

## Your city, with a garden on top

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Bruce Hemstock doesn't look like the type of guy who dreams of covering urban rooftops with plants and soil instead of tar and gravel. Dressed immaculately in a pressed blue shirt, black pants, shiny shoes, and designer shades, Hemstock looks like he belongs in a boardroom downtown-not here, next to New Brighton Park in East Vancouver, among huge wooden boxes filled with dozens of fledgling plants.

"This is *Armeria*," he says, gingerly touching one of the tiny shoots. "It grows in the sand dunes on the coast, so it's a good drought-tolerant plant and it shoots out these beautiful white and pinky-white flowers. And then this is *Prunella vulgaris*, which Native people have used for centuries to heal wounds. You can see the grasses here," he says, gently brushing his hand along the tips of the tiny blades. "I mean, I know it just looks like grass, but it's very exciting to me."

He's right. It does just look like grass. Still, Hemstock has plenty of reason to feel excited. After all, he and his colleagues at PWL Partnership Landscape Architects have designed the massive 2.5-hectare green roof that will cover the expansion on the Vancouver Convention & Exhibition Centre. In the process, they have created what is believed to be the largest nonindustrial green roof in North America; and by the time the new building opens in 2008, it will house more than 752,000 plants. For now, they're carefully watching to see how the 19 different species they have chosen look and behave in these test plots, which are laid out exactly as they will be on the roof.

Many outsiders are watching too. Whereas green roofs (also known as living roofs or eco-roofs) were considered to be on the architectural fringe just a couple of decades ago, they are now finding a secure place in mainstream design. Allowances for the added weight need to be made and the roofs carefully designed, but technological advances in everything from waterproofing membranes to lightweight growing media (the industry's term for soil) are making them easier and safer to build than they have ever been. And now, with more and more high-profile green roofs cropping up around the city and around the world, the interest in them is literally growing.

"What corporations are seeing is that sustainability can actually save them money. A green roof actually extends the life of the membrane on the roof by two to three times. Also, the overall costs of things like dealing with storm water and wastewater and generating power are going to come down. It also creates more comfortable environments for people to live and work in, so productivity goes up," Hemstock says. Still, he adds, many developers are understandably reluctant at first. "For people who don't know a lot about it, it's a little scary. They say, 'Why should we do this? Nobody else is doing it.' So it takes time for change to happen, but I think the development industry is embracing it in a really positive way, and we're really excited about that."

Russ Anthony is one of those developers. As president and project director of the Vancouver Convention Centre Expansion Project, which will also be a 2010 Olympic venue, he was charged with supplying a civic building that meets the highest standards in sustainability, and meets them in a cost-effective way. His initial interest in a green roof was rooted in aesthetics: with Stanley Park curving

around one side of Coal Harbour and Harbour Green Park extending from there, a green roof on the convention-centre expansion would create what Anthony calls "a green necklace". But before long, he began to understand the economic benefits, including efficiencies in heating and cooling, as well as reduced water usage. (The expansion will also include a full black-water treatment plant and a water-storage facility, so the rainwater that runs through the soil will be collected, cleaned, and used throughout the building for everything but drinking, and will then be used to re-irrigate the plants.)

"It's a bit of true ecology in the centre of the city. Those plants are eating up carbon monoxide and turning out oxygen. And instead of the sun bouncing off the roof and creating heat and glare in the city core, it's going to be absorbed," says Anthony, who adds that while people will not be able to go up on the roof, they will be able to visit a smaller version of the roof on a lower plaza. "We have parks, but this is just an extension of the idea that you have to have, even in a complex urban setting, a place of refuge that is to be respected for its own merit. And that will hopefully help us in marketing the convention centre and Vancouver."

Of course, a green roof on that scale does come with its share of challenges. The convention centre requires large, open spaces without supporting pillars and walls, and 15 centimetres of soil will add significant weight to the structure; wood is a cornerstone of the building's design, so the architects had to demonstrate to city hall that leaks would not be an issue; and the up-front cost of a green roof is a fair bit higher than that of a conventional roof.

"There were a lot of challenges along the way, but we've been able to overcome them and demonstrate that we are not paying a big penalty to have this design. We have been able to show that this is a responsible, prudent, and acceptable way of proceeding. There are some additional costs, but there are some additional savings, and on balance, I think it's worth doing," he says. "We don't feel like we are sacrificing for the principle. We think the principle actually works."

