

THE GREEN ROOF



INFRASTRUCTURE MONITOR

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When Design Moves Beyond Aesthetics

Ireen Wieditz, Director, Green Roofs for Healthy Cities

When it comes to design, certain projects strike the eye. And upon closer inspection, we see that these projects not only look great, but also provide an array of benefits beyond those of aesthetic appeal. Green roof design is no different.

In May, Green Roofs for Healthy Cities hosted the first annual *Green Roof Awards of Excellence* to showcase exceptional green roof design projects and recognize the contribution of design professionals. Six green roof projects were honoured at the *Greening Rooftops for Sustainable Communities Conference 2003* in Chicago, Illinois.



Steven Peck awards Chicago Mayor Richard Daley the Civic Award of Excellence for his leadership at the 2003 Green Roof Conference in Chicago.

The uniqueness of this awards program was its holistic approach to the evaluation of green roof projects. The projects were not only assessed on the basis of their visual appeal, but also on the grounds of their economic value, functionality, and ecological value. By recognizing these further attributes, the awards program was able to communicate the significance of using an integrated approach to green roof design, thus acknowledging the many benefits of green roof technology.

The awards program had six categories: retrofit and new construction for extensive green roofs; intensive green roofs; and a combination of extensive and intensive. See pages 10 and 11 for an overview of the award winning projects, which were selected by a multi-disciplinary panel of judges.

Interested in submitting a project for the 2004 *Green Roof Awards of Excellence*? Visit www.greenroofs.ca/grhcc/awards.htm.

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The Green Roof Infrastructure Monitor

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www.greenroofs.ca

Building on Our Success in Chicago

Steven Peck, Executive Director, Green Roofs for Healthy Cities

Coming off the heels of the hugely successful first annual *Greening Rooftops for Sustainable Communities Conference, Awards, and Trade Show* in Chicago last May, we are working hard on multiple fronts to continue to develop the green roof industry and provide our growing membership with significant added value. In Chicago our members voiced the need for standardized training in green roof design, implementation, and maintenance. In response, we've assembled a multi-disciplinary team of green roof experts to develop a one-day, intensive training course on basic green roof design to complement the emerging ASTM standard, which will be launched in 2004. Ireen Wieditz (iwieditz@cardinalgroup.ca) is managing this initiative.

We are excited about our next major conference, which will be co-hosted by the City of Portland, Oregon, a North American leader in the research and policy development for green roof infrastructure. The conference takes place on June 2-4, 2004 and coincides with Portland's Annual Rose Festival. Jennifer Sprout, Senior Director, Conferences and Special Events, (jsprout@cardinalgroup.ca) is coordinating the event, which is targeting over 750 delegates from around the world. We are also organizing a special *International Business Opportunities Reception* in Portland on June 2 to facilitate joint ventures and licencing agreements among green roof businesses.

In order to continue building our capacity to promote the green roof industry, we need the ongoing support of our existing members as well as membership growth. For 2004, we've significantly improved the tangible cost savings associated with Patron and Supporter level memberships and expanded our promotional activities. Angela Loder, our new Director of Membership would be happy to send you our new membership package (aloder@cardinalgroup.ca).

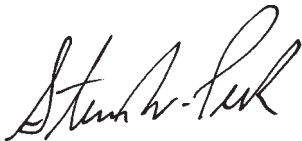
In our own local market, we've made significant progress. We've successfully advocated for the establishment of an official City of Toronto *Green Roof Task Force* to identify green roof incentives for potential implementation in 2005.

Recent meetings with representatives from the German, Austrian, and European green roof associations have led to plans for a multi-lingual green roof conference in Munich in September 2005. This will be an excellent opportunity to forge stronger linkages with researchers and industry associations and businesses in European markets.

Finally, we are working with Patron Level member McQuireWoods on incorporating Green Roofs for Healthy Cities as a non-profit 501 c6 in 2004. This will provide new opportunities for partnerships and place the industry association in the right institutional context.

Next year promises to be an exciting period of growth and opportunity for the emerging green roof industry. Thank you for your interest and support and I look forward to a gathering of the 'green roof family' in Portland next June.

Sincerely,



Steven Peck and Dr. Manfred Koehler of the University of Applied Sciences, Neubrandenburg, in front of a 10-year old Optima green roof at the International Horticultural Exhibition in Rostock, Germany.

About Us

Green Roofs for Healthy Cities™ is a network of public and private organizations founded by the Cardinal Group Inc. in March 1999 to foster the development of a multi-million dollar market for green roof infrastructure in North America. This involves training, building awareness, technical research and providing support for the implementation of public incentives and policies to help the industry grow. In 2004 we will become a non-profit industry association.

