

Green on Top = Savings and Benefits Below

By Sandra McCullough

Lake Calhoun is part of the chain of lakes near Minneapolis, MN, popular for fishing, windsurfing, swimming, sailing, canoeing, and comfortable living. It is also the site of a new, 23-unit condominium project, which will have something unusual on the roof—a 9,000-square-foot Green Roof system.

Mike Dean, a sales agent with Freedom Financial Realty, the firm in charge of marketing the condominiums, says the developers were willing to spend a little extra for the Green Roof because they wanted to embrace as many innovative building techniques as possible.



Additionally, the developers are trying to respond to growing concerns in the Minneapolis area about the amount of runoff that's flowing into city lakes and streams. In fact, the city recently passed an ordinance that provides various credits to building and home owners who reduce the amount of rainwater that ends up in city sewers.

This condominium project is just one of a number of sites with Green Roofs being installed in the Twin Cities area. In fact, more than a

dozen Green Roof projects are now planned or have already been installed on a variety of Minneapolis buildings, including the city's new public library.

And Minneapolis is not alone. Cities throughout North America, Europe, and Asia are installing Green Roofs atop office buildings, city halls, government facilities, and hotels. In fact, in many cities, these roofing systems have gone from being a novelty to becoming commonplace.

Not so New but Growing

Green Roofs are not new. Famed landscape architect Frederick Law Olmsted, who designed New York City's Central Park and worked with the Vanderbilt family to landscape Biltmore, their 125,000-acre North Carolina estate, was designing rooftop gardens back in the late 1800s.

In the 1930s, Green or garden roofs were installed atop Rockefeller Center in New York to provide a relaxing oasis for building workers. And today in Germany, more than 120 million square feet square have been built in the past 10 years. In fact, one in every eight buildings in Germany now has a Green Roof.

On the other side of the world, Tokyo is trying to counter the urban heat island effect, which makes cities much warmer than surrounding countryside areas, by requiring all large building projects to Green at least 20 percent of their roof.

And North America is not far behind. Officials in Portland, Oregon, encourage the installation of Green Roofs for their role in minimizing storm water runoff, which helps protect the local river salmon. In Chicago, there are plans to create 1.6 million square feet of Green Roofs, and virtually every major building project in that city is strongly encouraged to install a Green Roof.

Defining a Green Roof

Many of the early Green Roofs were really garden roofs, or what we call *intensive* Green Roofs. These are often found atop hotels, especially in large urban areas.

With an intensive Green Roof, as much as 40 or more inches of soil are installed on top of the building's existing roof, and grass, shrubs, flowers, and even trees are planted in the soil. They are much like what we might find in our own backyards and, just like a backyard garden, often require a considerable amount of maintenance. They also are generally very heavy, weighing as much as 60 pounds per square foot. Because of the weight, the facility must be specially designed to accommodate this type of roof.

On the other hand, an *extensive* Green Roof requires only two to six inches of soil and involves the placement of low-maintenance, hearty plants, such as succulents (often referred to as sedum), along with grasses and other smaller plant species on top of the present roof membrane. These Green Roofs require minimal maintenance, mostly weeding, after the initial installation. After that, they just need to be

checked every three or four months. Also, they are much lighter, with some extensive Green Roof systems weighing only 10 to 15 pounds per square foot when wet.

Going Modular

Many of the early Green Roofs were built right on top of the existing roof. This means soil was hauled up to the roof, where workers



spread it evenly so the vegetation could be planted. Even with scores of landscapers and workers, this process tends to be slow—and costly—often taking weeks. And there is always a concern about safety with so many people working atop a building.

Recently, another type of system has evolved; it is referred to as a modular Green Roof. With the modular system, the soil and vegetation are planted into modules made of 60 percent recycled plastic. The modules come in different sizes and are shaped to meet unique roof requirements.

The actual planting is all performed in a local nursery, not on the roof, which is faster and more cost-effective. The planted modules are then transported to the rooftop, where they are laid out, one next to the other. The process tends to be quick, with 3,000 to 4,000 square feet installed per day.

Issues and Benefits

One of the big concerns with a Green Roof or a garden roof is the ability to perform roof maintenance. With a garden roof or an intensive roof, this may require that soil and vegetation be removed from specific areas and then replaced after the roof maintenance work is completed.

With the modular system, the modules around the trouble area just need to be moved aside. Once the roof has been repaired, the modules are replaced in their original positions.

There are many benefits to Green Roofs. As referenced earlier, they help reduce storm water runoff dramatically—as much as 75 percent.

Additional benefits of a Green Roofing system include:

- **Reduces heating and cooling costs.** An asphalt roof can reach temperatures of more than 170 degrees; a Green Roof remains at about 60 to 80 degrees in the cooling season.
- **Increases the life of the existing roof.** Green Roofs can double the life of a rubber membrane roof, from 15 or 20 years to 35 and even 50 years. This is because of how it moderates the temperature swings, which can damage the roof because it causes the roof to expand and contract. It also protects the roof from ultraviolet rays.
- **Releases oxygen into the air.** The vegetation on the roof releases oxygen, which can improve air quality as it reduces the urban heat island effect.

- **Maintains quiet.** Green roofs act as insulation, absorbing noise and quieting a facility.
- **Contributes to LEED certification.** Green Roofs can earn a facility as many as six or seven points toward LEED certification.

At one time, project developers thought going Green meant adding costly changes and upgrades to buildings. Indeed, a decade or more ago, it was assumed that incorporating Green features in a facility could add as much as 20 percent to the construction costs.

However, today it is estimated that these added costs are closer to 5 percent or less. And when the savings and benefits of some of these Green features—such as Green Roofs—are figured into the equation, it becomes clear that going Green actually saves much more money than it costs and that any additional expenses are recouped within a short period of time. Because of this, as more facilities become environmentally responsible, we can expect to find Green Roofs on many more buildings.

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