GREEN ROOFS

Greening From the Roof Down

Green roofs are systems engineered to support plant life and function as an effective roof while performing multiple environmentally beneficial functions. While these systems are relatively new in North America, modern green roofs have enjoyed widespread popularity in Europe for decades. Although location, size, slope, function and plant choice make each green roof unique they all share common characteristics.

There are two types of green roofs. A green roof, with 15 cm or less of growing medium, is referred to as extensive. An extensive roof is generally comprised of low laying plants and does not have a secondary function. Conversely an intensive roof utilizes significantly more growing medium, sometimes more than 30 cm. With effective irrigation systems, these intensive roofs can resemble traditional gardens and include paths, benches and even water features.

Did you know…?

The Environment Centre's green roof has about 15 cm of growing medium. It is primarily composed of crushed recycled clay brick to hold moisture and compost to provide nutrients to the plants.

Green roof systems incorporate multiple layers. These layers work together to ensure both the longevity of the roof and the success of the plants. Typically, the following four components are found in a green roof system: however depending on variables additional layers may be incorporated .

1. An effective waterproofing layer is vital for a successful green roof. This layer prevents moisture from coming into contact with and degrading the structural integrity of the decking. A leak detection system is essential as it can be extremely difficult and costly to find leaks once the roof is complete. Therefore careful instillation and testing is required. Common waterproofing materials include plastics, synthetic rubber and rubberized asphalt.

2. A root barrier is important especially if the decking is constructed of a biodegradable material. This layer is placed above the waterproofing membrane and is designed to repel roots. Generally this layer is manufactured from a high density plastic such as PVC.

3. The drainage system allows excess water to drain from the roof, protecting roots from rotting. Examples of drainage systems include water storage cups or lightweight plastic modules. To prevent the growing medium from being washed away or clogging the drainage system a root permeable barrier, commonly made from a semi-permeable synthetic fabric, can be incorporated into this layer.

4. The final layer is the growing medium. The depth and the ratio of organic to inorganic materials in this layer will differ depending on a number of variables including: load-bearing capacity of the roof and types of plants to be grown. 20% to 50% of the growing medium consists of organic compost, with the remainder composed of an inorganic material such as expanded shale, baked clay, sand or crush clay roofing tiles. It is important to note that the organic component should not include soil, as it contains silt and poses a risk to the drainage system.

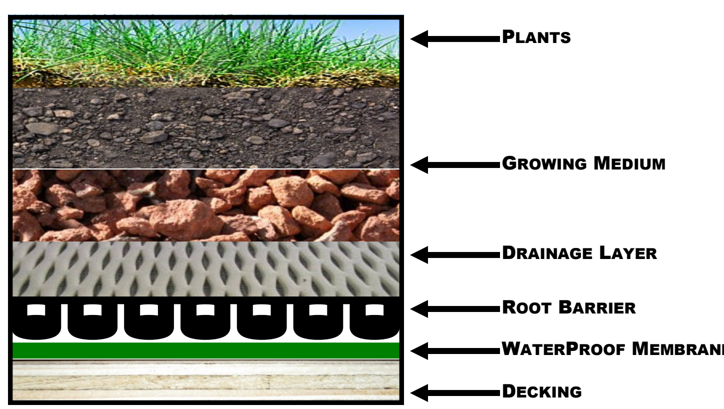

Image Credit: Sherri Owen

Once the growing medium is in place it is time to plant. As a result of the less than ideal growing conditions, hardy plants, those able to withstand extremes in temperature, wind and drought, are best. Low growing succulents, particularly sedums, sempervivums and delospermas, are popular choices for extensive green roofs. Conversely, since intensive roofs provide more growing medium, they are generally able to support plants with deeper and more complex root systems.

Did you know…?

The Environment Centre's green roof has been planted with native Ontario species such as nodding onion, chives, strawberry, harry beards tongue, prairie smoke, cylindrical blazing star, grey golden rod and balsam ragwort

Green roofs are complex systems, and as such they are easier to incorporate into new projects than existing roofs. When green roofs are integrated early in the planning process, architects are able to ensure that the pitch and load-bearing capacity of the structure are able support a green roof system. However, retrofitting an existing roof into a green roof system has been done before.

The cost to install or retrofit a green roof will vary according to the type of green roof desired, its function (public access, growing food etc.), slope, size and type the of plants selected. It is important, however to weigh the initial cost of the green roof system against the economic and environmental gains incurred through the structures lifespan.

An increased lifespan is one of the biggest economic incentives to install a green roof. Since green roof membranes are shielded from temperature fluctuations, as well as direct ultra-violet light, green roofs can outlast conventional roofs. The multiple layers also increase the building's insulation and as a result can reduce heating and/or cooling costs. Other potential benefits include: increased property value, improved aesthetics as well as savings generated from growing food on intensive roofs.

Environmentally, green roofs perform an array of important functions. Some of which include habitat creation and restoration, mitigation of the Urban Heat Island Effect, improvement of air and water quality and managing the rate and volume of storm water runoff.

Green roofs offer urban environments an unique opportunity to provide important habitat for at risk bird, insect, butterfly and plant species. By choosing plants found locally, these green space can be used by a variety of species including ground nesting birds, such as Killdeers.

The Urban Heat Island Effect refers to the tendency of highly urbanized areas to attract and retain heat at a greater rate than the surrounding countryside. As a result cities and metropolitan areas often experience higher temperatures. Green roofs help to combat The Urban Heat Island Effect as they do not attract or absorb as much heat as dark conventional roofs and provide natural shading which lowers temperatures.

Poor air quality and illness can accompany extreme heat in urban areas. In addition to cooling the surrounding air, green roofs also improve air quality by filtering airborne particles and absorbing carbon dioxide.

Finally, green roofs are instrumental in decreasing the volume and rate at which water is released into the storm water system after rainfall. By retaining, filtering and releasing water at a slower rate slower than impermeable surfaces, green roofs can help prevent storm water systems from becoming overwhelmed.

Bibliography

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