Annual memberships range from \$50 to \$7,200 US depending on the size and type of your organization. For additional membership information, please contact Angela Loder, Director of Memberships, at aloder@cardinalgroup.ca or visit our website at www.greenroofs.ca

Our Patron members include:

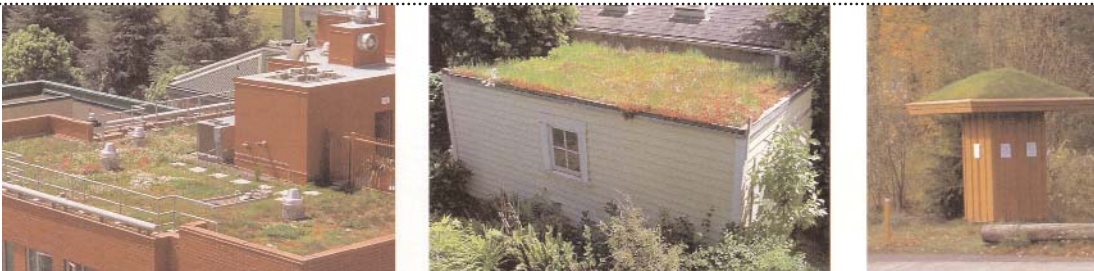


Second Annual Green Roof Conference Planned for Portland, Oregon

Green Roofs for Healthy Cities is pleased to announce that the *Second Annual International Greening Rooftops for Sustainable Communities Conference, Awards, and Trade Show* will be held in Portland, Oregon, USA from June 2 to 4, 2004. We are pleased to be co-hosting this event with the City of Portland, Oregon, a leader in many sustainable community practices. Experts and delegates from diverse fields from around the globe will share knowledge about the benefits of green roofs, new research findings, policy developments, and the latest in green roof products and services. The conference and trade show will provide many opportunities to network with the anticipated audience of over 750 delegates and to profile techniques, services, and products.

The three day conference will consist of plenary and specialized sessions focused on three main topic areas: Programs and Policies to Support Green Roofs; Research and Technical Papers on Green Roof Performance; and Innovative Case Studies from across the country.

Once again, we will be featuring a trade show where exhibitors will have the opportunity to display the latest information on new and existing green roof products and services as they network with the conference delegates. More than 75 exhibitors are expected to participate - double the number from Chicago!



Conference delegates will be given the opportunity to view some of Portland's newest and most innovative green roofs and green buildings through walking, cycling, and self-guided tours.

We are pleased to be offering two new events this year: the *International Business Opportunities Reception* and the *Green Roof Design 101* training course. The *International Business Opportunities Reception* will provide an opportunity for Green Roofs for Healthy Cities members, trade show exhibitors, and conference delegates to meet and mix with representatives from companies interested in licensing and joint ventures in green roof technology and services.

The *Green Roof Infrastructure Voluntary Training and Certification Program* is designed to teach individuals from various professional designations about green roof design, implementation, and maintenance. The first one-day workshop in the training and certification program will be launched in Portland. *Green Roof Design 101* will teach basic design principles of integrative green roof design.

We look forward to seeing you in Portland! For more information about the conference, visit our Web site at www.greenroofs.ca.

PORTLAND 2004 TRADE SHOW



With 75 exhibitors, over 750 delegates from more than 10 countries, Portland 2004 provides unparalleled access to senior level executives and global markets.

who will be there?

Building owners, developers, managers, architects, landscape architects, planners, engineers, roofing contractors and consultants, environmental scientists, academics, botanists, horticulturists, ornithologists, policy makers and environmental agency representatives.

benefits of exhibiting

Web site and trade show program directory listings, two (2) complimentary conference delegates passes, visitor passes and client invitations, and an opportunity to attend the International Business Opportunities Reception.

who should exhibit?

Innovative manufacturing and service providers seeking access to new and target markets and government officials and agencies.

testimonial

"I can't tell you how much we enjoyed the Green Roof Conference. I have been doing trade shows for many years ... and can say that the Green Roof show was by far the best I have ever exhibited in! ... It was a great mix of seminars and trade show time. We are looking forward to next year's show already."

Mary Beth Fletcher
White Premium Organics, 2003
Chicago Green Roof Conference
Trade Show Exhibitor

www.greenroofs.ca

New Membership Benefits

As part of my new role as Director of Membership, I have been looking at ways of enhancing the value of our memberships, and am pleased to introduce you to our new membership package for 2004. Our new offerings include a 10 percent reduction in our membership fees, two new memberships categories, and increased discounts for our existing members. Members also receive fantastic savings at our annual *Greening Rooftops for Sustainable Communities Conference, Awards, and Trade Show* in Portland, Oregon. We have worked hard to ensure that your savings outweigh your membership dues, and I would be happy to discuss with you the membership package best suited to your needs. Contact me at (416) 971-4484 or at aloder@cardinalgroup.ca to discover the full range of benefits and start saving today!

