



# currents

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## Flow



## Motion

GREEN ROOFS ARE GROWING RED HOT BY ALEX MCLEAN

**P**atrick Carey came to Bellingham last month to survey three rooftops in the Central Business District. An all-around expert in his field, Carey has been involved with nearly 100 green roof installations since founding his company, Hadj Design, 12 years ago. He has worked on green roof projects as far away as Kuwait, teaches courses on green roofs, and he recently wrote the chapter devoted to green roofs in the LID, or Low Impact Development, manual for Washington's Department of Ecology. Carey can seem serious, almost professorial at times. He is, however, a green roof evangelist to the very core of his marrow.

An example of the fixity of Carey's mission might be seen in how he responds to near-death experiences. As he watched from a hinky ladder, a mere squirt away from a rooftop—which very nearly launched the building owner on a 20-foot screamer—Carey remained unflappable in his sales pitch.

"Green roofs are softer, you know, if you fall on them," Carey said. The building owner, slightly squirrel-eyed and still clambering back to safety, ignored him.

Bellingham has about 18,000 square feet of green roofs installed. The global trend, however, suggests those numbers are both temporary and low. Green roofs, according to roofing trade associations, are growing by 16 percent in North America whereas the rest of the market has remained flat. Green roofs, by that standard, are red hot.

Cities that support green roof programs or provide incentives for their installation have the numbers in support of their efforts. Chicago, for example, is now claiming it has 7 million square feet of green roofs installed. Washington, D.C., the next nearest American contender, is approaching 2 million square feet. Flying over Stuttgart—via Google Earth—it is clear the Germans are hardly bluffing when they claim 10 percent of their commercial rooftops are now covered with green roofs. In some cities in Europe and, recently, in Toronto, Canada, green roofs are mandatory on structures of a certain size or type.

"It is not even a question in Austria, Copenhagen, Switzerland, some parts of Germany," Carey said. "I mean, they will still ask, 'What kind of roof are you putting up?' but their question refers to what kind of green roof."

### WHAT KIND OF ROOF?

Green roofs are variously called ecoroofs, vegetated roofs, garden rooftops, or living roofs. For our purposes, "green roofs" will suffice. Green roofs are roofs with plants on them and, given their benefits, many people believe they will save the world.

While formerly the whimsy of weirdo architects and wing-nut hippies, the modern version of green roofs have proven their ability to save money as well as the planet. Some of the largest green roofs in the world, after all, are those that have been freshly installed atop Fortune 500 mega-projects. This roofing technique makes sense to both corporations as well as city governments and, surprisingly, the up-front cost of installation—which can be significant—do not seem to be deterring them, ugly economy be damned.

"The European focus on stormwater retention got institutionalized," Carey said, explaining the recent history of green roofs. "Then groups like the U.S. Green Building Council and municipalities saw that they could save money on their infrastructure for stormwater retention. That really pushed it because all of a sudden there was money involved with it, there was a savings—a



monetary savings. It was documented in other cities and people saw they could do the same in theirs."

Tom Liptan, a landscape architect working for the City of Portland's Sustainable Stormwater Division, confirms this rough timeline. "We had so many issues related to our stormwater that the City and the managers of this department became open to finding solutions that weren't just giant pipes," Liptan said. "Somehow the idea of over \$1 billion going to making a bigger pipe seemed like all the eggs were in one basket."

Threatened with litigation for violating the EPA's water quality standards, Portland began to aggressively use low impact development strategies. The EPA defines LID as: "An approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible."

By replicating nature's sponge-like properties, the theory behind LID is that stormwater will be absorbed and filtered before it ever has a chance to pollute a stream or, in our case, all of Puget Sound.

"If you are addressing an environmental issue, it is supposed to cost more money," Liptan said. "Well, in this case, for stormwater management on a lot of sites, it is cheaper to do it with a green approach than it is with the conventional one that engineers have been using for decades."

## THROWING MONEY (UP) THE DRAIN

In order for Portland to ramp up its green roof coverage, that city decided to provide property owners and builders with incentives to attack the problem at its source. The City of Portland will help prospective green roofers with design, with permitting, with reduced or nullified stormwater impact fees and, sometimes, with labor for the installation. If a green roof meets certain design standards—ones proven effective at reducing stormwater flows—the City will also give a \$5-per-square-foot grant to help finance the project.

Liptan said that Portland now devotes \$1 million annually to such grants and, since the 2008 start of the program, 30 green roofs have been installed and 70 more are in some phase of progress. At least 50 of Portland's 273 green roofs (they call them ecoroofs) were installed "just to earn stormwater management credits—before the grants were even in place," Liptan said.

Because of this dervish of civic activity, and because Portland now has a reasonably mature cottage industry to support the green roof market, the city is looking to next steps.

"In the City of Portland we are actively discussing the idea of creating a requirement for ecoroofs such as might be similar to those in Europe—especially those in Germany, Austria, and Switzerland," Liptan said.

To many people who have yet to even see a green roof, the idea of suddenly requiring them seems radical, extreme, even a bit dangerous. Liptan points out, however, that Portland's building community is well aware of both the technology of green roofs and the city's stance on using LID strategies.

"We have been working on this for 12 years—we put ecoroofs in our stormwater manuals in

1999—so I wouldn't say we are just jumping into it haphazardly," Liptan said.

## ZID: ZERO IMPACT DEVELOPMENT

Bellingham puts a lot of effort toward "being green." The city has proven its willingness to experiment with LID widgets and strategies, for example, and a brief scan of registered LEED projects—the current litmus for environmentally sound construction—shows we have as many projects sited here as do our neighbors in doubly-populated Bellevue. The City of Bellingham, with nudges from groups like Sustainable Connections, drives a lot of this green momentum.

