



grassconcrete

grassroof[®]
the environmental rooftop innovation

design and installation guide

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grassroof®

DESIGN AND INSTALLATION GUIDE

DESIGN CONSIDERATIONS

- **FORMAT**
- **LOAD**
- **DRAINAGE**
- **COMPATABILITY**
- **MAINTENANCE**

FORMAT

The Grassroof system is designed for flat or shallow sloping roofs and can be installed to either new or existing construction. Using honeycomb cell paving technology the paving layer is supported clear of the roof leg by a network push-fit leg supports. This creates a gap that can be either filled with filter media or left as a clear waterway when using the GRF/2 option. Grassroof can function as the paving element itself or as a component part of other built up structures in the following green roof generic types:

Extensive

This sees the Grassroof paving soil infilled to the top level of the units and planted with a low maintenance species such as Sedum. Extensive roofs are generally not required to be accessed and are intended to need little maintenance.

Simple - intensive

Similar to the extensive format this sees a thin layer of soil placed over the surface. This will enable a wider range of planting or grassing to be adopted and will conceal the cellular units from visibility and from UV attack in warmer climates. Both the Extensive and Simple-intensive options can utilise our **Grasskerb** dry fix edging system

Intensive

Here the thin layer of soil is replaced by thicker layers that are deep enough to support shrubs and even shallow rooting trees. In such circumstances the Grassroof system will be used to create the underlying drainage route. For intensive applications consideration should be given to waterproofing of abutting structures

LOAD

The Grassroof brochure contains a load table detailing the dry weight of its components. To these should be added the weight of moisture held within the structure as well as elements such as plants, snow, wind and imposed loads.

Where the system is to be laid to timber structures particular attention should be paid to the size of supporting roof joists and compliance with local building regulations.

Grassroof is a low-weight system that because it sits above the roofing membrane can cover either the whole or part of a roof structure. This enables feature planters to be formed to create “roofscape” gardens. In this way hard paving can be combined with Extensive installations enabling access and maintenance across the roof deck.

DRAINAGE

The Grassroof system offers the potential to variably attenuate flow that passes through its structure. This can be achieved by the use of filter media laid within the drainage waterway that will help to create a lag time between precipitation and drainage via outlets. A fully operational Intensive green roof will significantly reduce the volume of water that ultimately reaches surface water drainage pipes by up to 70%. Where rainwater harvesting is required the Extensive or Simple-intensive solutions with a clear waterway will enable an initial lag to reduce peak demand but will then enable a proportionately higher volume of water to be collected.

CLIMATE

Differing climates will make differing demands upon vegetation; selected species should therefore be suited to the climate and the aspect of installation. For arid climates the use of moisture retaining types such as succulents will enable sustainable growth. In arid or exposed conditions we would also recommend the use of a semi-intensive structure. This will help to prevent heat build up within the structure as well as increasing the anchorage weight.

The use of a temperature reducing green roof has been identified as a means of mitigating the "Heat Island Effect" found within towns and cities and caused by concentrated heat emissions and the proximity of heat reflecting surfaces held captive by a polluted atmosphere.

COMPATABILITY

The underlying roof membrane can be either new-build or an existing structure. Prior to construction the underlying membrane should be assessed for suitability. For existing membranes the surface should be free from damage. If the membrane is in poor condition a new overlay of waterproof material should be applied. Where bituminous built up felt roofing is the membrane then the material should be checked to determine whether de-lamination of the layers has taken place. If there is evidence of this then remedial work will be required to the membrane.

MAINTENANCE

Maintainability of the paving layer should be considered with the design. A sedum surface will tend to require little or no maintenance. A grassed surface will however require routine grass cutting and so access for cutting equipment as well as load bearing will be required. The frequency of grass cutting can be controlled by the use of slow growing low height cultivars.

The use of non-organic fertiliser's herbicides or pesticides should be avoided due to the proximity of the drainage network.

Where ladder or scaffold access is required to high level structures then support pads will be required for extensive and simple-intensive applications. These should consist of concrete slabs positioned in the location of ladder or scaffold feet. The slabs should be picture framed by an appropriate type Grasskerb.

