Green roof applications

HOW DOES ONE CONSTRUCT A GREEN ROOF?

There are 2 methodologies that can be applied. The growing medium can placed directly on the specific underlay required for green roofs or alternatively the plants can be grown in modules/ trays. The Module approach is beneficial for difficult applications for example on corrugated roofs and where one wants an instant effect or needs mobility. Both these types require the following:

1. The roof must be checked by a specialist structural engineer to ensure that the existing roof can take the additional load of a green roof.
2. Next a Green Roof specialist / designer must be consulted before design.
3. An additional protection layer is applied on top of the existing roof membrane
4. A drainage layer is placed on top of the protection layer ***(not required for Module application).***
5. Specialised soil layer is carefully placed on top of the drainage layer
6. Only then is the vegetative layer planted.

THE SPECIALISED PLANT LAYER

Characteristics of the ideal vegetative layer in the application of green roof:

1. Must be drought resistant and heat tolerant
2. Preferably low growing and self seeding (so as to replace themselves from seed when stressed from heat and water fluctuations)
3. Wind resistant
4. Plants that can survive in extreme growing conditions

TIPS: When selecting plants, ensure that the plants have been hardened off / acclimatised to with- stand the harsh conditions mentioned above.

Examples of some of the plants used on a green roof

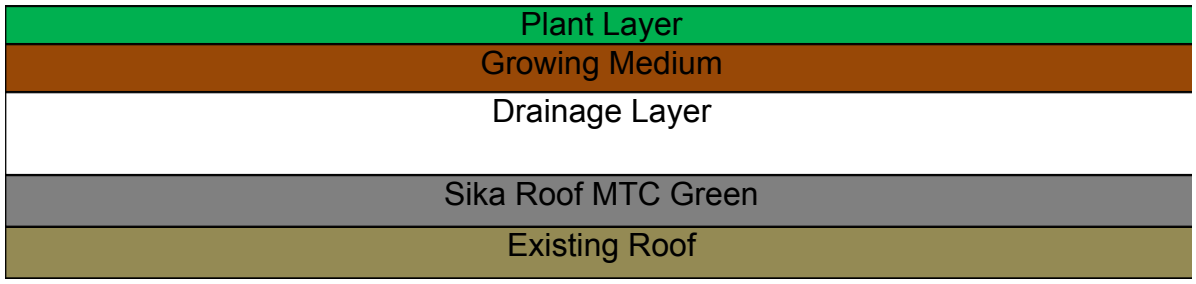
Aeollanthus parvifolius	*Cissus quadrangularis*	*Justicia flava*
Asparagus densiflorus	*Cotyledon orbiculata*	*Hibiscus calyphyllus*
Aptenia cordifolia	*Crassula multicava*	*Huernia hystrix*
Aloe arborescens	*Crassula obovata*	*Kalanchoe thyrsiflora*
Aloe maculata	*Crassula ovata*	*Kleinia fulgens*
Aloe rupestris	*Crassula perfoliata*	*Nymphoides*
Bulbine abyssinica	*Crassula sarmentosa*	*thunbergiana*
Bulbine inflata	*Crassula vaginata*	*Pelargonium capitatum*
Bulbine natalensis	*Crinum macowanii*	*Portulacaria afra*
Cissus fragilis	*Delosperma rogersi*	*Senecio barbetonicus*
		Stapelia gigantea

The Direct application (extensive)

Involves placing the growing medium directly onto the underlays required for green roofs

Specifications:

Layers of Direct Roof Application



ITEM	SIZE	QTY	PRICE PER SQM PLANTED
Direct application	1m x 1m x 80mm depth	1	*R 430

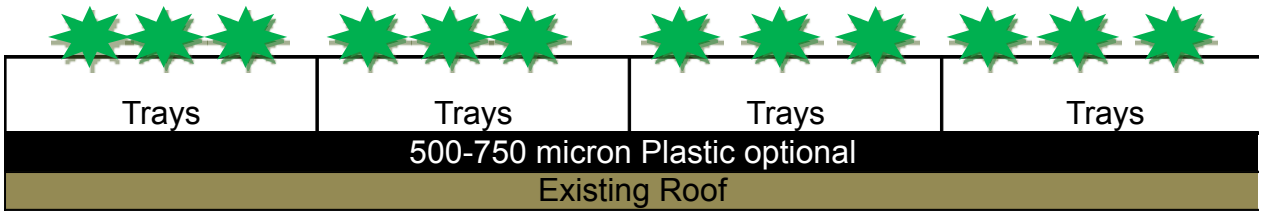
*(This price is an estimate, as each roof requires different design approaches)

The Tray / Modular application:

This system can be installed using 3 different depths. The trays are light weight and flexible, making set up and design easier than the direct application.

