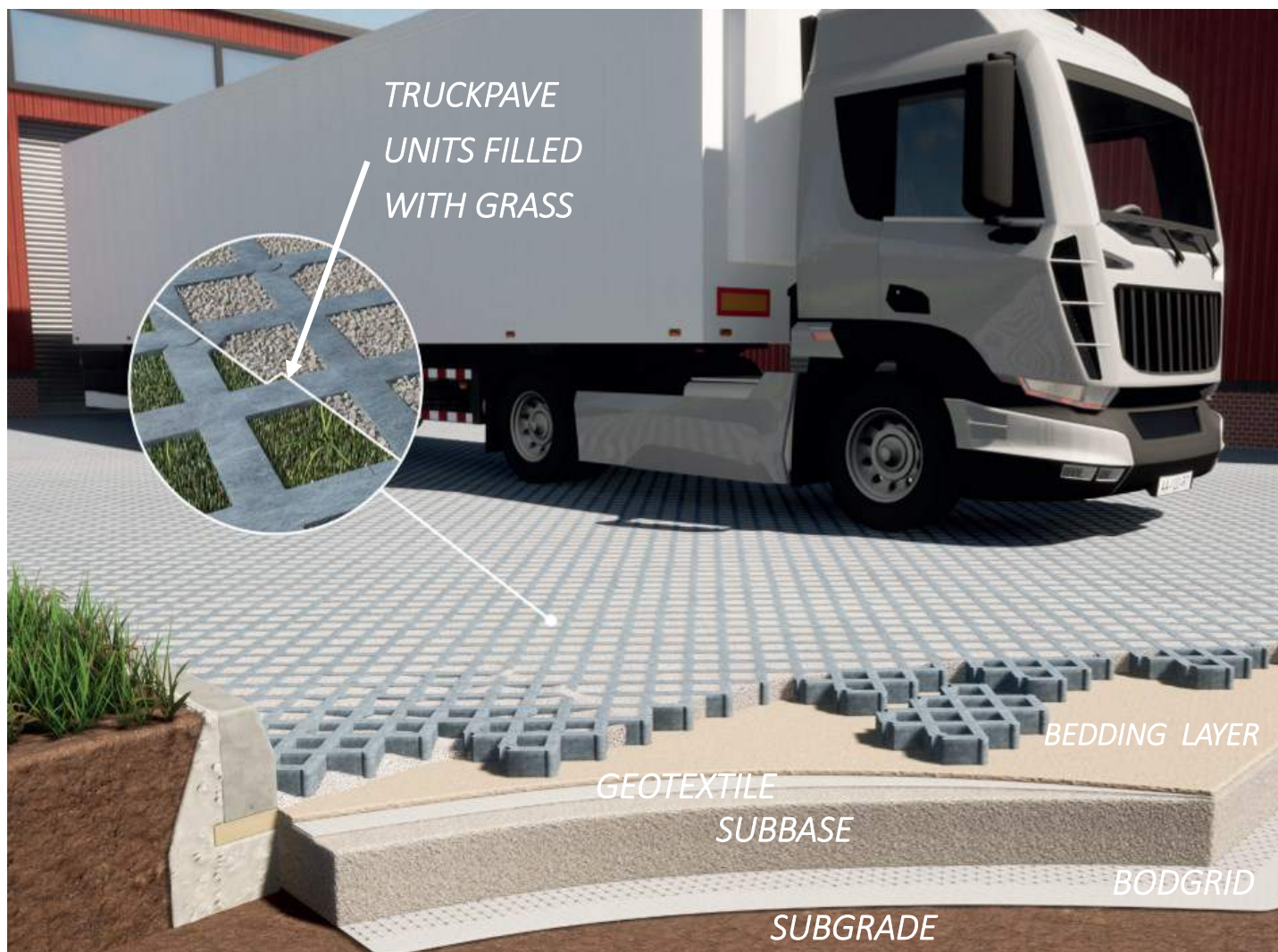




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INSTALLATION

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 coarse 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 substantial edge restraints such as heavy duty precast concrete kerbs, steel, plastic or treated timber 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. Spread coarse grit sand roughly level, and screed to an accurate level to achieve a bedding thickness of 20mm using a vibration plate. Do not compact to refusal. See material specification section for more guidance on suitable bedding materials.



