



PLANNING GUIDE

System Solutions for Intensive Green Roofs

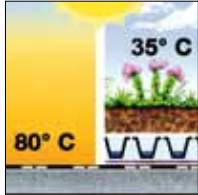
Life on Roofs



Why Have a Green Roof?

Urban, construction and ecological advantages:

Extended Roof Life



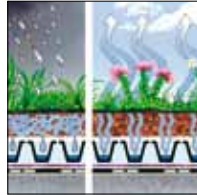
- Protects the roof membrane from UV exposure, heat cold and hail and mechanical damage.

New Habitat



- Encourages wildlife to remain within build-up areas.

Stormwater Management



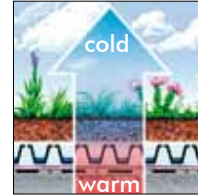
- Reduces immediate water run-off. The sewer pipes can be reduced in capacity.

Reduction of Dust and Smog Levels



- Enhances the micro-climate by cooling, filtering out dust and smog particles.

Improve Building Operations



- Thermal protection in both summer and winter and reduction of heating and cooling costs.

Noise Reduction



- Improves sound insulation.

Features

Unlike extensive green roofs, intensive green roofs offer almost endless possibilities of design. However depending on the kind of vegetation intensive green roofs require more maintenance.

The features at a glance:

- **Maintenance:**
 - Medium to high level of maintenance
 - Periodic to regular irrigation
- **Plant communities:**
 - Herbs, grasses, perennials, lawn, shrubs, bushes and trees
- **Loads and build-up heights:**
 - Build-up height from 6 in. to 30 in.
 - Weight from 33 to 250 lbs/sq.ft.
- **Design:**
 - Maximum freedom for the architect

Principles

ZinCo intensive green roofs are installed in accordance with current standards.

Our six principles at a glance:

- The System Build-up is tailored to suit each roof.
- The System Build-up ensures permanent drainage, even under load.
- The System Build-up provides for a good water/air balance.
- The System Build-up is adapted to suit the required type of vegetation.
- The System Build-up keeps maintenance and upkeep to a minimum.
- The System Build-up provides for a long green roof life.

All vegetation specific information is based on moderate continental climate. Please contact us for any other climatic condition.





ZinCo Intensive Green Roof Systems



System Build-up "Perennial Garden" 4



System Build-up "Roof Garden" 6



System Build-up "Urban Rooftop Farming " 8



System Build-up "Recreational Park" 11



Green Roofs on Inverted Roofs 12

Perfect Solutions down to the Last Detail



Foundations for Supporting Structures 12



Planting Bushes and Trees 13



Growing Media Depth
Depends on Type of Plants 14

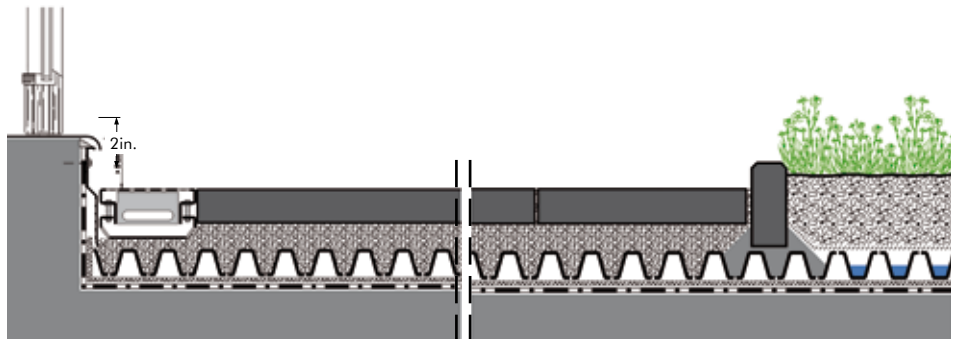
Ponds and Pools 14



Please see our Planning Guides :

- "System Solutions for Sloped Green Roofs"
 - "System Solutions for Extensive Green Roofs"
- for more information.

System Build-up “Perennial Garden”



The intensive System Build-up “Perennial Garden” allows for sophisticated planting design.