Angela Loder, Director of Membership

Highlights of our membership offerings include:

Portland, OR Conference June 2-4, 2004:

- **One free** delegate pass for Patron level members
- A **25%** delegate discount for Supporter level members
- A **75%** introductory discount for members to attend our *International Business Opportunities Reception*: joint ventures, licensing, and company profiling **NEW!**

Portland, OR Trade Show June 3-4, 2004:

- Up to a **50%** discount for Patron level members on exhibition space*

10 Planned Local Market Development Workshops:

- Patron level members receive **one free** workshop exhibit space, after which they enjoy a **75%** discount for each workshop*
- Supporter level members enjoy a **25%** discount for each workshop exhibit space*
- A **25%** discount on delegate passes for members

* Conference exhibit space includes two free delegate passes; one free workshop delegate pass

New Technology, Information, and Connections

- **Connections** to new clients via our network of industry leaders, academic researchers, and municipal policy-makers
- **Access** to the GRHC information clearinghouse, connecting you to the right people to get the information, techniques, and contacts you need
- **Stay Informed!** Monthly email updates on the latest policy developments, case studies, technical research, and events
- **Advocacy** for green roof market development by GRHC on behalf of our members, both in North America and internationally

Two Local Market Development Workshops Planned for Calgary and Edmonton

Green Roofs for Healthy Cities is pleased to announce two new market development workshops that will be co-hosted by the City of Calgary and the City of Edmonton during the first week of December 2003. The main purposes of these workshops are to demonstrate the benefits of a green roof system and to discuss steps on how to establish a green roof incentive program in the local municipality. Although green roofs are being adopted elsewhere in North America, local, technical research is required to understand the site level performance and regional scale benefits. Such research is critical to establishing standards, policies, and programs to support broader implementation.

These workshops will be an opportunity to learn from local and national experts about the design and implementation of green roofs. Afternoon break-out sessions will allow participants to identify local research needs and obstacles to implementation. Input from participants at the workshops will be used to guide the development of the local municipality's research program to further explore green roof technical performance and supportive policy options.

The Calgary workshop is scheduled for December 3 at the Rosza Centre at the University of Calgary and the Edmonton workshop for December 4 at the Fine Arts Building at the University of Alberta. The workshops will run from 8:30 a.m. to 4:30 p.m., with a networking reception for all participants following the workshop. Registration may be done on-line through our website at www.greenroofs.ca, in the News and Events section. Cost for this one-day workshop is \$150 and includes lunch, workshop materials and the networking reception. This seminar would be of benefit to municipal staff, landscape professionals, horticulturists, architects, engineers, urban planners, general contractors, building owners, developers and managers, environmental scientists, academics and researchers, as well as policy makers and environmental agency representatives.



A case study of the Ducks Unlimited National Headquarters/ Oak Hammock Marsh Interpretive Centre in Winnipeg Manitoba will be presented at the workshops in Calgary and Edmonton, in December 2003.

The workshops are organized and developed by Green Roofs for Healthy Cities and will include financial and in-kind support from local partners, including Canadian Municipal Housing Corporation (CMHC), the local municipalities, and Climate Control Central. Sponsorship opportunities remain open. In addition, GRHC members and local related associations, industries, and manufacturers are invited to participate in the tradeshow component of the workshop.

For further information about our *Local Market Development Workshop* series, please visit our website at www.greenroofs.ca, and go to the News and Events section, or contact Jennifer Sprout, Director of Conferences and Special Events at 416-686-5887.

International Business Opportunities Reception

The *International Business Opportunities (IBO) Reception* is an opportunity for Green Roofs for Healthy Cities (GRHC) members, trade show exhibitors, and conference delegates to meet and mix with national and international representatives interested in joint ventures or licensing green roof technologies for use in North America. The event will provide all those in attendance with the opportunity to establish international contacts and expand their business. The IBO Reception is an event where exhibitors can profile and gain exposure for their products and/or services on an international scale.

Date and Time

June 2, 2004, 2 p.m. to 5:30 p.m.
(coffee and snacks to be served at 3:30 p.m.)

Capacity

75 - pre-registration required

Location

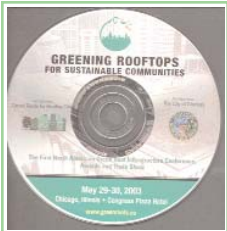
Hilton Hotel, 921 Southwest Sixth Avenue,
Portland, Oregon

Cost

Conference exhibitors - Free (maximum 40)
GRHC members - \$25
Conference delegates - \$100

For more information, please visit www.greenroofs.ca/grhcc/about_conference.htm or contact Alison Empey at aempey@cardinalgroup.ca or at 416.686.5887.

Chicago Green Roof Conference Proceedings Now Available on CD



If you missed the Chicago conference you can still obtain the most up to date information on green roof design and implementation, technical research, and policy developments by purchasing the conference proceedings on CD. The only compilation of green roof data from around the world, this CD is a must for anyone involved in green roof design, implementation, installation, research, policy development, and outreach activities.

The CD contains information in three important areas: Policies and Programs; Design and Implementation Techniques; and Research and Technical Information.

