

by Dennis Yanez  
National Marketing Manager,  
American Hydrotech, Chicago

## The Green Roof Need-to-Know List

**A green roof** is a high-performance environmental statement. Not only do they provide building owners and occupants with several ecological, technical, and economic benefits, but thanks to technological advances, today's green roofs present opportunities for the design professional to transform virtually any flat or sloped roof into a landscaped environment. The following is a list of considerations that a design team should carefully review when designing a green roof.

### PROJECT GOALS

The first step when planning a green roof is determining the design intent. What is the purpose of the vegetative roof? Is it to create additional usable space? Will it be pedestrian accessible? Is the project going to be a LEED certified? Are there stormwater retention requirements?

Focusing on the design intent early in the process will determine if the green roof should be extensive—shallow soil with fewer plant selections; semi-intensive—typically lawn applications; or intensive—requiring deeper soil to accommodate any plant species that could be found on grade.

### STRUCTURAL DECK/LOAD FACTOR

Green roofs add weight, or dead load, to the roof of a structure that must be factored into its design. Besides the weight of the roof membrane and insulation, the weight of the living roof components, growing media (soil), and plants must be taken into consideration. The weight of the components is typically expressed as a saturated or wet weight.

Some extensive green roofs can weigh little more than a traditional roof with ballast; however, this weight can increase substantially as the thickness of the soil is increased to accommodate the wider variety of plants that can be placed in an intensive green roof.

Along with considering the maximum load bearing capacity of the roof, other structural requirements include reviewing the height, size and slope of the roof.

### WIND UPLIFT

A green roof is still a roof and therefore it must be properly engineered to resist the wind uplift forces that will be acting upon it. Wind pressures can vary across a roof, depending on location. At the center of the roof, a thin layer of soil (15 pounds per sq. ft.) may be adequate. At perimeters and corners, high winds may necessitate the use of large stone ballast or multiple rows of precast pavers to prevent uplift.

### WATERPROOFING MEMBRANE

Of the various components that make up a green roof, there is none more important than the roof membrane, because no matter how great a green roof looks, if it leaks, the owner will not be happy.

Ideally, the membrane for a green roof assembly should have the following attributes: be capable of performing in a continuously wet environment; be fully bonded to the substrate; monolithic (with out seams); easy to detail; fully warrantable, including labor and materials; and most importantly, have a successful, proven track record.

There are a number of roof membranes and assemblies available, including built-up, single-ply and fluid applied. One of the most popular choices is a hot rubberized asphalt that when applied is monolithic. It is critical that the membrane manufacturer be consulted to ensure their product is adequate for use in a green roof assembly.

### DRAINAGE LAYER

The delicate equilibrium between over-watering and not providing enough water can be challenging enough with

landscaping on grade. The conditions are more extreme on a roof top, but the issue is the same.

Moisture retention and drainage panels that incorporate both a reservoir system and drainage channels are located beneath the soil, under a filter fabric, in a well-designed green roof. The drainage and moisture retention layer plays an essential part in storing excess rainwater that filters through the growing media.

### GROWING MEDIA

Growing media designed for green roof assemblies is 30% to 50% lighter than ordinary soil and provides good drainage, optimal moisture retention and nutrient availability. They are typically blends of sand and organic matter, along with lightweight aggregates such as expanded shale, slate, clay or naturally occurring aggregates like pumice or scoria.

These lightweight engineered media provide a stable structure for the anchorage of the plants' root system, while remaining as light as possible to prevent excess loading of the roof structure. The climate of the site and plants selected for the green roof dictate the appropriate chemical, physical and biological properties required of the growing media.

### PLANT SELECTION

A self-sustaining, well-designed green roof should adhere to the standards of good ecological design. Appropriate plant selection is a crucial part of this process. Since roof landscapes mimic nature, plants should be long lived and self-propagating. Vegetation should be selected based on its size; tolerance to drought, frost, direct radiation, and wind; maintenance requirements; and climate conditions. Native plants are the most favorable choice for all applications.

### IRRIGATION

Although most green roofs benefit from irrigation during the first few months of establishment, extensive roofs do not generally require long-term irrigation systems in most regions. A method for delivering water during the all important establishment period should be included in the design.

### MANUFACTURER SUPPORT/WARRANTY

Ideally, a green roof system should come from a single source; that is, a single manufacturer whose components are engineered to work together from the membrane up through the plants. Compiling individual components from different manufacturers is a potentially risky proposition that can result in "finger pointing" if a problem ever arises.

A green roof supplier should also be able to provide architectural/engineering support from the initial planning stage to installation. As well, the manufacturer should have an established history of working with experienced contractors who know the systems involved.

### MAINTENANCE

Often overlooked, the importance of proper maintenance can not be overemphasized. A successful green roof can be "low maintenance" however it should not be viewed as "No maintenance".

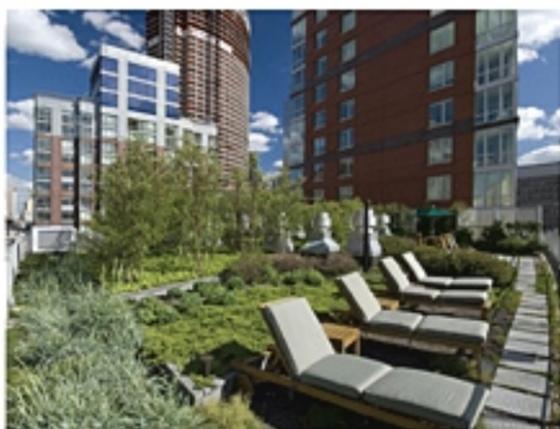
A green roof is still a roof, therefore it should still be subject to regular inspections just as a traditional roof would be. The standard checklist (drain, parapet and penetration inspections, etc.) can be modified to include green roof specific tasks such as inspection of vegetation free zones, light weeding and/or fertilization.

While this is not an exhaustive list, proper design and planning can help ensure the long term success and sustainability of a green roof project. □

■ Georgian Court University Wellness Center



■ Roof deck of the Solaire in Manhattan



■ Penn State Health & Counseling Services Building



■ The Solaire Hotel in Manhattan