The plants can be chosen amongst a wide variety of perennials, grasses and low shrubs, for example thyme, origanum or lavender.

An irrigation system should be provided for long periods of drought.

The relevant growing media Zinoblend I in combination with the water retention

and drainage element type Floradrain® FD 40-E creates the necessary habitat conditions so that the “Perennial Garden” – once rooted – requires little maintenance.

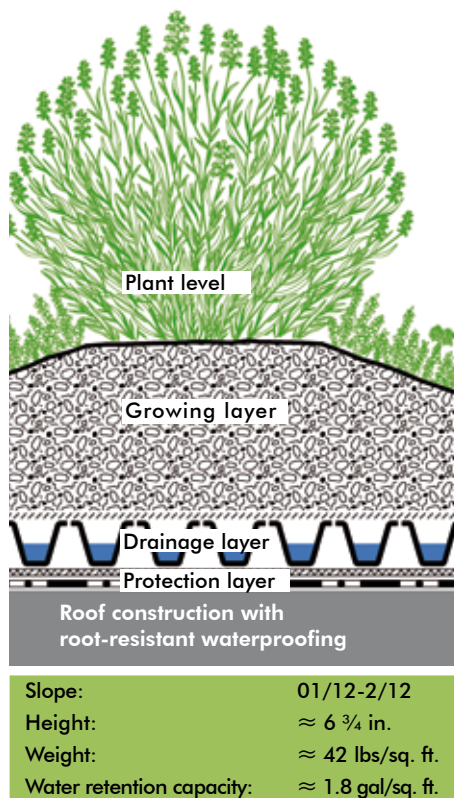
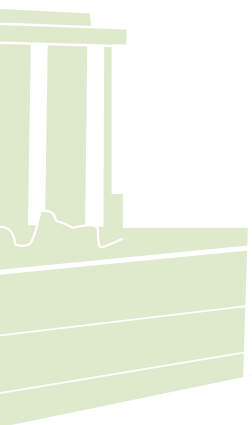
Floradrain® FD 40-E is an ideal drainage-element for green roofs, but it can be applied just as well under concrete slabs or paved surfaces. Borders between different areas can be used to stabilize and secure the system. Curbs can be set directly in concrete or mortar to the Floradrain® without impeding the water run-off.

Floradrain® elements also safely drain the excess water out of the channels. The required height for the waterproofing maybe be reduced to 2 in. above the finished surface provided consistency with local building codes. Under concrete slabs, which should have a slope of at least 1 %, the Floradrain® elements are to be laid “upside down” with the openings facing the protection mat and the cups must be filled with stone chippings.





"Perennial Garden" also contains fragrant drought resistant herbs and small shrubs. Lavender forms a colorfully flowering species in this System Build-up.



Plants

Growing Media "Zincblend I",
Depth: ≈ 5 in. (≈ 125 mm)

Filter Sheet SF
Drainage Element Floradrain® FD 40-E
Protection Mat SSM 45

Root Barrier WSF 40 (optional)

System Build-up “Roof Garden”

The “Roof Garden” green roof system is a multifunctional green roof build-up with high water storage. It is suitable for lawns, perennials, and with deeper growing media, for shrubs and trees. Integration with hard landscapes, for example, walkways, terraces, driveways or play areas, etc. is possible.

The Floradrain® FD 60 element is the heart of the system. It can be used to support small walls and structures, without penetrating the roof membrane or impeding waterdrainage.

