

Landscape Architecture Magazine, August 2003: plants

Meadows Above

A rooftop plant community in downtown Toronto

By Lorraine Johnson

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Mountain Co-op, Photo Courtesy Lorraine Johnson

When your company's name is Mountain Equipment Co-op (MEC), it's obvious what type of plant community is most appropriate, symbolically at any rate, for your rooftop landscape: a mountain meadow. But when your company's building is in downtown Toronto, the choice to install a green roof in the first place takes guts and vision—two attributes that this member-owned store, which sells wilderness-oriented gear, has in spades.

According to MEC's Facilities Planner Corin Flood, the company was in the process of designing a new store in Toronto, at the corner of King Street West and Charlotte Street, and "the board had ratcheted up our green building policy." That's the vision part. Where the guts come in is that funds had not been set aside for something as innovative and, at that point, untested in Canada as a green roof. Nevertheless, the company decided to go ahead with the green roof halfway through the building design and construction process. "The green roof was part of Mountain Equipment Co-op's corporate philosophy to go above and beyond what's considered normal in terms of sustainable design," says Heinz Vogt of Stone McQuire Vogt Architects, the building's architects. "There's still a

connection between the storm and sanitary sewer systems in this part of Toronto—they are not independent of each other—so during a heavy rain, the system can't handle the increased capacity, and the overflow [consisting of storm water and sewage] goes directly into Lake Ontario, bypassing the sewage treatment plant. This is one reason why the beaches are contaminated,” says Vogt. With a green roof, however, rainwater is absorbed by the plants, reducing runoff into the storm and sanitary combined system, which reduces the overflow burden. “It took great courage to do a green roof, to implement that strategy after design and construction had started,” Vogt adds.

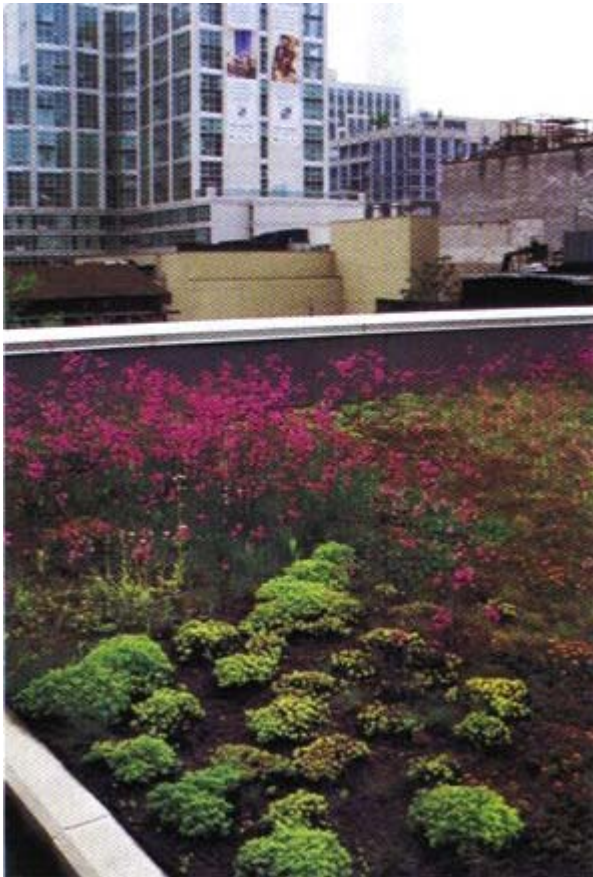
Once the decision to push the envelope had been made, the architects contracted Soprema, a Quebec-based company that specializes in green roof systems. (Soprema is one of approximately 10 companies in North America that offer complete green roof systems, according to Stephen Peck of the Toronto-based organization Green Roofs for Healthy Cities, but there are more than 100 offering component pieces of the system—such as growing media.) Soprema used the Sopranature system, which consists of an insulation layer, waterproofing membrane, drainage layer, filter, and Sopraflor growing medium (a mix of peat moss, light lava rock, organic material, and topsoil). The MEC roof was designed as an “extensive” green roof, with a shallow growing medium (5 inches), which is lightweight, low cost (typically \$12–20 per square foot), and low maintenance. Traditional roof gardens or “intensive” green roofs, on the other hand, are characterized by a deeper growing medium, with associated increased costs, intensive planting, and high maintenance.

The load capacity of the roof was designed for 45 pounds per square foot, but the green roof system used is just 38 pounds per square foot. “The structure is concrete and steel, so it's very efficient structurally in terms of carrying load,” says Vogt. However, because the decision to include a green roof was made relatively late in the design and construction process, “the roof structure had to be adjusted after the contract for the steel had been awarded.”