GRHC Members (Patron and Supporter)

U.S. residents
\$50 U.S.
Canadian residents (\$50 + \$7.50 GST + PST)
\$57.50 U.S.

Non-members

U.S. residents
\$99 U.S.
Canadian residents (\$99 + \$15 GST + PST)
\$114 U.S.

Shipping fees are \$15 U.S.

Visit www.greenroofs.ca/grhcc/cd.htm to order your copy.

RESOURCE GUIDE

Events

The *Second Annual Greening Rooftops for Sustainable Communities Conference, Awards, and Trade Show* will be held in Portland, Oregon from June 2 - 4, 2004. This event is being co-hosted by Green Roofs for Healthy Cities and the City of Portland, and is expected to draw over 750 delegates from North America and around the world. Visit www.greenroofs.ca for early-bird registration.

Green Roofs for Healthy Cities is partnering with local municipalities to co-host two *Local Market Development Workshops* in Calgary and Edmonton, on December 3 and 4 respectively. The workshops, which will run from 8:30 a.m. to 4:30 p.m., will bring together local stakeholders and experts interested in establishing a green roof incentive program in their municipality. Visit www.greenroofs.ca to register.

Updates

The University of Ontario (formerly Durham College), located in Oshawa, can now boast two new green roofs. Perennial Gardens Corp. was hired to install over 6,000 sedums and 2,000 Ontario native plants in six inches of soil over an area of approximately 9,000 square feet. Plants were chosen for durability as well as appearance. Although visible, the roof is to remain inaccessible and has no irrigation system installed. For more information, please contact Terry McGlade at sugarmarsh@greenroofonline.com.

The City of Waterloo installed a green roof on its City Hall this summer. The project is part of a green roof feasibility study to determine the benefits of green roofs for the Waterloo region. The project is being funded by the Canadian Federation of Municipalities, and was put into motion after Green Roof for Healthy Cities held a *Local Market Development Workshop* in Waterloo to help the City identify partners and supporters for the study.

Resources

English Nature, a British conservation group, recently published *Green Roofs: their existing status and potential for conserving biodiversity in urban areas*. This report assesses the potential of green roofs to conserve biodiversity in urban areas. The report, which was published in July 2003, can be found online at www.english-nature.org.uk/news/news_photo/Greenroofs.pdf.

Earth Pledge launched a new Web site on October 15, 2003. GreeningGotham.org presents Earth Pledge's vision for improving the urban environment by bringing life to barren and abandoned landscape - New York City's rooftops. GreeningGotham.org will allow New Yorkers to share in that vision, learn about the urgent environmental problems that face NYC and how green roofs can help solve them. Be sure to visit www.greeninggotham.org.



Category: Retrofit Extensive

Montgomery Park Business Center, Baltimore, MD

Award Recipient: Katrin Scholz-Barth Consulting

The 1.3 million square foot Montgomery Park Business Center in Baltimore, Maryland is a large scale adaptive re-use of the 1925 Montgomery Ward Catalog Warehouse. This commercial building is situated within a brownfield redevelopment and incorporates a number of green building features, such as rainwater storage for toilet flushing and operable windows.



Category: New Extensive

901 Cherry Offices for Gap, Inc., San Bruno, CA

Award Recipient: William McDonough + Partners

The green roof is 69,000 square feet in size and covered in native grasses and wildflowers. The design of this undulating green roof has a fundamental effect upon the building's design profile, its physical relationship to the surrounding environment, its mechanical performance, acoustical and thermal comfort and stormwater management.



Category: Retrofit Intensive

Garden Room, Shorewood, WI

Award Recipient: Buettner & Associates

The 4,000 square foot green roof sits atop a rehabilitated retail store specializing in unique garden items. The project was designed to explore the full potential of establishing a true garden in the city, provide display opportunities for merchandise and educate consumers about hardy urban plants. Tours are given regularly, which display a wide array of design possibilities for intensive green roofs.

Category: New Intensive

Ducks Unlimited National Headquarters and Oak Hammock Marsh Interpretive Centre, Winnipeg, MB

Award Recipient: Number Ten Architectural Group

The two storey building is designed to blend seamlessly into its marsh and prairie surroundings through the use of two green roofs totaling 28,190 square feet. The design objectives were to reduce the visual impact from a "birds eye" view, create opportunity for observation of the marsh, and restore habitat.



Category: Retrofit Combination

Peggy Notebaert Nature Museum, Chicago Academy of Sciences, Chicago, IL

Award Recipient: Conservation Design Forum

Located in the Peggy Notebaert Nature museum, this demonstration project provides an educational opportunity for visitors to the museum. Only 2,400 square feet in size, the project has four progressively thicker green roof systems along its 200 foot length and is designed in harmony with the existing architecture of the building.