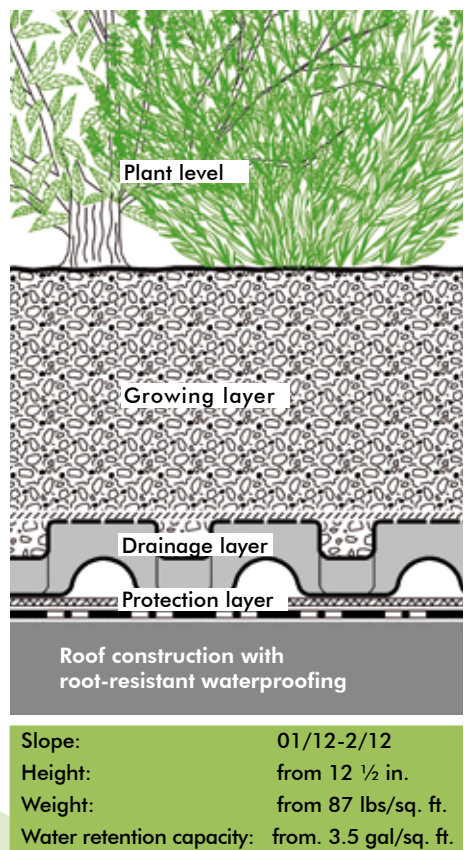


The “Roof Garden” build-up allows for the realisation of a variety of design concepts, even waterfeatures.





Within the "Roof Garden" System Build-up rainwater is being stored to reduce the need for irrigation. Floradrain® FD 60, the heart of this Build-up, allows very high water retention. Floradrain® FD 60 also enables concrete foundations for curbs, walls or furnishings without penetrating the waterproofing and unhindered drainage underneath Floradrain® FD 60.



Plants

Growing Media "Zincoblend I",
Depth: from 10 in. (≈ 250 mm)
(For growing media depth > 14 in.
in combination with "Zincoblend M" as
mineral sub-growing media

Filter Sheet SF

Drainage Element Floradrain® FD 60,
filled with "Zincoblend M"
Protection Mat ISM 50

Root Barrier WSB 100-PO,
if waterproofing is not root-resistant

System Build-up “Urban Rooftop Farming”

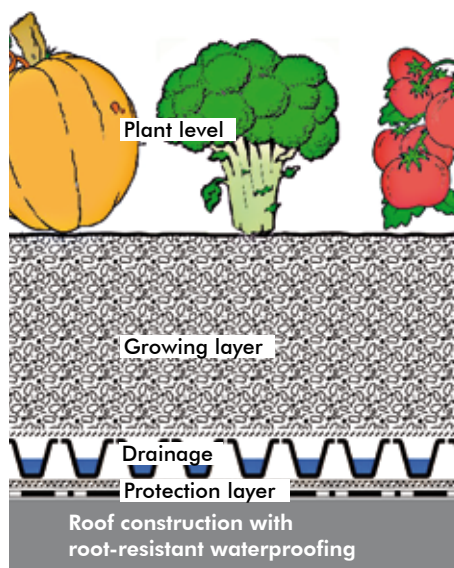


Interest in urban farming has increased significantly over the past decade, as consumers grow increasingly aware of food sources and suppliers. Once again, people are taking advantage of farmers markets and restaurants that use local ingredients. With increased interest, the demand has grown for more open space to grow fruits and vegetables. While buildings often win out to urban gardens on the ground, rooftops are quickly becoming an obvious choice for people to exercise their green thumbs. “Rooftop urban farms” have numerous advantages. Not only do they provide the benefits typical of most green roofs, such as decreasing the heat island effect and reducing storm water run-off. They provide a resource for communities that encourage entrepreneurship and self-sufficiency while producing quality, sustainable agricultural products.

Our new system helps growers maximise the benefits with a system designed specifically for their needs. In order for gardening to actually work in an extreme location such as a roof, all relevant factors must be taken into consideration. ZinCo has, therefore, developed the System Build-up “Urban Rooftop Farming” as a reliable solution. The drainage element Floradrain® FD 40-E is the heart of this build-up. With 8 in. of Zincoblend-F, this build-up is suitable for fruits and vegetables such as lettuce, onions, herbs, zucchini, eggplant, squash, cabbage, melons, strawberries.

For vegetables and fruits such as tomatoes, green beans, raspberries, blackberries, carrots a growing media depth of 12 to 16 in. is recommended.





Fruits and Vegetables

Growing Media "Zincoblend F",
Depth: ≈ 8.0 in. (≈ 200 mm)
to 12.0 – 16.0 in. (≈ 300 –400 mm)

Filter Sheet TG
Drainage Element Floradrain® FD 40-E
Protection Mat ISM 50
Root Barrier WSB 100-PO (optional)

Slope:	0/12–2/12
Height	$\approx 9 \frac{3}{4}$ in.
Weight:	≈ 61 lbs/sq. ft.
Water retention capacity:	≈ 2.5 gal/sq. ft.