According to Vogt, “The fundamental challenge was that this was an entirely new technology in Canada. There had not been a green roof like this constructed before, other than an experimental green roof at Laval University in Quebec. Though there were lots of European examples, no one had attempted this in Canada.”

The challenge of such innovation was made possible, though, by the fact that agronomist Marie-Anne Boivin, who then worked at Soprema (she is now an independent green roof consultant), had done research on plant hardiness at the experimental green roof at Laval, testing more than 100 different perennials for rooftop application, so when installation of MEC's green roof began in 1998 she had an extensive body of knowledge on which to draw in terms of plant selection. “Hardiness and resistance to drought are the two most important plant properties if the green roof isn't going to be irrigated. The experimental green roof at Laval is never

watered, and the plants are still thriving after nine years,” says Boivin, mentioning in particular lavender, sedum, chives, *Iris primula*, *Cerastium tomentosum*, and gypsophila. Along with hardiness and resistance to drought, plants were chosen to have low nutrient requirements and to be low growing, shallow rooted, resistant to heavy winds, fast growing but not invasive. “It’s a challenge to choose the right plants,” says Boivin, “and you really need to evaluate them on a case-by-case basis and according to the site particulars. Conditions are harsh on the roof: drought in summer, cold in winter. And with the wind, plants get desiccated. So you need tough plants.”



Mountain Co-op, Photo Courtesy Lorraine Johnson

On the MEC roof, Boivin specified many of the plants that had proven their hardiness on the Laval University roof, plus meadow annuals and perennials such as calendula, bellflower, lance-leaved coreopsis, flax, black-eyed Susan, evening primrose, and thyme. Grasses included four different fescues and Kentucky bluegrass. Boivin estimates that 25 percent of the plants specified were indigenous species; 15 percent of the total green roof area of 903 square meters (10,000 square feet) was planted with perennials in 4-inch pots (9–14 per square meters), and the rest was seeded with 50 percent (by seed weight) grasses, 40 percent perennials, and 10 percent annuals, sowed at 2 grams per square meters.

Although the plants were hand watered after planting (an MEC cashier with a landscaping background volunteered for the job), during the first two years following installation, Toronto experienced record hot, dry summers, and the green roof suffered. The ferns, for example, all died, and the other plants didn't perform as well as expected. Hence, in the third year, an irrigation system was installed.

Another unexpected result had to do with the sunflowers, planted in the shape of MEC's logo, a kind of aerial advertising for people in nearby buildings whose windows overlook MEC. "It was a good idea," says Boivin. "The sunflowers turned their flowers with the sun, so the view was always changing." Unfortunately, the sunflower seeds acted as a food source, attracting animals such as raccoons and possums, which were able to climb up the building to the roof, and also crows. The logo lasted only for one year and wasn't replanted. As Vogt points out, though, one of the major benefits of green roofs is that they provide increased urban habitat; the MEC meadow, for example, was planted to attract insects and birds in particular, and success was immediate: "We wanted ducks on the roof, and we got ducks on the roof," says Vogt. A duck laid her eggs there the first year; once hatched, the ducklings were transferred to a rural environmental education center.

At least one visitor species has become a problem, though: poplar tree seedlings. "The year after installation, the roof was full of seedlings," says Boivin. "The problem is easy to solve, of course. The poplars germinate at the same time, so you just need to go in there and pull them all out. During the first two years especially, while plants are getting established, it's very important to weed." Just how important is illustrated by Kaaren Pearce, of Elevated Landscape Technologies, who was contracted to do maintenance of the MEC green roof for the first two years following installation: "I filled 15 bags with poplar seedlings!" However, now that MEC's green roof is in its sixth year and the plants have filled in, very little maintenance is required: "The green roof is virtually self-reliant," says MEC's Manager of [his exact title TK], Dave Robinson. "A couple of times a year, someone comes in to weed and cut back the grasses, but that's it."

While there were a few surprises, which is to be expected in any pioneering project such as this, MEC's green roof has, as Flood puts it, "broadened people's imaginations; it has helped other people make the case for green roofs." So much so that the MEC roof is no longer the only project of its sort within miles. Toronto's City Hall, close by as the crow flies, now has a green roof on which extensive research testing is being done and data compiled. As Boivin says, "When everyone puts green roofs on all the cities in North America, then there will be a lot more experimentation, a lot more new discoveries of what works and what is possible."

Lorraine Johnson is the author of The Gardener's Manifesto (Penguin, 2003).

Resources

Mountain Equipment Co-op, 400 King Street West, Toronto, Ontario; 416-340-2667; www.mec.ca.

To arrange a visit to MEC's green roof, contact Dave Robinson at 416-340-2667.

Extensive information on green roof initiatives in Canada, including a virtual tour of Toronto City Hall's green roof, can be found at Green Roofs for Healthy Cities, www.peck.ca/grhcc/.