Category: New Combination

The Church of Jesus Latter-Day Saints Conference Center, Salt Lake City, UT

Award Recipient: Olin Partnership

Situated on one of the world's largest religious buildings, the green roof is multi-leveled and over eight acres in size. The vast expanse of meadowland, firs, pines, and aspens throughout, create an oasis for meditation in an urban area. It also serves an important gathering point for the congregation and its social requirements.



New Policy and Program Developments

Quebec Establishes First DSM Green Roof Financial Incentive Program

On Sept. 26, 2003, Quebec's Energy Board approved a \$1 CDN per square foot incentive for green roof implementation - a first for demand side management (DSM) the energy sector in North America. The mission of the Energy Efficiency Fund, established in 2000, is to develop and implement innovative energy efficiency initiatives for clients of Gaz Metropolitain, Quebec's natural gas utility. Jean-Pierre Finet, general manager of the Fund said, "We are promoting green roofs as an energy conservation measure which also has multiple economic, social, environmental, and health related benefits for building owners, occupants, and communities."

The *Green Roof Financial Incentive Program* is one of the Fund's five Industrial, Commercial, and Institutional Sector Programs. In order to obtain funding under the new program, at least 60 per cent of the roof must be greened with a minimum of six inches of growing medium depth. Robert Venasse, of Quebec-based green roof manufacturer Soprema said, "This is great news for green roofing and the environment."

For more details please contact J.P. Finet, General Manager, Energy Efficiency Fund at jpfinet@eefund.qc.ca or visit www.eefund.qc.ca.

Toronto Creates Green Roof Task Force

During its last Council meeting in September 2003, the City of Toronto voted to establish a formal *Green Roof Task Force* to investigate and recommend policies and incentives to encourage the construction of more green roofs in new buildings and retrofits. The task force will be comprised of nine individuals: three elected officials, three representatives of the green roof industry, and three stakeholders. The task force follows a three year Green Roof Infrastructure Demonstration Project which identified a number of social, economic, and environmental benefits for City inhabitants from six per cent green roof coverage (See GRIM, vol. 5 no. 1). The task force will meet over the course of 2004 and make recommendations on green roof incentives to City Council in January of 2005.

"This task force presents a great opportunity for Toronto to exploit the many social and environmental benefits that green roofs have to offer."

Case Ootes, Deputy Mayor for the City of Toronto, who moved this motion. The motion was seconded by tree advocate, Joe Pantolone.

For more information please contact Jane Welsh, City of Toronto at jwelsh@city.toronto.on.ca.

Greening the U.K.

Alison Empey, Director of Communications, Green Roofs for Healthy Cities

The first ever conference for greening rooftops in the U.K. took place on September 24 at the University of Sheffield in England. Steven Peck, executive director of Green Roofs for Healthy Cities, was the keynote speaker and was impressed with the event.

Nigel Dunnett, conference organizer and senior lecturer in the Department of Landscape at Sheffield University said: "Currently, there are no government incentives for green roof installation in the U.K. Aside from east London, where green roofs have been required in an effort to mitigate loss of habitat, no cities are promoting the idea." But Dunnett expects this to change and creating a Green Roofs for Healthy Cities U.K. may be a first step. "England has experienced massive urban flooding problems and has recorded its hottest day on record in 300 years. Green roofs are a way for us to combat these environmental problems," he says.

The event was focused on the potential of green roofs in the U.K. and featured speakers from the areas of landscape design, biodiversity, engineering, architecture, and horticulture. Mathew Frith, landscape regeneration manager for the U.K.'s Peabody Trust, outlined the historical development of green roofs in the U.K. and discussed how green roofs currently fit with urban regeneration initiatives and policy development. Dusty Gedge of the London Biodiversity Partnership was on hand to discuss the recent wave of green roof installations in London and how biodiversity conservation is the driving factor. Opportunities and barriers for the development of a U.K. green roof market was spearheaded by Jonathan Hines, the managing director of Architeype - a national architectural practice specializing in sustainable design in the U.K.

Although green roofs are a relatively new concept in the U.K., the country is looking to its more developed cousins to the east as models. Germany and Austria are examples of European countries who have been enjoying the benefits of green roof technology since the mid-'80s. The U.K. is also looking to benefit from experiences in developing the North American market. English Nature, a government funded body in the U.K. working to promote the conservation of wildlife and natural features, recently revealed a report claiming an estimated 200 million square metres of existing urban roofs in the U.K. could be vegetated with little or no structural modification.¹ The report also indicates there are at least 25 species of wildlife that could benefit from widespread green roof implementation, including beetles, spiders, bees, wasps, and a variety of birds such as the black redstart.

The conference was a first step in establishing an information-sharing network of individuals and organizations wishing to develop the market for green roofs in the U.K. Green Roofs for Healthy Cities is looking forward to developing a long-term relationship with this network and being a resource to help bring the wonders of a thriving green roof industry to the U.K. For more information about green roof research and incentives in the U.K. please contact Nigel Dunnett, University of Sheffield at n.dunnett@sheffield.ac.uk.