System Build-up “Recreational Park”



Nearly everything that can be made on the ground is possible on roofs too, provided the right technology is used.

For instance, on underground car parks green areas are often installed in conjunction with different types of pathways or vehicle surfaces. The use of a well-engineered system assures the continuance of the roof function to keep it watertight.

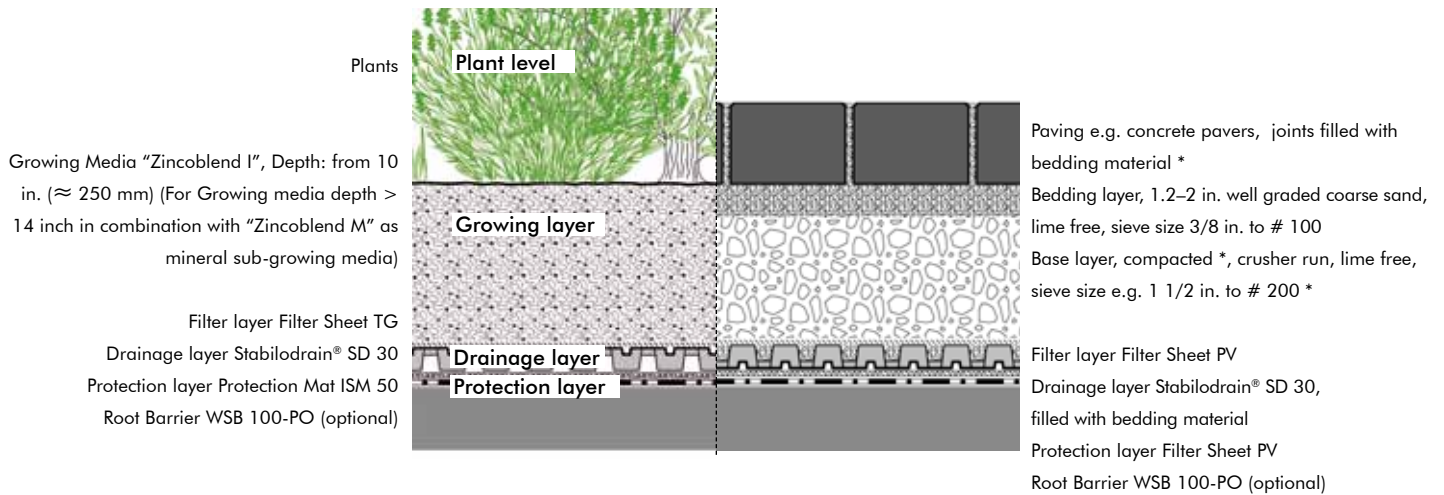
If walkways and driveways are combined with Green Roofs, not only drainage and compressive strength are important,

but also the water retention capacity. Stabilodrain® SD 30, the core piece of this build-up, meets all requirements and ensures durable functionality.

Stabilodrain® SD 30 is an extremely stable, high pressure resistant drainage element that is quick and easy to install with its lateral, specially shaped connecting profiles. Depending on the installation, it allows for drainage of water (diffusion holes facing downwards) or for drainage combined with water retention (diffusion holes facing upwards).

Stabilodrain® SD 30 can also be installed on inverted roofs, where it is essential to avoid creating a vapor barrier above the XPS insulation material.





Slope:	01/12–1/12
Height	from 11 1/2 in.
Weight:	from 81 lbs/sq. ft.
Water retention capacity:	from 3.4 gal/sq. ft.

Slope:	01/12–1/12
Height	from 12 in.
Weight:	from 127 lbs/sq. ft.