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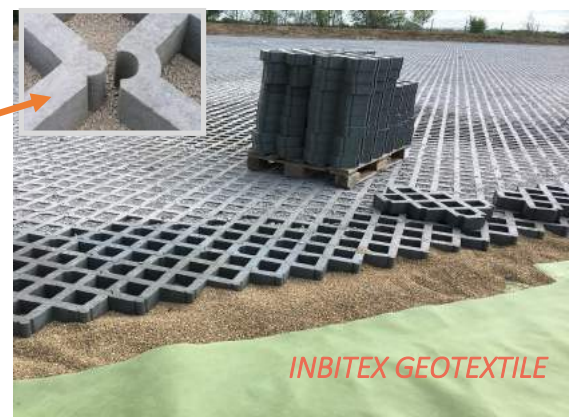


INSTALLATION continued

7. Start in the corner of the longest straight edge (kerb) leaving a 25mm expansion gap around the perimeter. Work to string lines, in a similar way to laying block paving. Progress uniformly across the site in rows making sure that the tongue and groove locators fit loosely together. The units can be laid in either orientation and staggered bond if required.
8. Cut pavers to fit around obstructions and at the end of rows using a fine toothed hand or circular power saw. Wherever possible avoid using small cut-pieces less than one-third of a unit.



**TONGUE
AND
GROOVE
LOCATOR**





INSTALLATION continued

9. Once all Truckpave units have been installed, fill pavers with specified free-draining, friable topsoil (rootzone preferably) brushing away any surplus soil off the surface so the tops are visible. A single pass of a light vibrating plate compactor may be used to consolidate the pavers and settle the infill further so the finished level is a minimum of 5mm below the top of the units. Do not overfill or over compact. The surface may be trafficked by slow moving plant during the filling process however care must be taken not to dislodge the unfilled Truckpave units or compact the soil. Tracked and heavy treaded machinery should avoid slewing and turning manoeuvres as much as possible.
10. The topsoil infill should be seeded with a lawn mixture containing plenty of hard wearing amenity perennial ryegrass and 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.
11. 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.





MAINTENANCE

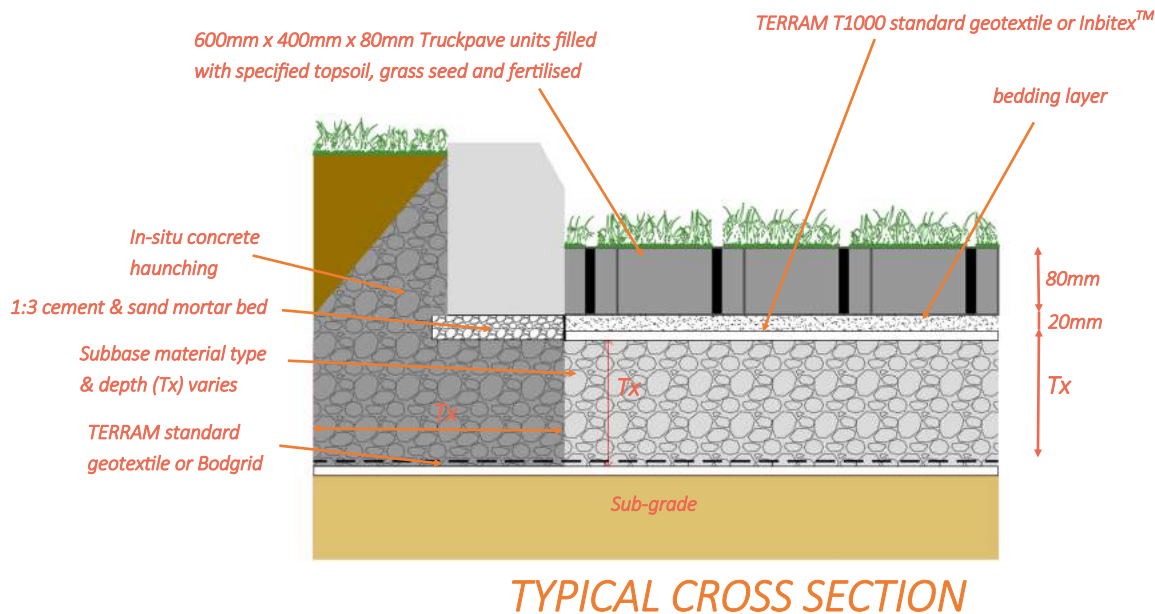
A grass filled Truckpave surface should last for many years with the usual maintenance required by a lawn. Maintaining a healthy grass filled Truckpave surface is dependant upon many factors including a successful initial installation, the frequency and intensity of traffic loading, sufficient irrigation, 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. Post construction settlement of the bedding layer can occasionally cause localised areas of Truckpave units to deflect and become loose. These can easily be re-laid in accordance with this guide.