System specifications:

LAYERS OF MODULAR APPLICATION



Deep Medium Shallow

Below is the price per blank tray (not planted)

ITEM	SIZE	QTY	PRICE PER TRAY
Tray	SHALLOW (800mm x 600mm x 75mm)	1	R 185

ITEM	SIZE	QTY	PRICE PER TRAY
Tray	MEDIUM (800mm x 600mm x 100mm)	1	R 220

ITEM	SIZE	QTY	PRICE PER TRAY
Tray	DEEP (800mm x 600mm x 200mm)	10	R 260

The containers are patented custom made modules that are made of a recyclable HDPE (High Density Polyethylene) and are UV resistant.

- Each module has a built- in drainage systems and water reservoirs that aid in both storing water for plant usage as well as slowing down rainfall run off into existing infrastructure.
- They are made in varying depths of 75mm, 100mm and 200mm thus allowing for greater use of plant species adaptability.
- The Modules are movable thus allowing for easy maintenance of the existing roof as well as changing of landscape design.

Below is the price per planted tray/ module

ITEM	SIZE	QTY	PRICE PER TRAY PLANTED	PRICE PER SQM TRAYS PLANTED
Tray	SHALLOW (800mm x 600mm x 75mm)	1	R 310	R 620
Tray	MEDIUM (800mm x 600mm x 100mm)	1	R 345	R 690
Tray	DEEP (800mm x 600mm x 200mm)	1	R 400	R 800*

*(This price is an estimate, as each roof requires different design approaches)

Guide specifications:

Weight:
A fully planted module saturated weight:

- **75mm depth: between 15-25kg +/- 50kg a square metre (***depending on what plants are being used).*
- **100mm depth: between 30-40kg +/- 80kg a square metre** *(depending on what plants are being used).*
- **200mm depth: between 40- 50kg +/- 90kg a square metre** *(depending on what plants are being used).*

Area coverage: for example an area of 48sqm would require +/- 78 containers this also allows for access space for maintenance if and when required**.** The module clearance above the roof surface is 30mm. This allows for air to pass between the roof and module, which acts as both an insulation and cooling layer. In addition it prevents water from sitting on the existing roof in pools.

With any green roof project certain installation requirements must be followed these costs are the customer/ client's responsibility.

- Before installations of the green roof modules, the roof must be inspected by a technical specialist (structural engineer/architect) in order to determine the adequacy of the roof and surface to accept the modules**. It shall be the owner's responsibility & cost to determine the adequacy of the roof to support the existing and proposed loads**. Verification of the integrity of the roof for water tightness shall also be the responsibility of the client/ owner.

- Before installation of the trays or direct applications, the waterproofing surface must be inspected by a professional to determine the adequacy of the waterproofing surface to accept the green roof.
- It shall be the Owner's responsibility to determine the adequacy of the structure to support the existing and proposed loads. Verification of the integrity of the existing waterproofing for water tightness shall also be the responsibility of the Owner if the green roof is installed on an existing waterproofing system.

Note: green roof installation will only occur after the structural capacity of the roof and its waterproofing have been assessed and passed by the relevant professionals.

A 30 day plant limited warranty: Green Roof designs will supply replacement plant(s) free of charge for any plant found to be dead or in severe decline for a period of 30 days from instalment. This warranty only covers those species selected and/ or approved by Green roof designs horticulturists

30-DAY MAINTENANCE PERIOD

A. The Green Roof design installation team shall maintain the Green Roof system for a period of at least 30 days after completion prior to acceptance from building owner.

B. The 30 day maintenance will include:

1. Water the Green Roof design System once a week (weather dependent) too aid in plant establishment. System shall be watered more frequently during extended hot and dry weather especially when plants are showing signs of wilting.

2. Perform spot weeding as necessary.

3. Replant and Repair all areas that have washed out or are eroded. Replace undesirable or dead areas with new plants.

4. Upon completion of the 30-day maintenance period, a written maintenance plan for the specific green roof system will be submitted to the relevant owner. A Green Roof designs consultant will be made available to go over this document. Upon acceptance, the Owner will assume module/plant maintenance.

Please note: that a 90 Day, 180 Day and 360 Day maintenance periods can be arranged at a retainer cost to the client (please contact Green Roof designs to ask about their extended maintenance plans)

Advantages and disadvantages of different Green roof applications

Options	Trays	Direct
Maintenance and repair	Containers/ trays can be moved easily without disturbing plants and growing medium	Layers need to be lifted, rolled until problem found, could disturb plants etc
Easy Alterations & Additions	Option of containers allows for the installation of green roofs in sections. Thus offers opportunity for future add-ons and alterations	Often difficult and expensive to change/add-on due to edge design requirements
Installation	Trays can be pre-planted, thus offering quick installation. The container system components can quickly be put in place on the roof in accordance with design. It is also a DIY user friendly technique.	Various layers are needed to be installed prior to planting.
Lightweight	Trays can be installed on basically any existing roof surface in good condition and structural capacity	Direct systems are often heavy and may require additional roof surface replacement or support
Plants	Some plants may struggle as their roots need space to roam	Plants roots have a greater a space to move and network

Please see www.greenroofdesigns.co.za for more information on green roofs, landscaping, and our products.