Stabilodrain® SD 30



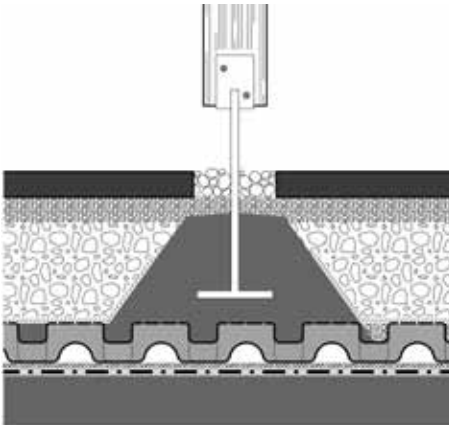
Elastodrain® EL 202

Stabilodrain® SD 30 and particularly Elastodrain® EL 202 with its dense studding are ideal sub-structures for all types of pathway and vehicle surfaces.

Foundations for Supporting Structures



Floradrain® drainage elements can be used in various applications. They allow to build hard and soft landscapes, patios, decks, walkways and driveways, play areas, ponds etc. There are virtually no design limits.

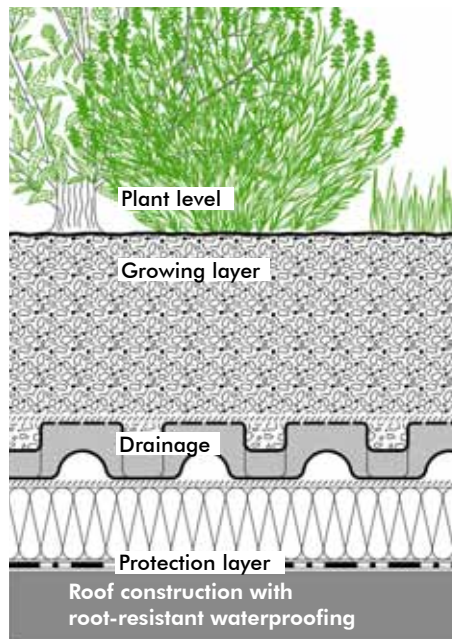


Floradrain® FD 60 can also be used locally as a formwork enabling foundations for various furnishings without penetration of the roof membrane. The channel system on the underside of the elements ensures the unimpeded drainage of excess water.

Green Roofs on Inverted Roofs: Reference based on System Build-up “Roof Garden”



With inverted roofs, layers that prevent the diffusion of damp must not be installed above the XPS thermal insulation boards. Therefore, the water retaining protection mat must be replaced by the diffusion permitting Separation Membrane TGV 21. If root barriers are necessary they have to be placed below the insulation boards directly onto the waterproofing.



Slope:	0/12–1/12
Height	from 12 ½ in.
Weight:	from 86 lbs/sq. ft.
Water retention capacity:	≈ 3.4 gal/sq. ft.

Inverted Roof (Slope 0/12–1/12)

Plant layer

Growing Media “Zincoblend I”, Depth: from 10 in. (≈ 250 mm) (For Growing media depth > 14 inch in combination with “Zincoblend M” as mineral sub-growing media)

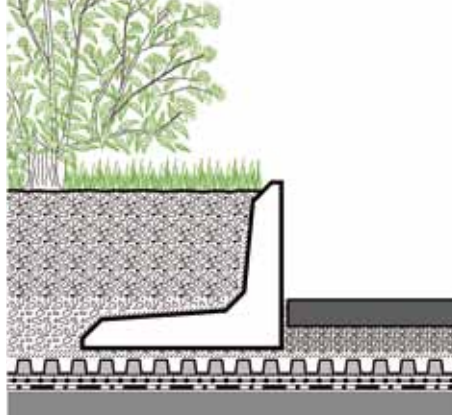
Filter Sheet SF

Drainage Element Floradrain® FD 60, filled with “Zincoblend M”

Separation Membrane TGV 21 (XPS thermal insulation)

Root Barrier WSF 40 (optional)

Planting Bushes and Trees



In order to establish trees and bushes on roof areas, it is often necessary to create more space for the roots by forming special planting areas with higher growing media level, such as planters or mounds. Anchors are often used for securing bushes and trees against wind and can be

attached to the borders of planters. If there is no possibility to do so, the plants can also be tied for example, to galvanized reinforcing mats, which are laid into the growing media layer and covered with a biodegradable fiber mat (e.g. coco mat) or fastened to perforated paving slabs.