INSTALLATION

An existing roof structure should be inspected in both dry and wet conditions. Inspection during a dry spell will reveal any cracking to the membrane or joint lifting. An inspection following rain will identify the sufficiency of drainage falls. Some roofs are designed to hold or slowly draw water to prevent the membrane from drying out quickly.

TEMPORARY WORKS

Before any work commences a site specific assessment of health and Safety requirements should be made. The assessment should identify:

1. A safe means of access to the work.
2. A safe mode of supplying materials to the roof and for storage there.
3. Protection for installers against falling.
4. Protection to the public from falling / flying materials.

International regulations vary in this respect and we must recommend compliances with local regulations as an absolute minimum standard.

PREPARATION

1. Remove dirt, grime and any vegetation from the membrane.
2. If the existing surface has a chipping or mineral surface this should be removed with a stiff brush taking care not to block drainage outfalls.
3. If a filter material is to be used in the waterway then drainage outfalls should be covered with an appropriate sized piece of geo-textile membrane to prevent loss of the filter material.
4. Check the roof membrane for depressions, these should be levelled with a bituminous liquid compound or for plastic or other membrane types affected by heat then an alternative levelling screed can be used. The Grassroof system will permit some flexibility however sudden changes in contour could cause paving units to lift from the leg support anchorage.

grasskerb

Set out the area to be paved by chalk marking corners and changes of direction. Where Grasskerbs are to be installed they should be positioned in place along a string line drawn from each fixed point. To fix in position remove the backing tape from one side of the adhesive pads and fix to the skeletal ribs of the Grasskerb. Remove the outer backing strip only when ready to fix the kerb in position.

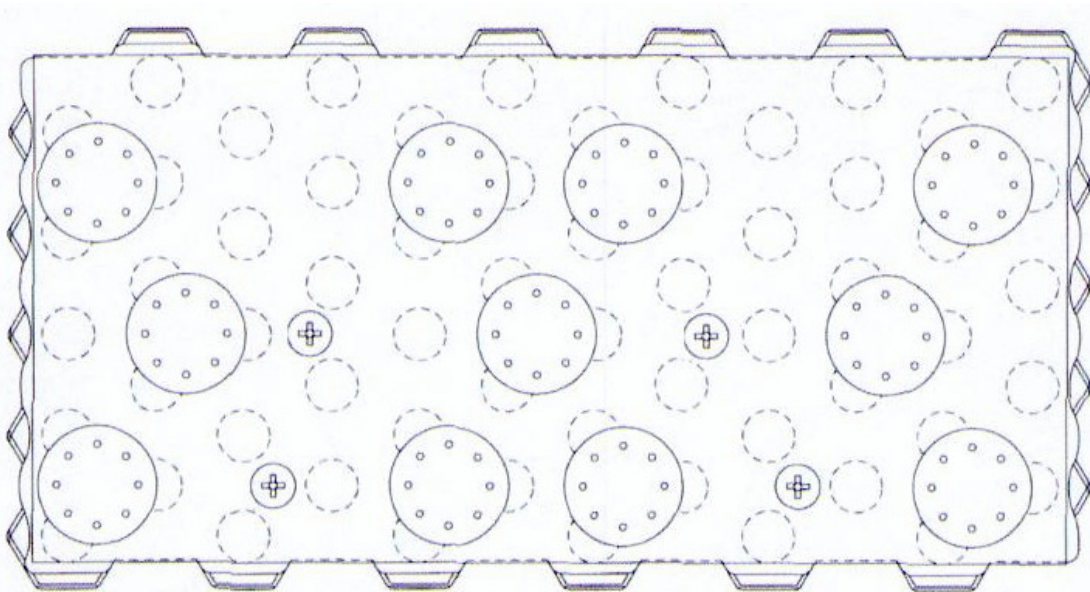
Where curved or irregular profiles are to be formed the outer longitudinal skeletal arm of the Grasskerb can be cut to enable articulation. For curved work it will be necessary to screw the Grasskerb to the roof deck. This can be done by either drilling and screwing through any part of the skeletal structure or by utilising the large pre-formed holes on the skeletal ribs. With a plate washer under the head of the screw this will permit some re-alignment into position. Where membranes are perforated this should be sealed with a flexible sealant material.

