

THE GREEN ROOF



INFRASTRUCTURE MONITOR

Fall 2004

New West Coast Green Roof Research Facility Launched

Maureen Connelly, British Columbia Institute of Technology

On October 15, 2004, the British Columbia Institute of Technology (BCIT) received \$600,000 in federal government funding in support of its new Green Roof Research Facility (GRRF) which officially opened on Sept. 20, 2004 in Vancouver. Government officials, partners, and supporters of the BCIT research facility joined researchers and supporting faculty of the School of Construction and the Environment in celebrating the official launch of the GRRF.



*The BCIT Green Roof Research Facility green roof.
Photo courtesy of Maureen Connelly*

In 2002, a Vancouver workshop led by Green Roofs for Healthy Cities, identified that the major barriers to market penetration of green roofs in British Columbia were primarily rooted in the lack of climate-specific performance data, the absence of third-party testing and verification of green roof systems, and a lack of demonstrated feasibility and policy support. To address these issues, BCIT, supported by

a consortium of regional government organizations, industry associations and material suppliers, created the green roof research program. Resulting was the Green Roof Research Facility, an experimental field test site, established in collaboration with the National Research Council of Canada (NRC).

The 100-square-metre GRRF has three roofs: one conventional roof and two green roofs at different depths. The controlled access building monitors the thermal performance of green roofs, the temperature profiles throughout and above the roofs, heat flux through the roofs, and energy consumption of the building. Rainwater is monitored for reduction and delay of runoff and research on the quality of the runoff is ongoing. The monitoring results will produce data for BCIT and its partners, which will be used for energy models and a regional water balance model. Information gathered will also be used for the development of green roof

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The Green Roof Infrastructure Monitor

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Green Roofs for Healthy Cities Continues to Grow

It's been a very busy year with the level of activity constantly growing as our green roof family expands! There is a veritable explosion of interest in green roof projects across the continent, a steady rise in public policy research and development efforts, and some important moves to continue the development of a healthy and profitable industry.

Many thanks to our friends in Portland, volunteers, delegates, speakers, and exhibitors, who made the the second annual *Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show* a big success. The show featured double the number of trade show booths, and more delegates and presenters than in Chicago a year ago.

Congratulations in particular to our *Green Roof Awards of Excellence* winners who are featured on pages 12/13. Special congratulations go to Tom Liptan, Bureau of Environmental Services, City of Portland, and winner of the Civic Award of Excellence for his leadership and perseverance in developing 'ecoroofs' in Portland and for contributing to green roof education around the world. Portland appears ready to take green roof infrastructure to the next level and Tom updates us on new developments on page 6.

We've been fine-tuning our *Green Roof Design 101* course and have begun delivering it in Canada and the United States. Special thanks to the dozens of people who helped us to develop this course - members of the Steering and Peer Review Committees and our trainers. We will be delivering this introductory course in over 30 locations next year. See the article on page 15 by Hazel Farley, our new Director of Market Development and Training. More details about the accreditation program will be forthcoming in 2005. Hazel will also be responsible for Green Roof Symposiums, our one-day workshops designed to help develop local green roof research and market development policies and programs.

We are delighted to be working with Drew Becher and Elizabeth Berry of the Government of the District of the Columbia, which is co-hosting the third annual *Greening Rooftops for Sustainable Communities* in Washington, D.C., May 4-6, 2005. Jennifer Sprout provides details about the conference on page 4. The call for papers resulted in a record number of submissions with excellent content from North America, Europe, and Asia to choose from.

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Green Roofs for Healthy Cities - North America, Inc. is now incorporated as a non-profit 501 c6. Our board members include: Monica Kuhn, Leslie Hoffman, Dan Slone, Don Huff, and Peter Lowitt. The new governance structure allows us to work towards a broader funding base for program development. In 2005, we are also introducing a new membership system, which is much simpler, reduces membership fees, and creates a new Individual Membership category (details on page 14).



Tom Liptan receives the 2004 Green Roof Civic Award of Excellence from Steven Peck and Monica Kuhn at the second annual Greening Rooftops for Sustainable Communities Conference, Awards, and Trade Show in Portland, Oregon in June 2004. Congratulations Tom!! Photo courtesy of Green Roofs for Healthy Cities

I look forward to seeing many of you in time for spring, cherry blossoms, and green roofs in Washington, D.C.

Sincerely,

Executive Director

About Us

Green Roofs for Healthy Cities is a non-profit industry association whose mission is to foster the development of a 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. For more information, please contact Jennifer Sprout, Director, Conferences & Special Events at jsprout@greenroofs.org, 416-971-4494 or visit our Web site at www.greenroofs.org

Our 2004 Patron members include:



The Green Institute



Climate Change Central



Green Roofs Goes to Washington...

Jennifer Sprout, Green Roofs for Healthy Cities

It's official! We are delighted to announce Green Roofs for Healthy Cities will be co-hosting the third annual *Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show* with the Government of the District of Columbia in Washington, D.C. on May 4, 5, 6, 2005 at the DC Convention Centre. Following the format of previous conferences, we will be presenting national and international speakers in three tracks: Policy and Program Developments; Case Studies and Design; and Research on Technical Performance and Benefits. We received over 80 high quality submissions and we anticipate the 2005 speakers will surpass all expectations. Our International Steering Committee, co-chaired by Drew Becher of the Government of the District of Columbia and Steven Peck, GRHC, will be selecting these papers with the help of many volunteers. The committee is comprised of more than 18 industry professionals, including designers, researchers and manufacturers, each bringing a rich variety of experience and qualifications to the task. All papers will be peer reviewed in January and February to ensure the highest standard of quality and accuracy.



*Capital Building**

This year's trade show will be bigger and better than Portland (which was bigger and better than Chicago!), with an estimated 100 exhibitors showcasing the latest information on new and existing green roof products and services. We will be offering one-day passes for the first day of the trade show (May 5) for a nominal fee, and we encourage you to invite local clients and contacts to attend and learn about the latest green roof technology and innovative products.