¹English Nature, *Green Roofs: their existing status and potential for conserving biodiversity in urban areas*, July 2003.

The BCIT Green Roof Research Facility

Maureen Connelly, MAIBC, British Columbia Institute of Technology

The British Columbia Institute of Technology (BCIT) is constructing a Green Roof Research Facility in British Columbia. Research on the performance of green roofs will be conducted at the new research facility with an overall goal to collect objective research data on site-level performance and the regional scale benefits of green roofs specific to the temperate rain forest climate of the southwestern region of B.C. This research is a critical step in developing effective policies and programs in support of green roof industry development.

The research, which is planned to take place over a five year period, will investigate the influence of green roofs on stormwater runoff characteristics at site-level management and the environmental benefits provided by green roofs through thermal performance. Interfacing research plans concerning the quality of stormwater runoff from green roofs and the potential for stormwater reuse, as well as species selection and maintenance programs are being initiated. The research facility will provide for simultaneous testing of a non-green reference roof and two green roof systems. The facility will host a complete weather station and a centralized data acquisition system to collect information from each roof system in real time for joint analysis by BCIT and the National Research Council. Maureen Connelly, MAIBC¹, is developing the research facility and research plans as a key initiative for the Centre of Excellence in Building Construction.

The construction of the facility is progressing well. With the installation of the wood frame panel system in place this past Spring, the facility was ready for the installation of the research roofs. In July, members and executives of the Roofing Contractors Association of British Columbia (RCABC) donated their time and experience to construct the three research roofs. To add to the excitement, CBC Television was on hand to film the interface of the instrumentation in the roof and the planting for a documentary which will air next Spring. This Fall we will focus on the installation of the data acquisition system while plant establishment and growth takes place. With ample student involvement in the design and construction, the building will cost approximately \$125,000. The instrumentation and data acquisition is estimated to cost \$40,000. While the research facility is not a public building, the research plots can be seen from a viewing platform, or by calling ahead to arrange a tour. For updates and more information on the green roof research facility, visit www.greenroof.bcit.ca. Also visit the GRHC Researcher's Corner at www.greenroofs.ca.



A green view from atop the new BCIT Green Roof Research Facility.

Photo credit: Scott McAlpine, BCIT

Project sponsors and contributors: BCIT School of Construction and the Environment, Canada Mortgage and Housing Corporation, EarthTech Engineering, Environment Canada, Greater Vancouver Regional District, Public Works & Government Services Canada. In-kind contributions from Roofing Contractors Association of BC, and numerous material and suppliers of the construction and roofing industry.

¹ Member of Architectural Institute of British Columbia

The Water Balance Model for B.C.: Evaluating the Effectiveness of Stormwater Controls

Laura MacLean, Environment Canada

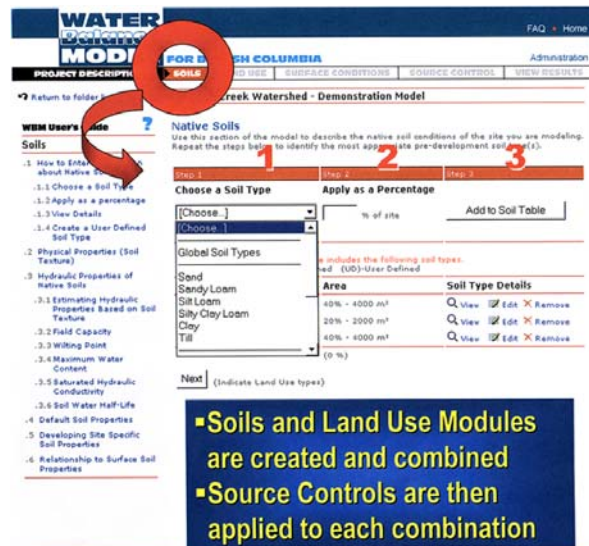
Whether it is to prevent flooding, reduce infrastructure costs, or preserve valuable aquatic habitat, British Columbia communities acknowledge the need to find innovative ways to address the increase in stormwater runoff volume that accompanies urban development. Source controls such as green roofs, absorbent landscaping, infiltration devices, or rainwater harvesting can all be employed successfully to manage this excess stormwater on-site. Despite this, it can be difficult to know which combination will be most effective, and most affordable, under different conditions. A consortium of government agencies in B.C. have recently launched the "Water Balance Model for B.C.," a Web-based scenario modeling tool intended to support decision-making about land use and stormwater management.

The public-domain model, available at www.waterbalance.ca, is based on a hydrology engine developed by CH2M HILL that simulates rainfall-runoff relationships. The Web interface, developed by Lanarc Consultants Ltd., allows non-technical users to easily build and run scenarios and generate graphical outputs.

The model requires basic information on climate, soils, and land uses. The user may then selectively apply various source controls to determine the impact they will have on the rainfall-runoff response. For example, the model could predict the impact of requiring green roofs on all new commercial development in a particular watershed. Similarly, the user could determine the depth of growing medium required to capture 90 percent of all annual rainfall volume on a particular site.