The adhesive pads will set the Grasskerb units with a 5mm gap to the roof deck. This will be sufficient to enable drainage but will retain filter material if used in the waterway.

grassroof

Plan the method of installation to maintain access without trafficking the newly laid paving. Installation should be uni-directional commencing with a single line of Grassroof units. For rectangular roofs with a combination of falls and cross falls commence laying along the shortest dimension. This will limit the potential for the joints to over tighten on the variable profile.

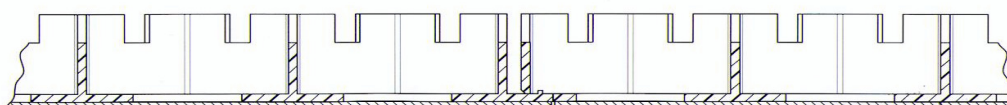
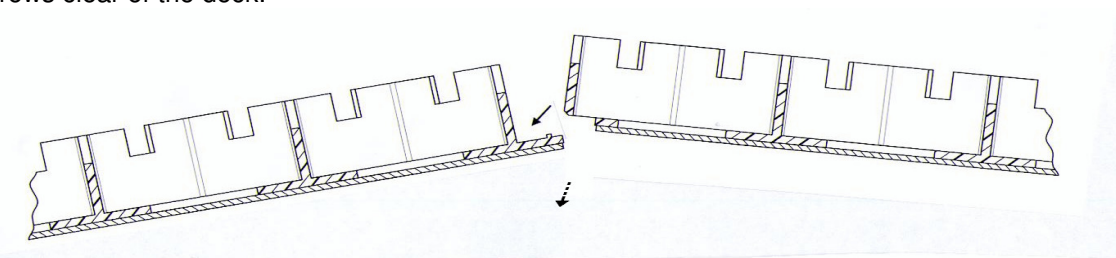
The underside of the Grassroof unit features 15 No. projecting cleats, 11 No. of these should be used for a normal installation and to these the Leg Support Units (LS/1) should be fixed. These have a taper fit and will only require an adhesive when used in severe wind load applications.



Underside of the GRF/2 unit with the LS/1 unit in position

Peel off the backing strip to one side of the adhesive pad LSP/1 and fix to each of the LS/1 units.

Each Grassroof unit should be “folded” into an interlock with the neighbouring unit. To avoid having to break the bond of newly laid units to make a joint we recommend the use of a temporary batten under the end of each unit. A wooden batten 50mm wide x 38mm thick x 100mm long positioned under the outer edge of each unit will enable a roof deck fixing contact with the first row of leg supports leaving the remaining two rows clear of the deck.