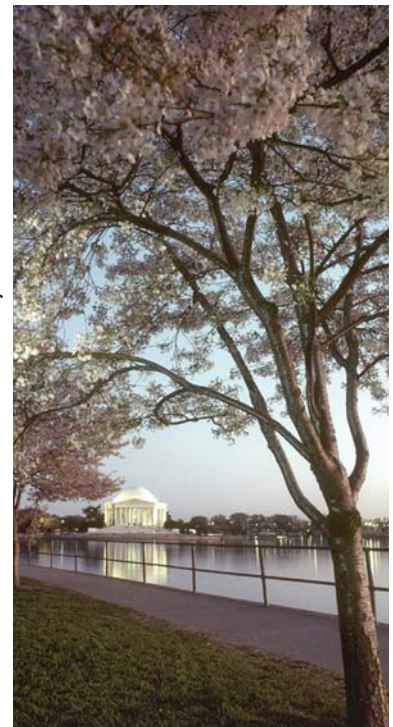
Registration for delegates and exhibitors will be available online at our Web site (greenroofs.org) by mid-November. Exhibitors should register early to reserve the best spaces.

Don't forget about our *Green Roofs Awards of Excellence*. Established in 2003 to recognize green roof projects exhibiting extraordinary leadership in integrated design and implementation, the awards help to increase awareness of green roof infrastructure and the associated public and private benefits, while recognizing the contributions of green roof design professionals. Project submissions will be accepted from December 1st, 2004 to February 15th, 2005. They will be reviewed by a distinguished panel of judges and awarded at the conference in May.



greening rooftops
for sustainable communities
washington, dc, may 4, 5, 6, 2005

We look forward to welcoming you to the Capital City! For more information about the conference, trade show, or registration, visit our Web site at www.greenroofs.org or contact Jennifer Sprout at jsprout@greenroofs.org



*Washington's famous cherry blossoms. **

**All photos on this page courtesy of Washington, DC Convention and Tourism Corporation (WCTC)*

1425 K Street Green Roof Shows the Way for Widespread Adoption and Community Benefits

Dawn Gifford, DC Greenworks

In June, two environmental groups and a commercial real estate company joined City officials and a group of sponsors, contractors, architects, and property managers to unveil a new project showcasing the benefits of green roofs.

A collaboration of DC Greenworks, Casey Trees, and Blake Real Estate, the 3,500 sq. ft. extensive green roof, is a showcase to accelerate the adoption of green roof technology in the nation's Capital.

There are eleven varieties of plants, in 3 to 4 inches of growing medium, forming a mosaic pattern. The plants include *sedum album*, *sedum sexangulare*, and *sedum spurium suldaglut*, which blossom at different times of the year.

Monitoring equipment is expected to document a significant reduction in stormwater runoff and rooftop temperatures. Meteorologist Bob Ryan's 4-Winds Program at WRC-TV is contributing to the cost of monitoring equipment and will report live conditions from the roof. The reduction and mitigation of stormwater runoff in the city and across the region is a top priority in improving water quality in area rivers and the Chesapeake Bay. Reduced temperatures mean less air pollution in a region suffering from unhealthy air much of the summer.

The project was supported by grants and training provision from the Chesapeake Bay Small Watershed Grants Program, National Fish and Wildlife Foundation, Watershed Protection Division of the DC Department of Health, the US EPA and Bridges to Friendship. Contributions were provided by Commercial Roofing, International Leak Detection, Barrett Roofs, JDR Enterprises, Laurel Valley Soils, and Emory Knoll Farms.

In the heavily developed areas within the city, green roofs offer a practical alternative to reduce stormwater runoff, temperatures, and air and water pollution. A study by DC Greenworks of a 255-acre downtown area identified 86 acres of plantable roof space. Transforming that area from a source of stormwater runoff to green roofs that capture (then evaporate or transpire) rain water, could reduce runoff by as much as 56 per cent, resulting in a reduction of the stormwater surge causing untreated sewage to flow into area rivers during combined sewer overflow events. By reducing air temperatures - a contributing factor to ozone formation - green roofs, like trees, can help the District and surrounding jurisdictions meet federal air quality standards.

For more information, visit www.dcgreenworks.org.



*The 1425 K Street green roof, after planting.
Photo courtesy of D.C. Greenworks*

Portland Ecoroof Program

Tom Liptan, Bureau of Environmental Services, City of Portland

Portland, Oregon is a city of 500,000 covering an area of 135 square miles. Only 160 years ago, this area was covered with some of the largest coniferous trees in the world. Today, as in most cities, those natural conditions are replaced by habitat for people. Of course we need our habitat, but at full build, rooftops can cover more than 30 square miles of the city. This contributes to an issue driving city efforts and expenditures perhaps more than any other...water pollution. Water pollution affects not only human health but also fish and other aquatic species. Efforts to protect Portland's rivers and streams date back to 1938, but today the city faces issues making those efforts more critical. Combined sewer overflow (CSO) abatement, stormwater pollution and flooding, listing salmon as a threatened species, designating six miles of Portland's Willamette River as a federal superfund site, aging sewer infrastructure, and new requirements to protect groundwater make clean rivers and healthy watersheds more important than ever.

People in Portland have learned much about the benefits of green roofs and their activity has picked up since the City hosted the *Greening Rooftops for Sustainable Communities Conference* in June. Here is an update:

* Portland State University is installing a 17,000 square foot ecoroof that will be the largest in Portland. This project received additional floor space through our Zoning FAR Bonus incentive;



The Multnomah County Building's green roof demonstration project.

Photo courtesy of the City of Portland

* Many developers are installing ecoroofs to qualify for the FAR bonus - a recent project proposes a 48,000 square foot ecoroof, and some developers are actually banking the FAR for use on other buildings;

* Some developers think it's a good investment and are willing to pay the higher cost, even though they may not be in the district that offers FAR bonuses while some find the aesthetics alone to be compelling enough to install an ecoroof;

* Many property management representatives attended the green roof Conference and gained important information, however, I have noticed that some seem to be slightly overconfident in their newfound knowledge. The industry is still very young and we all have much to learn;

* As for the City, we continue to investigate and document ecoroof benefits and concerns. Our stormwater monitoring shows that ecoroofs provide excellent stormwater management, but we have learned there is a potential for pollutants to drain out of certain substrate mixtures and other roof sources. We are working with growing media providers in our region to address this issue;

* The City continues to investigate incentives and opportunities to promote ecoroof applications and prior to the 2004 Conference, the Portland offices of Sustainable Development and Environmental Services began a project to quantify the financial benefits of a mass application of ecoroofs in an old industrial district of Portland. We presented our preliminary findings at the Conference, finding that sewer fees would be reduced by \$500,000 and \$250,000 in energy savings realized annually;

* Additional study is underway assessing the potential savings of using ecoroofs and other green approaches to reduce stormwater runoff into the city sewer system; and

* Portland has recognized ecoroofs as a stormwater management practice since 1999 and an increasing number of people from academia, municipalities, consulting firms, manufacturers, developers, and homeowners continue to inquire about them.