The strength of the tool lies in its ability to provide answers instantaneously and to ensure transparency by allowing users to control the input data and assumptions. The tool is intended for use by planners, engineers, developers, and community environmental groups. Using a tiered access approach, the model addresses the needs of a range of audiences, from the non-technical user with a general interest in stormwater management to the decision maker who requires very site-specific information.

Further information about the Water Balance Model for B.C. is available by contacting Laura MacLean at laura.maclea@ec.gc.ca, or by visiting www.waterbalance.ca.



A screenshot of Environment Canada's Water Balance Model, designed to allow users to gauge the effect of various stormwater management tools for specific climate, soils and land uses.

Furthering the Green Roof Market with Flynn Canada Ltd.

Alison Empey, Director of Communications, Green Roofs for Healthy Cities

Since 1998, Flynn Canada Ltd. has been installing premium green roof systems across the nation. With 13 offices across Canada, Flynn can be found in most major centres and has the capability and experience to install every roofing product line available in the country. Although most of their green roof projects to-date have been in the Toronto area, including Toronto City Hall and the Eastview Neighbourhood Community Center, Flynn has completed installations in many other markets across the country including Vancouver and Winnipeg.

Once green roof technology began emerging in North America, Flynn saw an opportunity to offer customers a new and innovative service. Flynn Canada Vice President John McManus remembers, "Green roofing systems were a new product line, a new and innovative way to turn a conventional roofing system into a specialized one with all sorts of economic and environmental benefits - it was an opportunity for us to provide added value to our customers." From a business perspective, there was also an opportunity to increase contract values. "Specialized systems require more components and additional considerations," says McManus. "The added cost of the job had potential to provide an appealing income."

With a growing curiosity in the marketplace and interest brewing within the company, Flynn took action. "We got involved with Green Roofs for Healthy Cities, which was a springboard for us with respect to generating public awareness of our capabilities and of our involvement within the green roof industry," says McManus.

But the move into the green roof market has not been without challenges. In Flynn's experience, convincing a private owner or developer to incorporate a green roof can be difficult due to the increased cost. "If the building owner is initially curious about incorporating a green roof and there is a chance for them to make use of the space, there's a stronger likelihood the project will turn into a green roof," says McManus. "The opportunity to reduce commercial energy use can also be a strong selling point."

Although reducing energy consumption is a bonus for building owners, McManus believes that in order for the private sector to truly buy into the green roof movement, various levels of government need to create credits or incentives. "The public sector is growing rapidly with more and more installations being done on hospitals, schools, and government buildings, but the private sector requires tangible incentives to offset the initial investment," he says. With green roof demonstration projects in place and data being collected in cities across North America, McManus believes it is only a matter of time before this happens. "As more and more data becomes available, the facts will prove to government bodies the validity of green roof technology," he says. "Once this happens, policies will be developed, demand for projects will increase, and cost will come down. Green roofs will eventually become mainstream."

With the future looking so bright for green roofs, and the expectation that demand will skyrocket, McManus anticipates the emergence of many new products, manufacturers, and contractors.

But with no universal standards established for the design and implementation of green roofs, he fears problems could arise. "With no qualification process, any material manufacturer could enter the market and claim they're qualified," warns McManus. "This creates the danger of poor quality jobs and project failures, which would be a huge set back for the industry."

Flynn would like to see green roof standards developed and set in place. "They would increase the quality of green roof systems, manufacturers, and the installation process," says McManus. "Standards would regulate the criteria by which systems are installed, helping to ensure the reliability of the system and, as a result, the industry. As a trusted installer of green roof systems in Canada, Flynn will embrace any standards established by the industry."

Case Study

The new Earth Rangers Centre, located in Woodbridge, Ontario, is the world's most advanced education, wildlife rehabilitation, and research centre. The building will host a variety of programs for classroom school children and inner city kids and a centre for sustainable living developed through a partnership with Toronto and Region Conservation. Incorporating many leading edge environmental technologies, including a green roof, makes the new Earth Rangers Centre the most energy efficient education and health care facility in Canada.

The green roof, installed by Flynn Canada Ltd. over a period of four months, will be ready for planting in early Fall 2003. It consists of a Soprema roofing system and, once completed, will be accessible to the public. The green roof is 15,000 square feet and will help the centre save on energy costs, reduce stormwater runoff, and improve air quality.

The artist's rendering of the Earth Rangers Centre located in Woodbridge, Ontario shows the location of the green roof on the building. Designed to fit in with its natural surroundings, the 15,000 square foot green roof will help the centre save on energy costs, reduce stormwater runoff, and improve air quality.

Flynn Canada Ltd. is installing the roof, which will be ready for planting in early Fall 2003. Once completed, the green roof will be accessible to the public.

For more information about Flynn Canada, please contact John McManus at jmcanus@tor.flynn.ca.