Although many assume that city officials are reluctant to approve building methods that are outside of the norm, Dale Mikkelsen, the green-building planner for the city of Vancouver, says his department is actively encouraging people to build green roofs. As yet, there is no specific green-roof policy for the city, he says, but the city is putting green roofs on several civic projects, such as the new Mount Pleasant Community Centre, and it's trying to convince Wal-Mart to put a 60,000-square-foot green roof on top of its proposed Marine Drive store. In the city's development of Southeast False Creek, 50 percent of the buildings will require the capacity to house a green roof. (For more on the Southeast False Creek development, see page 40.)

But for now, if a developer wants to build a green roof on a commercial building, all he or she needs to demonstrate is that the roof meets the same health, safety, and fire guidelines that any type of roof would. In the past five years, Mikkelsen adds, new developments in materials are making that task easier than ever before.

"It used to be that if a developer wanted to do a green roof, that developer had to design the membrane, the planting materials, and the drainage material. Then we would have to assess whether it would work," he says, on the phone from his office. "But now you can get prefabricated products for green roofs that carry warranties that are as long as the ones for traditional tar or gravel roofs. So it's really straightforward."

It's not quite as straightforward, however, if you want to build a green roof on your home. "Most of the green roofs on top of people's garages are outside of city regulation, because we just don't have the

tools to verify or allow green roofs-yet. So if someone came in looking for a building permit for a green roof, we would say, 'We don't have one.' Some people take that as a no. Other people think 'Well, they just aren't regulating it' and they go and build it. But we don't have the resources or even the desire to police that," he says. "We're trying to build the tools to actually help them."

Randy Sharp looks up at the hundreds of plants that are sprouting from the sloped roof of his wood-frame Kitsilano garage. A landscape architect and president of Verdir Systems, a company that supplies green-roof products, Sharp used a "Darwinian process of elimination" to select the plants: if they didn't survive, he didn't replant them. When it came to the structure, the stakes were extraordinarily high, he jokes, because his wife parks her convertible inside the garage; so he added a couple of extra beams and supports. Now he, along with the birds, insects, squirrels, and his neighbours, are all enjoying the self-sustaining garden, and he hopes that the city will encourage people to build more.

"Unfortunately, we don't have any incentives either in the city of Vancouver or the GVRD, so we'd like to see more carrots available for people who want to build rooftop gardens," he says. "In Germany, 15 percent of all buildings there are covered with green roofs. It's amazing."

While green roofs like his are becoming so popular that even Home Depot is asking if Sharp can supply the growing medium in bags, he doesn't recommend it for the average do-it-yourself homeowner, because the roofs need to be very carefully designed. He also recommends using a local installer who is committed to establishing and maintaining the roof for the first year. The initial cost is still higher for a green roof, he says-in fact, it roughly doubles the price of a conventional roof-but over the long term, it can actually create cost savings as well as longer-term benefits for the environment.

"If we build enough green roofs in a neighbourhood and start to link them together, you can create green corridors for the wildlife to move around," says Sharp, who, along with Hotson Bakker Boniface Haden Architects, is helping to create the green-roof and living-walls demonstration in the Green Garden area of the 2005 Vancouver Garden Show (at VanDusen Botanical Garden, June 9 to 12). "They would also draw down the cool, fresh air from the mountains and help flush out the air pollution. And because the green roof acts like a sponge, it soaks up water and releases it back into the air, which means that the water doesn't have to be treated at our treatment plants."

Back at the test-plot site for the convention-centre expansion, Bruce Hemstock pulls the large mesh gate closed and clicks the padlock shut. Although he's been designing rooftop gardens-mostly the kinds with potted plants and trees-on rooftops for decades, it wasn't until recently that developers began to embrace the idea of plants in place of tar and gravel on their roofs. With highly visible green-roof projects such as the one on the convention-centre expansion, however, he expects that the industry in B.C. will continue to blossom.

"We worked on the bid for the convention centre back in 1994, and nobody was talking about green roofs back then. And then just in the last month, it has really hit me that this project has some real significance," he says. "I mean, people are watching it happen, and they're starting to say, 'Wow, if they can do it, why can't we?'"

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