The Chicago Standard

Michael Berkshire, City of Chicago

The City of Chicago is serious about making green building, the building standard in Chicago in both the public and private sectors. On June 10, Mayor Daley announced at the American Institute of Architects' annual conference that all new public buildings and major renovations will be designed, constructed, and maintained using *The Chicago Standard*. This new standard incorporates LEED™ credits that have been deemed most appropriate and applicable to Chicago. To encourage the private sector in adopting greener strategies, the City has formalized a policy requiring private development projects receiving public assistance and/or being reviewed by the Department of Planning and Development to include sustainable development standards. Those innovations will help them become healthier places in which to live and work, cheaper to operate and maintain, and friendlier to our natural environment.



Green roof on the Chicago Center for Green Technology.

Photo courtesy of the Chicago Department of the Environment

Specific sustainable standards being promoted through this policy are LEED™ Certification; Energy Star Certification; and stormwater best management practices, such as bio-swales, permeable pavement, and rain gardens. This new policy also requires the construction of green roofs that will keep rainwater out of overburdened sewer systems, reduce urban temperatures, improve air quality in densely developed neighborhoods, and reduce a building's energy costs.

To further encourage the private sector to adopt environmentally sensitive construction methods, the City has created a Green Building Resource Center at the Chicago Center for Green Technology, which is open to the public and offers seminars and tours. The City also has created Mayor Daley's GreenWorks Award to recognize excellence in innovative, sustainable design and construction.

For more information about The Chicago Standard, green roofs, and other sustainable development standards, please visit the Department of Environment's Web site at <http://www.ci.chi.il.us/Environment/GreenTech/sub/how.html>.

Greenroofs for Healthy Cities will be in Chicago on December 1st, 2004 for a Green Roof Design 101 Introductory Training Course - please see pg. 23 or visit our website at www.greenroofs.org.

Stantec Designs Its Own Green Roof in Edmonton

Shauna MacArthur, BA, LAT, LEED™AP, Stantec

Believing in sustainable approaches to conserve energy, reduce the need for non-renewable resources, and recognizing the need to consider the environment caused Stantec to pursue the installation of a green roof atop its Edmonton office. Promoting sustainable design to clients is part of the Stantec practice, so when the opportunity to apply this belief arose in the form of a new building addition, the design was built with these ideals in mind. Currently, a Silver Certification in the LEED rating system is being pursued for the new building.

The building and Edmonton's geographical location posed some design challenges. First, a system that fit the load requirements was needed. Since additional mechanical equipment was relocated to the roof, the

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Update on GRHC Green Roof Research Committee

Bradley Rowe, Michigan State University, Chair, GRHC Researcher Committee

The first meeting of the GRHC Research Committee was held in June during the annual green roof conference in Portland, Oregon. At this meeting, the group discussed where green roof research stood in North America, determined the Committee's agenda (both short and long-term goals), and identified who wanted to contribute. Other topics of dialogue included: the scope of the committee (international or limited to North America); updating the GRHC Researcher's Corner (determined to be the responsibility of individual researchers to provide GRHC with this information); posting a bibliography of green roof papers; starting a researcher's listserv; developing a peer-reviewed green roof journal; establishing standards for conducting and reporting green roof research; and obtaining funding.



Plant and Soil Sciences Building, Michigan State University. Instrumentation will record data to develop a model for energy consumption.

Photo courtesy of Bradley Rowe.

A follow-up conference call was held September 21, 2004 where two major topics were discussed. First, it is our role as the Research Committee to assist in the selection and review of papers submitted for the research track of the *2005 Greening Rooftops for Sustainable Communities Conference* to be held in Washington, DC in May. Second, since funding of green roof research is vital to long-term success, it was agreed that various government funding agencies in Washington be approached to raise awareness on the benefits of green roofs. Hopefully, if the decision-makers in these agencies are educated about green roofs, they will be more likely to fund future projects.

For more information please contact me at 517-355-5191 ext. 334 or via email at rowed@msu.edu.

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*Stantec green roof in Edmonton.
Photo courtesy of Stantec*

acceptable load was reduced to 10lbs/sq.ft. The second challenge was Edmonton's location - Zone 3, which experiences extremely cold and dry winters. Designers knew the depth of the growth medium needed to be substantial if the plants were to last throughout the winter. The required depth was in contrast to the load requirement, so an extensive investigation into different green roof technologies was undertaken.

Hydrotech was able to provide a lightweight garden roof assembly, complete with a built-in irrigation system. This was required so new plants could become established when planted late in the season as well as to provide irrigation from the dry Edmonton environment.

Hydrotech proposed a new solution with Hydromat, a multi-purpose green roof system. This was the first installation of its kind to incorporate root barrier, capillary mat, and an irrigation system with engineered growing medium into one easy product, designed to fit the dimensions of the roof. The roof construction was complete at the end of the summer and Stantec staff now anxiously awaits the upcoming season to fully realize the benefits of the new green roof. For more details see www.stantec.com.

Green Roofs in the Big Apple

Colin Cheney, Green Roofs Initiative Director, Earth Pledge

In 1968, Hundertwasser wrote, “It is incomprehensible why the roofs of Vienna are not being used as parks and forests.” In this spirit, green roof proponents in New York City continue to strive to make green roof infrastructure a concept at once conceivable and attainable.

New York City is in the process of adapting and adopting the International Building Code and technical and advisory committees are working to write allowances for environmentally friendly materials and techniques. As part of its ongoing work to promote green roofs, the Earth Pledge *Green Roof Initiative* is collaborating with City officials to include green roof language in this new code.

Since 2002, the New York Ecological Infrastructure Study (NYEIS) - a multidisciplinary team of research partners including Earth Pledge, NASA, Columbia Earth Institute, the Gaia Institute, and Hunter College - has undertaken analysis of green roof benefits at the building, neighborhood, and city level. The NYEIS will publish its first research report this fall, summarizing initial findings on how green roof development benefits water quality, climate, and energy usage. Earth Pledge continues work on integrated stormwater models under commission of the New York City Water Board. The models detail the dynamics of rainwater retention and detention for individual buildings, and analyze the potential impact of green roof development at the drainage basin level.