Green Roof Infrastructure Helps to Implement Goals of Smart Growth

Angela Loder, Director of Memberships, Green Roofs for Healthy Cities

Smart growth attempts to address some of the negative outcomes of the post World War II style of development, including a loss of greenspace, deteriorating downtown cores, and expensive, sprawling infrastructure (American Planning Association 2002). By using previously unused urban roof space to provide multiple social, economic, and environmental benefits, green roof infrastructure offers a tangible means to overcome several important barriers to achieving Smart Growth. Most importantly, green roofs can contribute to attaining four of its major goals: support of cost-efficient infrastructure, infill development, the development of healthy communities, and biodiversity conservation.

The ability of green roofs to help mitigate the urban heat island effect (Laberge 2003; GRIM 2002:4, 2), as well as substantially reduce and filter stormwater run-off (Hutchinson et al 2002: Stender 2002), is becoming well known. These attributes can significantly improve municipal infrastructure by simultaneously providing reduced heating and cooling demand loads and energy costs as well as reducing combined sewage overflows (McKernan 2002). Combined with the potential for cities to leverage private funds for green roof installation through the use of incentives (see Peck and Wieditz 2003), green roofs offer the real possibility of helping cities achieve more cost-efficient infrastructure called for by Smart Growth advocates.

Green Roofs and Smart Growth

Increased amenity and green space.

Reduction of community resistance to infill.

Reduced strain on municipal stormwater systems.

Reduction of the urban heat island effect and cooling demand load.

Conservation of biodiversity through added greenspace.

A lesser-known benefit of green roofs is their use in furthering Smart Growth's goal of infill development and the support of healthy communities (Congress for New Urbanism 1999). Preliminary research indicates that green roofs can not only help to make urban communities more attractive places to live, but that they can significantly lessen community resistance to infill development, a substantial barrier to its implementation. The problem is two-fold. On the one hand, infill development is often associated with increased traffic congestion, loss of greenspace, and loss of neighbourhood character and property values by existing residents (Congress for New Urbanism 1999:17). On the other, the potential for land-use conflict between greenspace and infill development in urban areas, can result in a lack of greenspace that reinforces the image of cities as polluted,

noisy, and dirty places to live, further hampering efforts to implement densification and infill. Green roofs have been shown to mitigate against these barriers in two ways. First, the addition of greenspace has been shown to contribute to increased productivity and well-being for those nearby (McDonough 2003 in metropolismag.com). Part of this is due to biophilia, our deep attachment to, and need for, natural surroundings (Browning 2000:59-60), which has been shown to influence worker productivity, health, well-being, and sense of place - that ephemeral quality so essential to the success of a city and its communities (Stefanovic 1998; Browning 2000).

Secondly, when green roofs are part of a proposed infill development, they can often help reduce community resistance. Experience has shown that though neighbours often initially object to proposed increases in density, well-designed projects can alter their perception and even turn them into advocates of infill (Congress for New Urbanism 2001:41).

As part of this trend, the provision of green roofs have been used to sweeten a development proposal to reluctant communities (Kuhn 2003) or to give something back to the community in exchange for the increased density or unpopular building project (Welsh 2003). For example, at the suggestion of the City of Toronto, a proposed infill project at Ryerson University for a new engineering building investigated the possibility of adding a green roof. It was subsequently found that this was a deciding factor in appeasing neighbouring residents within a condominium who were opposed to the project (Quinn 2003). By offering greenspace to communities as part of infill development, green roofs can both help mitigate community resistance to infill and provide biophilic improvements to the overall living environment. With green roof infrastructure, rooftops can serve, multiple purposes and become parks, nature preserves, community gardens, or simply beautiful places to look upon.

Lastly, the addition of greenspace without the usual land-use conflicts has shown promise in re-creating habitat in urban areas (Burke 2002), an essential part of the Smart Growth doctrine and the health of a city. Research conducted by English Nature and Dr. Stephan Brenneisen (2003) has demonstrated the ability of green roofs to provide habitat for birds, invertebrates, and native plant species. The call for the preservation of biodiversity within cities requires a change in our conception of scale, and a re-thinking of our idea of urban nature and space (Hough 1994). Though never a complete replacement for lost wilderness, green roofs can help to mitigate the impact of ever expanding urban boundaries. By using normally wasted roof space, green roof infrastructure has considerable potential to provide additional greenspace for healthier cities, biodiversity restoration and protection, and cost-efficient infrastructure while helping to reduce traditional neighbourhood resistance to infill development.



The green roof on the Kanton hospital in Switzerland. This project serves as one of the research sites for the biodiversity research being conducted by Dr. Stephan Brenneisen, whose research has shown that green roofs provide habitat for birds and invertebrates in urban areas.

For the full article, members should consult the electronic *Green Roof Infrastructure Journal* in November. For a list of references, please contact Angela Loder at aloder@cardinalgroup.ca or at 416.971.4484.

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