Subgrade Assessment

California Bearing Ratio (CBR). The design CBR should be obtained either by testing or by measurement of the plasticity index of the subgrade material. In the case of CBR testing, the method described in BS1377-4:1990+A2:2002, Clause 7 should be used

The surface of the subgrade material should be prepared according to the Highways Agency's Specification for Highway Works

Detailed preparation of the subgrade should be in accordance with the recommendations in BS7533-3. An acceptable subgrade level should be free of any soft spots, reasonably parallel to the plane of construction. A capping layer may be required if the ground is structurally weak, likely to be subjected to exceptional loads or is significantly below the specified ideal formation level.

The table below gives typical values for the subgrade strengths (the CBR) normally encountered in the soils of Britain and Ireland

Consistency	Indicator			Strength	
	Tactile (Feel)	Visual (Observation)	Mechanical (Test) SPT	CBR %	CU kN/sqm
Very Soft	Hand sample squeezes through fingers	Man standing will sink >75mm	<2	<1	<25
Soft	Easily moulded by finger pressure	Man walking sinks 50-70 mm	2-4	Around 1	Around 25
Medium	Moulded by moderate finger pressure	Man walking sinks 25mm	4-8	1-2	25-43
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

Notes

- If the geotextile layer is omitted, then the total sub-base layer thickness should be increased by 50%
- A Department of Transport Type 1 sub-base may be used provided that an adequate drainage system is installed. Alternatively a porous sub-base layer may be specified however this should be covered with either a geotextile filter membrane and/or suitable clean gravel blinding layer to avoid fine particles entering the sub-base layer.
- Drainage details; 100mm diameter perforated pipe drain laid at a minimum gradient 1:100 bedded on gravel trench backfilled with suitable drainage aggregate, covered or wrapped with a suitable geotextile fabric and leading to a suitable outfall or soakaway. For specific advice contact the manufacturer.
- Rootzone bedding and grid fill must be free draining, structurally sound proprietary blend of sand/soil or sand/compost, this is normally identified as a 60:40 or 70:30 ratio blend and in-situ blending is not recommended.
- Max advised gradient for traffic applications is 12%. Pegging may be required.
- GRID® complies with BS8300:2001
- The preparation of the subgrade, the construction of the sub-base and the construction and type of roadbase (if present) should generally be in accordance with relevant current practice as described in the Highways Agency's Specification for Highway Works.
- It is essential that the sub-base compaction is thorough, using a vibrating plate compactor or vibrating roller.
- The thickness of the laying course after final compaction of the surface course should be 40 - 50mm, within an accepted surface level tolerance. All areas of prepared laying course material should be protected and not left exposed overnight.
- The laying course may be placed and screed using a mechanical device.
- It is necessary to include a substantial edge restraint when constructing Grid® See Ancillary Items:

Calculations for Quantities

Hardcore/Broken Stone required for the base layer

For cars = 300kg of hardcore/broken stone per m² (providing 150mm depth)

For trucks = 400kg of hardcore/broken stone per m² (providing 200mm depth)

Sand or Fine Chippings required for the levelling layer

For all grid types = 25kg of sharp sand (grass or gravel finish) or fine chippings (gravel finish only) per m^2

Topsoil required for a grass surface (per m2)

For 40mm grid = 65kg of topsoil

Aggregate required for a gravelled area (per m2)

For 40mm grid = 70kg of gravel

Sub Base Specification

Bedding Layer	30mm thick of 5 – 20mm angular aggregate (BS EN 13242)
Grid Fill	To top of grids using 5 – 20mm crushed aggregate (BS EN 13242)
Sub-base Layer	DoT Type 3 or modified porous sub-base layer. DoT Type 1 with drains

Typical Sub-Base Thickness

The table showing sub-base thicknesses is intended as a general guide in accordance with BS7533. For further details on permeable paving design refer to BS7533 Part 13; for installation refer to BS7533 Part 3.The design for pavements should satisfy two parts - to support the traffic load and to manage the surface water effectively.

Application Load	CBR (%) Strength of Subgrade Soil (See Chart)	DoT Sub-Base Thickness (mm)
Fire Engine and occasional HGV Access	>=6 =4<6 =2<4 =1<2	100 120 190 380
Light Vehicle access and overspill car parking	>=6 =4<6 =2<4 =1<2	100 100 135 260

Gravel Fill Option

1. Cut the grass closely to the surface or where necessary remove the turf and topsoil to a depth of <75mm and dispose of all debris. Level the formation layer and lightly consolidate.
2. Install edge restraint.
3. Place a layer of GeoGrid stabilisation mesh or Geotextile fabric on the formation layer and ensure that it is flat to the surface by pinning as required. An optional geotextile fabric layer can be placed on the formation layer prior to the GeoGrid installation to prevent migration & contamination.
4. Place a 5-10mm thick layer of sharp sand blinding the area to level out and even the GeoGrid. The GeoGrid must not be allowed to become exposed above the gravel / aggregate layer.
5. Place the Grid® ground reinforcement grids onto the sharp sand layer. Connect the Grid® panels using the slot and peg snap connection.

Grass Fill Option.

1. Follow steps 1-3 as for gravel. Note: It is not necessary to install the optional Geotextile fabric layer as stated in Step 3(gravel).
2. Place a 35mm thick layer of compacted RootZone layer evenly over the geogrid. The geogrid must not be allowed to become exposed above the gravel / aggregate layer
3. Fill Grid® pavers with the specified propriety Rootzone. A light vibrating plate can be used to consolidate the pavers and to settle the Rootzone infill if required.
4. Rootzone must be a free-draining structurally sound sand/compost or sand/soil blend. This is a nominal propriety blend of 60:40 or 70:30 ratio. Self blending is not recommended.
5. Carry out a normal seeding, fertilising and watering programme. A very light top dressing may be applied to just cover the seed and to

6. Grid® can be cut using a hand or power saw fit around obstructions and curves. Cut pieces which are less than half the original size should be avoided where possible. Grid® can be firmed in place using a light vibrating whacker plate if required. 7. Fill Grid® with the specified gravel or aggregate. Preferably a clean, well graded angular material within the range of 5-20mm diameter. Fully rounded 'pea gravel' is not recommended. 8. Consolidate the surface using a light vibratory whacker plate if required. 9. Refill any localized low areas with gravel and repeat consolidation until satisfied with the final compacted finish. 10. The surface can be trafficked immediately.	provide adequate germination conditions. Do not overfill the paver cells. Alternately thin-cut turf can be rolled into the surface if required. 6. The surface may be trafficked immediately, but it is preferable to allow the grass to fully establish prior to use.