Storage facility green roof, Edgewater, NJ.

Photo courtesy of Marisa Arpels, Earth Pledge

Working with Earth Pledge’s Viridian Project, organizations in low-income communities have installed three green roofs on supportive and affordable housing buildings in Chelsea, Harlem, and Brooklyn. In addition, two winners in the New York City Green Building Competition, sponsored by the city and EPA Region 2, feature green roofs: the Brooklyn Ice House, and the Queens Botanical Garden.

In February, Earth Pledge’s 200-page green roof resource book will be published—the first book to examine green roofs from an environmentally specific perspective. *Green Roofs:*

Ecological Design and Construction includes 40 case studies of individual green roofs from Europe, Asia, and North America, as well as a detailed analysis of municipal-scale green roof development.

Through the participation of numerous stakeholders, New York gets a bit closer every day to Hundertwasser’s vision being “in a few years they will...issue a building ordinance requiring every house, every garage, every factory - particularly every factory - to have a layer of earth on the roof.”

Greenroofs for Healthy Cities will be in New York on December 3rd, 2004 for a Green Roof Design 101 Introductory Training Course - please see pg. 23 or visit our website at www.greenroofs.org.

Ottawa Forms Green Roof Task Force

David Miller, Senior Environmental Planner, City of Ottawa

On May 11, 75 people attended a Green Roof Market Development Workshop held at the Canada Post Conference Centre in the City of Ottawa. Participants represented a broad range of interests from government agencies and professionals in the development community, to interested community members and green roof manufacturers. The workshop, a joint effort of a number of groups including the City of Ottawa, CMHC, Environment Canada, Canada Post and the National Capital Green Building Association, was organized and presented by Green Roofs for Healthy Cities. After presentations on approaches and technical concepts for green roofs, participants discussed challenges and opportunities related to green roofs in Ottawa. Small break-out groups addressed such topics as stormwater management benefits, maintenance issues, urban heat island reduction and climate change benefits, and urban amenity and planning objectives.

Follow-up from the workshop has included the establishment of an Ottawa Green Roofs Task Force. The Task Force has set short-term objectives including: the creation of an Ottawa Green Roofs Inventory and Guide; the development of a screening tool for use in identifying green roof potential during the early stages of development approvals consultation; and the compilation and promotion of “how-to” material in the Ottawa context.

Long-range objectives of the Task Force will focus on larger issues related to financial incentives and policy approaches, and the identification of a green roof retrofit project within the City building portfolio. Further information on the Ottawa initiative can be obtained from David Miller, 613-580-2424, ext. 21447 (david.miller@ottawa.ca).

cover story continued

installation and design guidelines and for policies and programs to support the broad implementation of green roofs in the Greater Vancouver Region.

Over 200 students and 15 faculty members of BCIT’s polytechnic trades and technology programs have now had first-hand experience in the construction of a green roof project. This milestone is the initiation of an educational strategy to integrate green roof technology into the school’s curriculum.

The building housing the Green Roof Research Facility was completed about a year ago. With the past year being dedicated to establishing roof plants and commissioning the instrumentation and data acquisition system, the first year of monitoring can now officially begin. Partners and supporters of the GRRF include the School of Construction and the Environment, British Columbia Institute of Technology, Canada Mortgage and Housing Corporation, Environment Canada, Greater Vancouver Regional District, Georgia Basin Action Plan, National Research Council of Canada, Public Works and Government Services Canada, and the Roofing Contractors Association (GRHC) of British Columbia.



*Maureen Connelly provides a tour of the new Green Roof Research Facility on Sept. 20, 2004
Photo courtesy of Maureen Connelly*

Minneapolis Introduces Stormwater Feebate for Green Roof Infrastructure

Lisa Goodman, Minneapolis City Council Member

Minnesota is the land of 10,000 lakes and 100,000 environmental activists yet we have arrived late to the dance of stormwater management. In Minneapolis, we obtain our drinking water from the Mississippi River, yet a majority of stormwater runoff and some sanitary sewer deposits flood into the river when we experience a significant rain event. Minneapolis experiences rainfall of about 26 inches (683 millimeters) of rainfall annually, making it ideal for a more extensive use of stormwater best management practices (BMP's).

Minneapolis is experiencing a building boom not seen in decades. This has given us the opportunity to revise our zoning code and comprehensive plan to incorporate incentives for building tools that both manage our stormwater issues as well as green the City. On November 5, 2004, city council enthusiastically voted to enact a stormwater utility fee with an aggressive credit system, which would allow for up to a 100 per cent credit in certain circumstances, for the installation and operation of green roofs, bioswales, and porous pavers. On the planning front, we have introduced two code changes, which will create a floor area ratio bonus (FAR) for the installation of green roofs downtown and on commercial corridors, and allow a variety of BMP's including green roofs as alternative compliance to general greening requirements.



The new green roof at Minneapolis' Green Institute.

Photo courtesy of Lisa Goodman

While it is our goal to have both the development control issues and the credit system implemented by the end of this year, we believe strongly that residents and businesses need government to lead by demonstration. The City's first major success is the 18,000 square foot green roof on the new Downtown Central Library (designed by Cesar Pelli) set to open in 2006. We are also working in coalition with the Minneapolis Building Commission to install a green roof on the central courtyard roof of City Hall.



Close-up of a flower in bloom on the roof of the Green Institute.

Photo courtesy of Lisa Goodman

Other ideas are being vetted including: requiring a green roof for projects receiving Tax Increment Financing (TIF) assistance; reduced development approvals of stormwater and erosion control plans if green roofs are part of a development; and an incentive and educational initiative dedicated to promoting stormwater BMP's for property citywide.

Looking out across the City from the 25th floor, you are surrounded by a sea of blacktop and tar roofs. The long-term goal of this work is to reduce runoff into the Mississippi River, improve our environment, and create a sea of green on rooftops for generations to come.

Greenroofs for Healthy Cities will be in Minneapolis on December 6th, 2004 for a Green Roof Design 101 Introductory Training Course - see pg. 23 or visit www.greenroofs.org.