For better or worse, the motivating threat of killing Lake Whatcom, the city's drinking water supply, may force Bellingham well ahead of the "green" curve as far as stormwater management goes.

Bill Reilly, manager of the Storm and Surface Water division for Bellingham Public Works, puts detail to this theory. "In the Lake Whatcom watershed we are taking LID to a greater extent. We are literally proclaiming that, in order for people to develop out there, they have to, *have to*, emulate forested conditions. They have to prevent water from leaving their properties," Reilly said. Reilly paused, as if letting his statement percolate a bit, then added: "The soils are not really great out there."

Those soils, which are already naturally high in phosphorous, become force multipliers when disturbed by new construction and allowed to sluice down streets and driveways. "Adding impervious surfaces just becomes the conduit for phosphorous to get to the lake. We want to slow down water. We want to keep it on sites," Reilly said.

Roughly 75 percent of Reilly's budget for capital projects is thrown into the watershed. This, however, only amounts to about \$600,000 per year. When combined with Whatcom County's efforts, total stormwater improvements so far are closer to \$5 million. An additional \$23.1 million has been spent to buy properties and remove them from the threat of development. One doesn't have to squint too hard before the watershed starts looking like a welfare fiefdom for tax dollars.

It is a battle the city, by itself, will lose. With 15,000 people already living and driving and pet-pooing in the watershed, the prospect of full build-out for the thousands of remaining acres spells certain death to the lake if its residents don't help.

In recognition of the fact that city property covers only the streets and sidewalks, the City of Bellingham, resigned to the sanctity of private property trumping a public resource, now provides LID incentives for current homeowners within the watershed. Similar to Portland's efforts in its downtown, the aim of COB incentives are to hoard the rain before it even becomes stormwater.

The 300th free rainbarrel was installed in the watershed last week and a new program, in which the city will reimburse as much as \$6,000-worth of plants or LID infrastructure installed on a property, already has 60 houses signed up. Both incentive programs are funded by State grants.

## CRACK(ING) PIPES: BREAKING THE ADDICTION TO CHEAP WATER

Green roofs will not, actually, save the world. Only people can do that. On their own properties.

A study by Washington DoE reported that 75 percent of the pollution in Puget Sound comes from stormwater outflows. Like our problems with Lake Whatcom, which Reilly said will only become "more onerous" once new EPA mandates are in place, the solutions to the problem start at the source.

Carey, the green roof guru, frequently cites a radar survey done over Seattle's rooftops. "Single-family residences had 6.5 times more horizontal roof area—or footprint—than commercial roofs," Carey said. "If the whole idea of stormwater maintenance in green roofs is to make the rooftops more absorptive, then it seems to make sense to focus on where the roofs are."

Residential green roofs, however, are far more problematic than the blank, vast, flat vistas provided by commercial rooftops. Even the three flat-roofed projects Carey surveyed downtown may prove to be unworkable since—as was the case for a similar scoping done for Bellingham's City Hall building—some older structures cannot safely handle the additional weight of plants and soil.

New buildings and homes, on the other hand, can easily be designed for stormwater management. If green roofs somehow offend a builder's sensibilities, there are other interesting options.

Until recently, DoE considered rainwater to be state property the moment it touched ground. Green home builders, as a result, had phantom rain cisterns and filtering systems built in their projects but were not allowed to plumb them to any toilets or hosebibs. The rule has changed and Bellingham-based Aiki Homes and other green builders have since been able to not only reduce those flows gurgling toward salmon streams but also those sucked out of municipal water supplies like Lake Whatcom.

The most extreme example of this notion of going "off pipe" can be seen in what 20/20 Engineering, based in Bellingham, has done for Seattle's Bertschi School. Once this project passes a year of analysis, it will be only one of four buildings certified in the world to have zero net water usage, zero net energy usage, and no resource impacts other than the materials used to build it. Designed to meet the updated standards of the Living Building Challenge—essentially a version of LEED on steroids—the Bertschi School will be the bar all other green contenders must hurdle.

If the example of large cities are a forecast, and if the creativity already shown in Bellingham provides a hint, it seems that truly green buildings and homes are likely to reign around here.

"The driver was stormwater initially," Liptan said, referring to Portland's green evolution, "but it has expanded to looking at the benefits that vegetated roofs and vegetation on the ground provide in an urban environment that, quite often, we eliminate because we're building and paving the city. Providing vegetation in the city, I think, is the way of the future." ☺

*Contributor Alex McLean continues to gush about green roofs at his website, [www.bellinghamgreenroofs.com](http://www.bellinghamgreenroofs.com)*

## GOALS FOR GREEN ROOFS

The waterproof membrane of a green roof, because they are protected from sun and weather, last two times longer than a conventional, exposed roof typically will. Green roofs, however, typically cost at least twice as much as a conventional roof.

### OTHER BENEFITS:

- reduce stormwater outflows 50 to 60 percent
- detain heavy rainwater surges for 1-2 hours
- insulate/reduce power usage 5 to 30 percent
- reduce HVAC mechanics (air conditioning)
- reduce urban temperatures (heat island effect)
- reduce air pollution (absorption/transpiration)
- filter rainwater (phytoremediation)
- reduce water-proof membrane leachates (to runoff)
- reduce water-proof membrane replacement (to landfill)
- improve aesthetics
- create local jobs
- food production (rooftop garden)
- reduce noise pollution
- create usable public space
- provide habitat for insects and birds