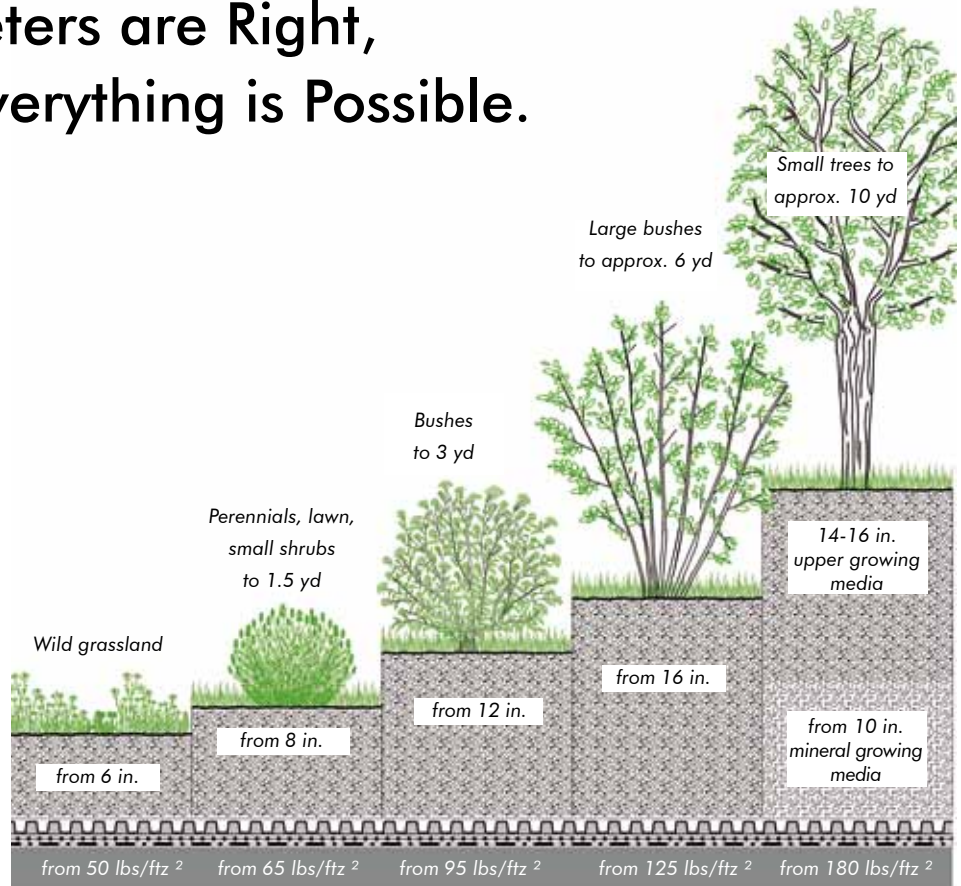
Within a System-Build-up not only "mounds", but also borders for areas deeper and varied growing media are possible. E.g. if bushes were to be planted around a roof garden to achieve more privacy.



If Parameters are Right, Almost Everything is Possible.

Growing Media Depth Depends on Type of Plants

Plant growth is especially affected by the type and depth of the growing media. With 6 inches of growing media, natural wild grasslands are possible. For sophisticated perennial plantings, as well as for bushes and trees, higher growing media levels are required. The potential for horizontal extension of the roots of trees and bushes must be ensured. ZinCo offers a range of growing medias with which every green roof request can be fulfilled.



Ponds and Pools

With the correct design, ponds and pools can be installed on roof decks. They should generally be placed above the drainage layer and lined separately with a special plastic membrane; should the pool ever leak, the water will flow to the regular roof drainage. It is recommended to have at least 12 in. depth of water to compensate for the higher evaporation rate on high and exposed buildings.



Creating Space – with Green Roof Systems

This Planning Guide aims to give you a general overview of the technology involved in the various intensive green roof options.

Our technical experts will be pleased to advise you on specific solutions for your own individual building projects: from the planning phase right through creating your specification texts.

Challenge us!



ZinCo USA, Inc. · 401 VFW Drive · Rockland, MA 02370
Phone 866 766 3155 · Fax 7866 766 3955
info@zinco-usa.com · www.zinco-usa.com