Green Roof Awards of Excellence 2004 Winner Profiles



Category: Intensive Residential
Recipient: Balmori Associates, Inc., NY

The Solaire Building, located in Battery Park City, New York is the first 'green' residential high-rise in North America. The building design incorporates two green roofs: an intensively planted 5,000 square foot terrace green roof on the 19th floor and a 4,800 square foot extensive green roof on the 28th floor. These green roofs are an integral part of the sustainable, low-impact design objectives of the Gold LEED™ rated building. The dense strand of bamboo trees seen in this photo were planted in the center to provide a windscreen throughout the year and shade the green roof's paths and benches.



Category: Intensive Institutional
Recipient: Roofscapes, Inc., PA

In September 2002, a 17,250 square-foot Roofmeadow® green roof was installed on the new single-level Oaklyn Branch Library building in Evansville, Indiana. With much community consultation, William M. Brown, the lead architect, capitalized on the steeply-sloping profile of the lot to create an earth-sheltered structure, blending the roof with the landscape on the uphill side. This publicly accessible green roof was designed to create a native 'medic meadow' prairie blending into landscape; irrigate with minimum evaporation; conserve energy; and require minimal maintenance.



Category: Intensive Industrial/Commercial
Recipient: Jeffrey L. Bruce & Company, MO; Peter Lindsay Schaudt Landscape Architecture, Inc., IL

The renovation and improvement of North Burnham Park and the rebuilding of Soldier Field restored the historic exterior and colonnades and replaced the seating bowl with a 61,500-seat facility and luxury suite complex. The main design objective was to reclaim the important urban site and restore the prominent park setting, realizing the 1906 Burnham plan for the Chicago waterfront. The result is approximately 17 acres of reclaimed public waterfront parkland.

2005 Awards of Excellence submissions being accepted from Dec. 1, 2004 through Feb. 15, 2005.

Green Roof Awards of Excellence 2004 Winner Profiles

Category: Extensive Residential
Recipient: Shim-Sutcliffe Architects, ON

The Island House is a single family residence located on one of the Thousands Islands in the St. Lawrence River between New York State and Ontario. This island has agricultural roots and there are still many operating dairy farms in the vicinity. The architects wanted to retain the openness of this agrarian landscape while



providing their clients with privacy and a splendid view of this grand river. The green roof is integrated both into the site and the building concept. The surrounding clover meadow and the two green roofs compliment each other, blurring notion of the building roof and ground plane.

Category: Extensive Institutional
Recipient: Roofscapes, Inc., PA

In June 2001, a 6,000-square-foot Roofmeadow® green roof was installed on a new holistic wellness center in central Pennsylvania. The green roof was an integral part of the green building concept proposed by Van Der Ryn Architects and it was engineered by Roofscapes, Inc. as a 5-inch Roofmeadow® Type 1: Flower Carpet system to satisfy the unusual deadload, pitch, maintenance,



and aesthetic requirements of the architects and owner. Several unusual engineering challenges presented themselves in this project: stabilizing vegetation on the steep slope with deck pitches ranging from 14 to 30 degrees, protecting new plantings from severe mountain wind scour; detecting leaks on the sloped surface; and securing waterproofing at the gapped fascia.

Category: Extensive Industrial/Commercial
Recipients: William McDonough + Partners, VA; ARCADIS, MI

Recognized in 2004 by Guinness World Records as the largest green roof in the world, this green roof covers 454,000 square feet atop Ford's new truck assembly plant. The green roof is a part of a comprehensive effort to revitalize the historic Ford Rouge Centre complex as a model for 21st Century sustainable manufacturing and is a significant component of a site-wide 600-acre stormwater management system. Other design objectives include the establishment of habitat at roof level, reduction in ambient temperatures, and protection of the roof membrane.



For further project details, visit <http://www.greenroofs.org/portland/awards.php>

2005 Membership - Reduced Fees and New Categories

In 2005, we are introducing a number of important changes to the structure, costs and benefits of membership. We simplified our structure, replacing 30 categories of Patron level memberships with four new Corporate levels and reduced our membership dues. We've also introduced an Individual Membership category in response to numerous requests from researchers, designers and students.

To help us launch our new membership opportunities, we are pleased to offer a one-time FREE Individual Membership during 2005. All registrants to one of our Symposiums or Design 101 courses will automatically receive a one-year complimentary membership with all of its attendant benefits.

Thank you for your ongoing support.

Corporate Membership Benefits

Cost:

Manufacturers: \$4,800 USD

Distributors & Suppliers: \$3,500 USD

Government: \$950 USD

Miscellaneous: \$1,500 USD

- Utilities /Researchers
- Developers
- Engineers
- Landscape Architects
- Architects
- Nurseries
- Green Roof Consultants

* One free opportunity per membership year for a table top display and two representatives to attend a Green Roof Symposium (estimated savings: \$750)

*50% reduction (\$375/Symposium) on the cost of exhibiting at any Green Roof Symposiums (savings of \$375/Symposium).

* Additional 5 individual memberships for distribution to employees at corporate member's discretion (estimated savings: \$125/individual, totalling \$625; additional savings of \$500 for individual registration at annual conference)

* Membership listing (corporate logos and contact information) on Membership Page.

* One sixth of a page description of products and services in the Participants' Handbook for the Green Roof Design 101: Introduction to Green Roof Design Principles course.

* 50% savings on any CD purchases

* 25 per cent discounted advertising rates in the *Green Roof Infrastructure Monitor* (see page 16 for the rate card)

Individual Membership Benefits

Cost: \$125 USD

* Discounted registration fee (\$100 discount off regular registration fee for the Annual Conference)

* 50 per cent discount on purchase of conference CD-Roms (savings of \$50)

* Two line description on the searchable online membership database.

* Membership listing on our Members' Directory in our conference CD-Rom

* Registration of one contact email for each individual

* Bi-monthly electronic newsletter on green roof developments

* One semi-annual hard copy (or electronic version) of the *Green Roof Infrastructure Monitor*

Green Roofs Design 101 Popular with Industry Professionals

Hazel Farley, Green Roofs for Healthy Cities

Green Roofs for Healthy Cities launched the introductory course Green Roofs Design 101 to rave reviews at our second annual conference in Portland in June. More than 120 delegates participated in three training courses and the positive evaluations indicated that we were on the right track. Design 101 is the first course in a green roof accreditation program being developed by our Training and Accreditation Committee, chaired by Ed Snodgrass of Green Roof Plants.