DESIGN—INTRODUCTION



TYPICAL CROSS SECTION

Terram Truckpave™ is a heavy duty interlocking cellular porous paving grid system manufactured from 100% recycled waste mixed polymers. Typical applications include lorry & coach parking, emergency fire tender access routes, service yards and loading areas. The porous surface makes Truckpave units ideal for use within a source control permeable paving SUDS (Sustainable Drainage System). Most Truckpave 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 heavy vehicle
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 Truckpave 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.**

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DESIGN continued

TABLE 1 MINIMUM SUBBASE THICKNESS (Tx) WITH BODGRID

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

TABLE 2 MINIMUM SUBBASE THICKNESS (Tx) WITHOUT BODGRID

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

* California Bearing Ratio test

Regular tight turning of vehicles and “dry” steering may occasionally cause displacement of the units and compaction of the soil infill 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. If construction traffic axle load exceeds 60kN (6 Tonnes) the minimum subbase thickness over TERRAM Bodgrid layer should be 200mm (300mm without Bodgrid).



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. Truckpave 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 coarse 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 soakaway. 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. Substantial edge restraints such as heavy duty precast concrete kerbs, steel, plastic or treated timber sleepers are required along all perimeters. For very large areas and where there are significant changes in gradient and/or geometry, surface flush flat topped kerbs may be required to provide intermediate lateral restraint.
7. Bedding layer material should be clean, coarse-grained sand free from silts & clays. The paver fill material should be good quality, free-draining friable topsoil suitable for grass growth such as propriety rootzone and with no contaminants or oversized debris. The use of site-won materials or in-situ self-blending is NOT recommended without taking further advice. Amenity grass seed mixture should contain hard wearing, low fertility and/or drought tolerant species with option of a low percentage of clover content if acceptable. 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.
8. The final pavement and drainage design should be undertaken by a suitably qualified civil engineer and based on specific site conditions.

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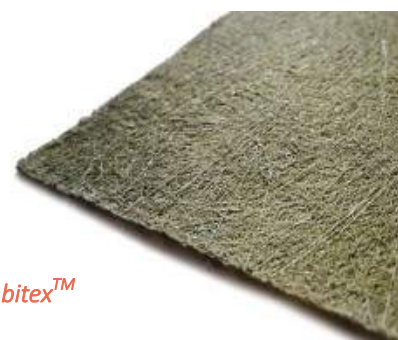
MATERIAL SPECIFICATIONS

TABLE 5 Terram products

TERRAM TRUCKPAVE™	
Dimensions	600mm x 400mm x 80mm
Compressive strength	<1,500tonnes (15,000kN)/SQM
Maximum axle load	20 tonnes (200kN)
Material	100% recycled plastic
Coverage	4.2 units/SQM
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



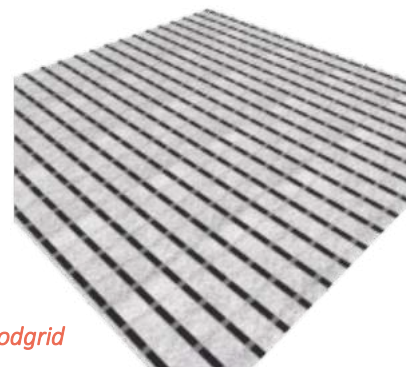
Truckpave™



Inbitex™



*Standard
geotextile*



Bodgrid

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MATERIAL SPECIFICATIONS

TABLE 6 Fill materials

Truckpave surface fill	
Description	Good quality, free-draining friable topsoil with a high sand content
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 suggest- ed 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
Bedding layer	
Description	Clean coarse grit (sharp) sand
Aggregate size	0 to 4mm
Grading to BS EN 13242 or 12620	Gc 85 0/4 Site category II <1.5% fines (0.063mm)
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, coarse 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



UNCOMPACTED

COMPACTED



Coarse grit sand



Type 1



Type 3 (1x) - permeable



CGA type 4/20 (Clean stone) - permeable

