

Station 1 - Green roof

An abbreviated history
Green roofs have a long and rich history, dating back to the Orient. One of the earliest and best known examples of a roof garden are the Hanging Gardens of Babylon. Roof gardens were also known and treasured by the Romans. Scandinavian sod roofs emerged from the needs of addressing the harsh climatic conditions and dealing with construction economics. The contemporary green roof originated in the German-speaking part of Europe. The recognition of the environmental and ecological benefits led to a widespread application and the first scientific research into this technology in the 1950s. The green roof industry in the U.S. started to emerge in the late 1990s.

Green roof 101

In very simple terms, a green roof is a vegetated roof cover that is installed on the top of a modified roof system. The modification generally consists of some structural reinforcement to accommodate the additional weight of the green roof. They can be retrofitted to many existing roofs and easily integrated in most new constructions. Generally, a green roof consists of a drainage layer that is installed on top of a waterproofing membrane, followed by a filter cloth and an engineered light-weight soil medium for the vegetation. The depth of green roofs typically ranges from 4" to 6" or more. They can be installed on flat roofs

or on roofs pitched up to 45 degrees. The vegetation of green roofs must consist of very drought tolerant vegetation due to the free draining nature of the light-weight soil medium and its limited depth. Suitable plant groups are succulents and other xeric vegetation. The vegetation at Elm Ave. consists of 50% experimental species while the other 50% are proven species (predominantly *Sedums* sp.). The experimental species have been carefully researched and are found in very dry prairie habitats, in dry habitats of the Great Plains states, and in areas of the Southwest high desert. It is very likely that this green roof will change its appearance over the next seasons.

What are some reasons for building a green roof?

In addition to the obvious aesthetic benefits, the vegetation and growing medium protect the roof from damaging heat and solar radiation, thereby extending the life of the waterproofing layer by twofold or more. There is virtually no maintenance required on the waterproofing or roof structure over the life span of a green roof.

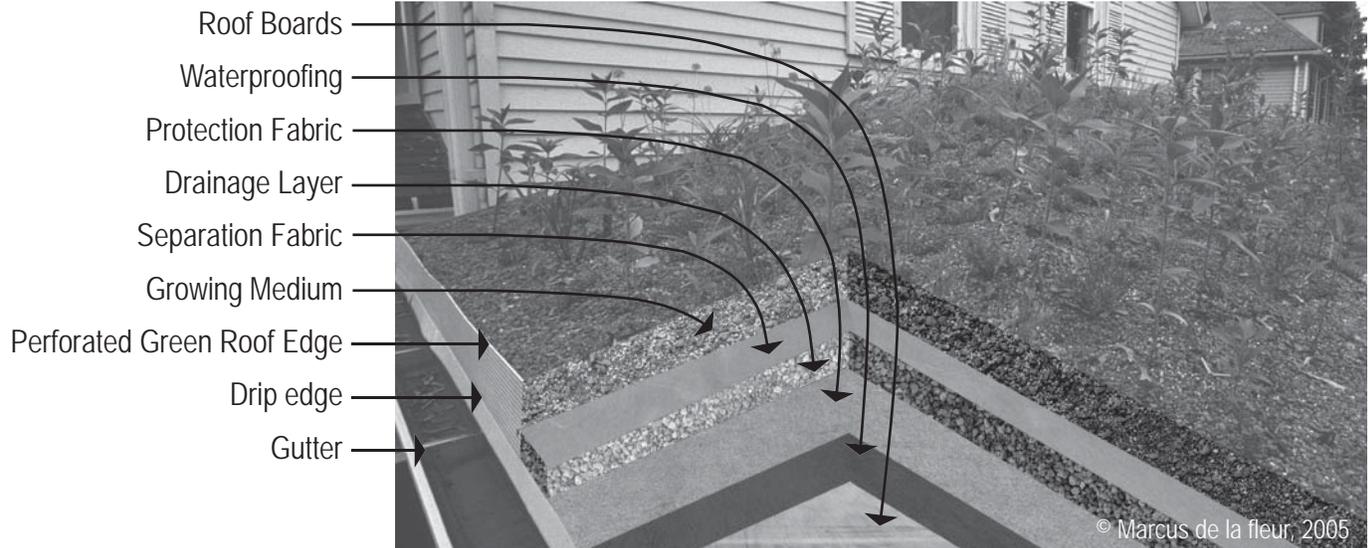
What makes a green roof environmentally beneficial?

On a typical roof (like any impervious surface), sunlight and water act more as a nuisance than a resource. Rainwater falling on these roofs picks up pollutants

Station 1 - Green roof

- Station 2 - Rain barrels
- Station 3 - Porous pavement
- Station 4 - Rain garden
- Station 5 - Gravel grass
- Station 6 - Cistern
- Station 7 - Bioswale





deposited from the air and carries them into natural waterways such as streams and wetlands, causing great harm. Plants manage water and solar resources much more effectively. On a green roof rainwater is absorbed by the plant roots, reducing the overall runoff. The green roof at Elm Ave. is capable of capturing and retaining up to 70% of our annual rainfall. This means 70% of all rainwater falling onto the green roof will be recycled back into the atmosphere. Excess water is filtered before leaving the roof, which helps to improve water quality. Plants also improve air quality by trapping some airborne pollutants, and regulating temperatures by transpiring water. A green roof increases energy efficiency: It reduces heat gain and transfer in summer and reduces heat loss in winter. It further provides some acoustic insulation.

Can my roof be converted to a green roof?

Virtually any roof can be converted to a green roof using currently available systems, but it is easiest to convert flat roofs or roofs sloped at an angle of less than 15 degrees. The most important factor that determines the type of green roof used in a conversion is the load bearing capacity of the roof structure.

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Green roofs restore many of the functions/services of the living landscape back into our contemporary built landscapes.

It is strongly recommended that this type of evaluation be done by a structural engineer.

How much does a green roof cost?

Every green roof project is unique, but in general extensive (low profile) green roofs start at around \$15 per square foot (including the waterproofing). Intensive green roofs (thicker profile) generally cost \$25 to \$40 or more per square foot, but can support a greater variety of plants. These costs also assume that the existing roof can support the necessary weight.

How much maintenance does a typical green roof require?

An extensive green roof such as at Elm Ave. requires very little maintenance once the vegetation has been established. One or two maintenance visits per year are recommended to check for weed growth.

The Elm Ave. Green Roof
The green roof on Elm Ave. is the first residential green roof installation in DuPage County, which was made possible by the Elmhurst based not-for-profit organization Conservation Research Institute (CRI). CRI received a 2003 grant from the general grant program of the DuPage Community Foundation based in Wheaton, Illinois. The grant awarded in October 2003 underwrote in part the development of this residential Green Roof Demonstration Project. CRI worked with Conservation Design Forum, Inc. (CDF) also based in Elmhurst, to design and construct this residential green roof during May and June of 2004. The goal of this project is to provide a living demonstration in the heart of a residential neighborhood to raise awareness of and to convince homeowners of the feasibility of green roofs.

Some other frequently cited green roofs from the Chicago area include the Chicago City Hall Rooftop, The Peggy Notebaert Nature Museum, the Chicago Center for Green Technology, and the research and trial green roof on CDF's office building.