Since the Portland conference, five courses have been delivered in major Canadian cities and plans are underway to deliver 30 more over the next year, primarily in the US. Green Roof Design 101 has been developed for professionals including architects, landscape architects, engineers, planners, developers, policy makers, and roofing consultants. Those who enroll in the course are eligible for continuing education credits from associations such as the American Institute of Architects, the American Society of Landscape Architects, the Roofing Consultants Institute, and others.

Courses are produced in co-operation with local partners and have included chapters of the AIA and ASLA and other national associations and organizations. Partner members receive a discounted rate for the training course and all attendees receive a one-year Individual Membership in Green Roofs for Healthy Cities.

If you or your membership is interested in holding a Design 101 course in your city, please contact Hazel Farley, Director, Market Development and Training at 416-971-4494 ext. 222 or by email at hfalley@greenroofs.org.

For a list of upcoming Design 101 courses, please see the ad on page 23

Special thanks to our Steering Committee members who worked to develop this course.

Tom Liptan, L. Arch., Environmental Specialist, City of Portland; Charlie Miller, P.Eng., Roofscapes; Lucien Marton, L. Arch., M+S Landscape Architect; Chuck Friedrich, L. Arch., Horticulturist, Carolina Stalite Company; Michael F. Gibbons, P. Eng., Architectural Systems, Head, ASTM Green Roof Task Group; Tom Houlihan, L. Arch., GreenTech; Wendy Willow Wark, Principal Green Roof Innovations; Edmund Snodgrass, Horticulturist, Green Roof Plants; Richard Kula, Env. Sc., Sustainable Buildings, Prairie Architects; Tom Doyle, Soprema; Marie Anne Boivin, Green Roof Expert, Soprema; Marisa Arpels, Earth Pledge; John W. White, Horticulturist, Garland; John McManus, Roofing Expert, Flynn Canada

Green Roof Symposiums

Hazel Farley, Green Roofs for Healthy Cities

Focused on local research needs and obstacles to green roof implementation, Green Roof Symposiums bring together industry experts and key policy makers at these one-day, intensive workshops. In the last year, Symposiums were held in Washington (DC), Minneapolis (MN), Edmonton (AB), Calgary (AB), Ottawa (ON) and Montreal (PQ).

Tangible outcomes have led to the implementation of several new and innovative civic policies and incentives for green roof development. For more information on how you can partner with GRHC to bring a Green Roof Symposium to your city, contact Hazel Farley at 416-971-4494, ext. 222.

The Green Roof Infrastructure Monitor is now offering advertising!

Space is limited

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Visit www.greenroofs.org and see the Resources Section to view back issues.

The Green Roof Infrastructure Monitor has a distribution of 5,000 in addition to its online availability, generating approximately 10,000 hits per month.



Le Forum living wall in Paris.
Photo courtesy of Randall Sharp.

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New Green Roofs study for City of Toronto

Jane Welsh, Senior Planner, Policy and Research, City of Toronto

The City of Toronto, in partnership with CRESTech, has received a \$40,000 grant from the Federation of Canadian Municipalities Green Municipal Enabling Fund to undertake a study on the municipal cost savings benefits of green roofs. The study will aid in the City's investigations of ways to encourage implementation of green roofs.

As an older, highly urbanized municipality, a significant portion of the natural landscape of Toronto has been replaced by hard, non-permeable surfaces. These conditions give rise to increased pollution levels and energy demands as the surfaces absorb solar energy and radiate it as heat and do not allow the absorption of stormwater. Municipalities can mitigate some of these effects by promoting green alternatives, such as green roofs, in building design and construction, as many European cities have done. While green roofs are starting to be implemented in North America, and a few have been constructed in Toronto on a volunteer basis, they do not exist in the volume required to make a significant environmental impact. A recently released Urban Heat Island study by Environment Canada suggests that greening just six per cent of the City of Toronto's rooftops could reduce summer temperatures by one to two degrees Celsius, resulting in a five per cent decrease in electricity demand for cooling. This would save an estimated \$1 million in energy costs per year and an estimated reduction in the incidence of smog days by five to ten per cent.



Toronto City Hall's Green Roof Demonstration Project

Photo courtesy of GRHC

The City of Toronto is currently investigating ways to encourage implementation of green roofs, but to do so, we need to understand the specific environmental benefits given our local environment and climate. The new study will: identify the measurable benefits of green roofs to the City's environment; quantify the potential monetary savings to the City; identify the projected time for cost recovery; and identify minimum threshold points for the City to provide incentives to make significant cost savings.

Toronto's commitment to support green roofs stems from recommendations of the Environmental Plan for a strategy to encourage green roofs and policies of the new Official Plan supporting the "development of innovative green spaces such as green roofs, and designs that will reduce the urban heat island effect." The City has also participated in the Green Roof Infrastructure Demonstration Project on the podium roof of City Hall and the gymnasium roof of Eastview Neighbourhood Community Centre. A project report is available at: <http://irc.nrc-cnrc.gc.ca/fulltext/b1054.1/> The City is undertaking this study in partnership with CRESTech (one of four Ontario Centres for Excellence), a program made possible by the Ontario Ministry of Economic Development and Trade. A consultant has recently been hired to undertake the environmental/social cost benefit analysis portion of the study.

For more information contact: Jane Welsh, Senior Planner, City Planning at jwelsh@toronto.ca.

The Romero House Centre Roof Garden

David Orsini, Sunarts Design

Thanks to the vision and dedication of the staff and volunteers of Romero House, a roof garden now exists at 1558 Bloor Street West in Toronto. This garden was conceived as part of a building renovation/addition initiative, which includes a neighbourhood centre and transitional housing for refugees. The fundamental practice of Romero House is a community-based vision and due to the community building potential of gardening, a garden was a prime objective of the organization from the very outset.

Due to a lack of space at ground level, the only place to build a garden was on the second storey roof of the existing building. This 90 sq. m (950 sq. ft.) area, once a surface of tar and pea gravel, is now a people-plant environment with different nooks and areas for gardening, cooking, socializing, and solitude. As there is a lack of interior space at Romero House, the roof garden has become an integral part of the centre's living quarters.