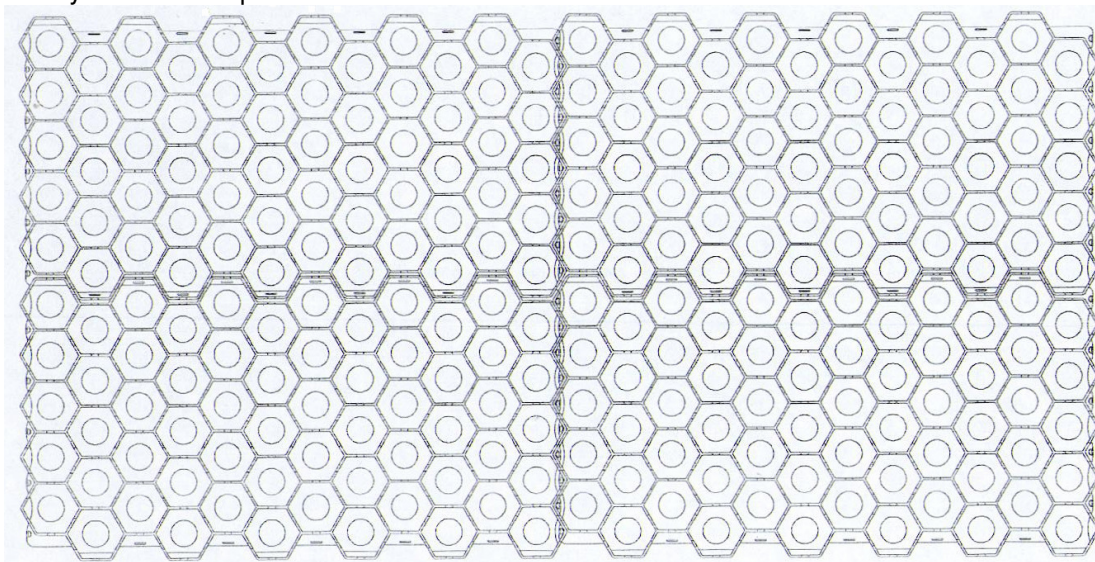


Grassroof units fold into a fit

Lay the first complete row with a batten under each unit.

Begin the second row of installation in a stack bond grid without overlapping the cross joints of the previous course. Immediately before laying each unit remove the timber batten from the neighbouring unit and reposition to the corresponding location on the next row. The interlocks on each unit fold together to fully lock into position when returned to a horizontal position.

After the installation of three rows lightly compress the surface of the paving to the first row via a wooden board to ensure that the LS/1 units achieve a full bond to the roof deck. This process can now be repeated row by row as work proceeds.



Grassroof units in position

GRF/1 Specific Applications

The GRF/1 unit utilises a filter material beneath the paving layer this can be a Perlite, Vermiculite or a fine pea shingle where weight isn't a factor.

To introduce the filter material pour through the circular holes of Grassroof GRF/1 pavers after installation. To eliminate excess voids under the paving a light vibration is recommended. This can be achieved by the use of an electric pad sander applied to a thin metal sheet or strip placed onto the paving. For larger installation a vibrating beam can be introduced.

GRF/2 Specific Applications

THE GRF/2 unit is designed to achieve a clear waterway, to enable this the GRF/2 unit is backed with a geo-textile membrane.

Where the LS/1 pads are to be screwed to the roof deck the membrane will need to be punctured at the point corresponding to the underlying LS/1 unit. After fixing the puncture should be reinstated with an LSP/2 patch.

SOILING

Topsoil infilling to the Grassroof paving should take place as the installation proceeds. To reduce the weight of the installation we recommend the use of a 1:1 composite fill of either soil / Perlite or soil / Vermiculite. Other materials such as expanded clay can be used for arid climates to assist moisture retention. Moisture retaining polymer additives can also be used with any soil combination.

The soil should be a fine loam material capable of infilling the honeycomb matrix of the Grassroof paving. Where fine soils are used in high rise applications it may be necessary to overlay a temporary lightweight membrane until the vegetation has established.

When installing intensive application consideration will need to be given to forming a flashing at abutments to prevent soil loss particularly when used with GRF/2 units. For cavity wall structures a tanking layer will be required to prevent seepage into the structure. This can be a bitumen banded roll material proprietary types of which are readily available.

For extensive roofs using sedums care to be taken to limit the nutrient level within the soil. These are plant types suited to soils of low fertility; by improving the growing medium the plants are likely to become invasive

VEGETATION

For extensive roof application we recommend the use of a sedum. Species should be selected relevant to the climate and the natural habitat requirement of local wildlife. For arid climates the use of the more succulent types of sedum are recommended. Please refer to our “Vegetation” table for further information.

For simple-intensive installations sedum or shallow rooting grass types can be used, the latter can be sown from seed or can be turf applied.

Intensive installations provide a deeper growing medium onto which can be applied most types of grass seeds as well as shallow roofing shrubs according to the depth of the overlay.

Drainage through the Grassroof paving will transfer directly to the surface water drainage system. The use of a fertiliser, herbicide and pesticide should therefore be avoided.

The use of non-native species should be carefully considered prior to use. There may be some merit in introducing new species that aren't indigenous to assist with elements such as pollution control and mitigation of the “Heat Island Effect” found within urban areas. On the other hand non-native species can sometimes prosper to the detriment of local indigenous types; this in turn could upset the balance of natural fauna and flora.

Some National Governments carefully control the import and movement of plant species to avoid risk of endangering the natural eco-system and to control the threat of pests that may be introduced with non-native species.

FURTHER INFORMATION

For further assistance with individual projects please contact info@grasscrete.com



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