Planters are lined with rigid insulation to resist the drastic thermal fluctuations endemic to rooftop environments. The planters are also raised so that snow deposition will not be directed onto neighbouring roofs. Cold frame lids will be placed on the top of the planters in the autumn so that the growing season can be extended and a pulley at the corner of the garden allows for the vertical transport of supplies to and from the roof without the scrapes and scuffs common to stairway transport. As the landscape architect for this project, I realized that it was very important not to "over-design" this social setting and allow it to develop its own uniqueness and personality. To allow for this modular, re-locatable components such as benches and planters were specified whenever possible. Though only in its first growing season, this garden already has a well-defined character due to the participants' interaction with each other and the space. At present, 12 residents and staff members are enjoying fresh organic produce from the garden. Due to the roof garden's closer proximity to the heavens it has also become a place of prayer for some.

This project was made possible through a generous grant from the Ontario Trillium Foundation. For more information on Romero House visit www.romerohouse.org.

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The First Green Rooftops in Mexico City

M. Sc. Müller G. T., consultant and Dr. Navas G. G., Autonomous University of Chapingo

Since pollution has no frontiers or boundaries, Dr. Gilberto Navas Gomez, professor and investigator at the Autonomous University Of Chapingo, and Tanya Müller García, a local roof greening consultant, firmly believe roof greening must be a fundamental aspect in urban planning worldwide. As such, they have been responsible for the lobbying and implementation of green roofs in México. Because of its density and increasing population, México City's major issues are air pollution and the loss of green space due to urban development.



*Quilaztli public school prior to roof greening, Mexico City, Xochimilco
Photo courtesy of Dr. Gilberto Navas Gomez*

Roof greening was first implemented in Mexico City in 1999 in urban public schools lacking green space. The idea to combine the beneficial aspects of green roofs with environmental education was also very innovative not only for students, but for the staff and the nearby community. The results were beyond excellent as the system overcame earthquakes in its early days during the rainy season. Today over 5,000 square metres of green rooftops have been installed, mostly in public schools.



*Quilaztli public school after roof greening, Mexico City, Xochimilco
Photo: Dr. Gilberto Navas Gomez*

The high cost of roof greening, linked to the lack of knowledge about green roofs and their benefits, are

the major obstacles when presenting roof greening as an alternative method to improve environmental conditions in the City. There was strong opposition because first impressions were that the retention of water would increase humidity problems and the additional weight represented a higher level of danger during earthquakes.

First priority was to adapt green roof technology used in developed countries to the conditions of Mexico by using natural resources. As an example, for drainage, tezontle stone was used, which is very porous. Considering budgetary restrictions it has been recommended that extensive green roofs be installed with crasulaceas due to the fact that many species are native to the Valley of Mexico City and resist the different climatic conditions throughout the year.

In the legal arena, there have been advancements. During 2003, the local congress of Mexico City, approved fiscal benefits for those willing to adopt technology that improved environmental conditions and for those who created green areas. Roof greening can be classified both as a technology and as the creation of a new green area, hence eligible for both benefits. The demand for roof greening continues to increase because there is genuine interest on behalf of the local authorities to expand the green roof market.

For more information, email tmueller@tacrimex.com.

Restoring a Coastal Ecosystem: The Sechelt Green Roof

Randall Sharp, Sharp & Diamond Landscape Architecture & Planning

The Sechelt Justice Centre is a restorative building replacing lost green space with a meadow in the sky. The unique project has exceeded the designer's expectations for a self-sustaining rooftop ecosystem and the client's requirement for a high performance building with a low maintenance roof. With full plant coverage after only nine months, the District saves \$3,000 annually on maintenance and water efficiency: no watering, no fertilizer, and no weeds.



The Sechelt green roof in July 2004.

Photo credit Randall Sharp

The District of Sechelt and the BC Buildings Corporation require energy efficient and economical structures. As such, the key green roof benefits identified specifically for Sechelt included: superior stormwater retention; water efficiency/drought resistance; improved air quality; urban heat island mitigation; extended membrane life; and wildlife habitat creation.

The Verdir growing medium is 75mm deep and weighs 15 lbs./sq.ft. saturated. The mineral substrate is comprised of three to five millimeters of black pumice, a lightweight volcanic glass, high in silica, with



A tomato horned caterpillar grazes atop the Sechelt green roof.

Photo credit Randall Sharp

60 per cent porosity, and is mixed with blended soil high in microbial activity for rapid plant growth. The growing medium was designed to replicate the soil conditions of the coastal bluff ecosystem. The waterproofing is a Soprema two-ply SBS membrane and drain mat on a one per cent slope.

The meadow design features green and blue grasses representing the waves of the Pacific Ocean complemented by multi-colored sedums and blossoms. Installed in September 2002, by June the plants had grown together beautifully and with rapid coverage achieved, the irrigation was turned off. The plants go dormant in the summer and fall, turning shades of golden and russet brown, and green again in the winter.

The roof provides an attractive vista for tenants and habitat for numerous insects and songbirds. Future plans include adding birdhouses and structured wildlife habitat to increase diversity with large trees and façade greening to connect the green roof to the greater landscape. The eco-roof, installed nearly three years ago, has become inspiration for local residents to create their own coastal meadows up on the roof.

For more information: randy@sharpdiamond.com

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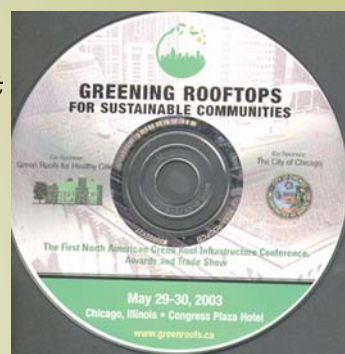
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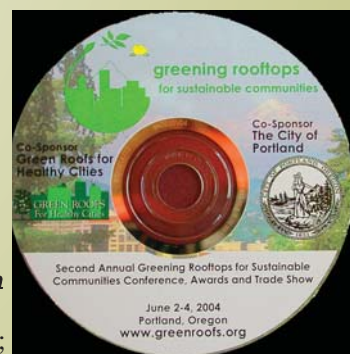
2003 Chicago CD-Rom includes:

Key Steps to Developing Local Green roof Markets, Steven Peck & Ireen Wieditz, Green Roofs for Healthy Cities; *Moisture Management in Green Roofs*, Charlie Miller, Roofscapes Inc.; *Modeling the Urban Heat Island Benefits of Green Roofs in Toronto*, Dr. Brad Bass, Environment Canada; *Green Roof Development in Sweden*, Violette Lindhqvist, International Green Roof Institute; *Plant Survival, Biodiversity and Stormwater Among Extensive Green Roofs in Berlin and Neubrandenburg*, Dr. Manfred Kohler, University of Applied Sciences, Germany; *Green Roofs and the LEED System*, USGBC; *Chicago's Green Initiatives*, Kimberly Worthington, City of Chicago; *Toronto's Green Roof Demonstration Project*, Jim Kamstra, City of Toronto; *Native and Ornamental Plant Survival Research*, Dr. David Beattie, Penn State University; *The Influence of Green Roof Slope, Substrate Depth and Vegetation on Runoff*, Dr. Bradley Rowe, Michigan State University; *Stormwater Monitoring of Two Green Roofs in Portland, Oregon*, Ryan Retzlaff, City of Portland and more...



2004 Portland CD-Rom features:

Green Roofs and Implementing the Goals of Smart Growth, Angela Loder and Steven Peck, Green Roofs for Healthy Cities; *New York's Green Roofs Policy Task Force*, Colin Cheney, Earth Pledge; *Creating a Marketplace for Green Roofs in Chicago*, Lois Vitt Sale, Wight & Company; *Lessons from the City of Atlanta's Green Roof Project*, Ben Taube, City of Atlanta; *Portland's Experience with Land Use Tools to Promote Green Roofs*, Marie Johnson, City of Portland; *Tokyo's Green Roof Regulations*, Yuko Nishida, Tokyo Metropolitan Government Bureau of Environment; *Life Cycle Cost Analysis*, Allen Lee, Quantec; *Planting Options for Extensive and Semi-Extensive Green Roofs*, Nigel Dunnett, University of Sheffield & Noel Kingsbury; *Plants as Design Elements*, Ed Snodgrass, Green Roof Plants; *Formulation of Effective Performance Specifications for Green Roofs*, Charlie Miller, Roofscapes, Inc.; *Overview of German Research and Related Design Principles*, Dr. Manfred Kohler, University of Applied Sciences, Germany; *Design Criteria for a Green Roof Medium*, Dr. David Beattie and Robert Berghage, Penn State University; *Stormwater Performance of a Green Roof in Toronto*; Glen MacMillan, Toronto Region Conservation Authority; *Bugs, Bees and Spiders: Green roof design for rare invertebrates*, Dusty Gedge, Royal Holloway College & Gyongyver Kadas, London Biodiversity Partnership; *A Green Roof Comparison Project: The Illinois EPA-CDF green roof*, Bruce Dvorak, Conservation Design Forum and more...



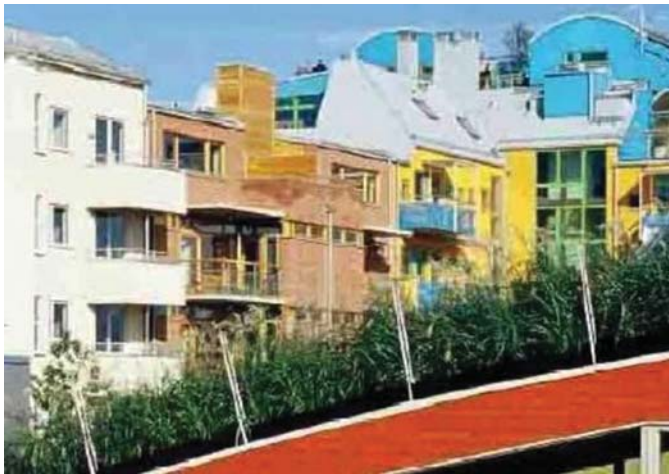
Growing Green Through Smart Urban Planning

Sharon Boddy, Freelance Writer and Editor

Bo01 in Malmö, Sweden boasts an extensive green roof system that is both functional and beautiful. Planned as a sustainable urban community as part of the 2001 European Housing Exhibition, Bo01- “Bo” means “living” in Swedish - is powered by renewable energy sources and blends energy-efficient housing with retail areas and attractive public spaces.

City planners wanted greenery and water to be visible at every turn, so they created a Quality Program, in cooperation with the 19 architects and developers chosen to build on this 25-hectare former industrial site. The program included a host of environment-friendly initiatives - from transportation and energy measures to green roof technology - and the City awarded developers additional points on their applications if these features were included.

The result is a variety of green roofs-from relatively modest rooftop gardens maintained by homeowners, to sedum-covered and terraced green roofs and walls.



A green roof in Bo01, Malmö, Sweden

Photo courtesy of Sharon Boddy

“The roofs produce oxygen and help to clean the air,” said Eva Dalman, an architect with the City’s planning department. “They also add to the biological diversity of the area, to encourage insects, birds, and plants.”

Bo01’s green roofs are low-weight, requiring little maintenance, can absorb vast quantities of rainwater, and provide additional insulation. With an average annual rainfall of close to 800 mm (31 inches), urban stormwater management is an ongoing challenge in Malmö, where surface runoff routinely floods basements, overflows sewers, and overloads the local wastewater treatment plant.

“The green roof system helps delay the water and minimizes the risk of flooding,” Ms. Dalman explained. Runoff is diverted into small, open canals found throughout the area (some form part of the façade of townhouses), vegetated ditches, and constructed wetland ponds.

Ultimately, Bo01’s green roofs contribute to the overall look of this spectacular sustainable housing area. Ms. Dalman summarized it this way: “They don’t just treat stormwater runoff-they are beautiful to look at and it has been scientifically proven that human health is positively affected by foliage.”

For more information about the mission, visit FCM’s Knowledge Network at <http://kn.fcm.ca>, or contact Sharon at sboddy@sympatico.ca.



The green roofs of Malmö.

Photo courtesy of Stephan Brenneisen

Upcoming Events

Green Roof Design 101 Introductory Training Courses

December 1

Seattle, WA; Chicago, IL

December 3

New York, NY; San Francisco, CA

January 26

Vermont (city TBA)

January 28

Boston, MA

February 16

Houston, TX

February 18

Dallas, TX

February 23

Baltimore, MD

February 25

New Haven, CT

March 4

Cleveland, OH

March 16

Portland, OR

March 18

Salt Lake City, UT

April 6

Ottawa, ON

April 8

Montreal, QC

April 13

Los Angeles, CA

April 15

San Diego, CA

June 1

Memphis, TN

June 3

Nashville, TN

June 10

Pittsburgh, PA

September 23

New York, NY

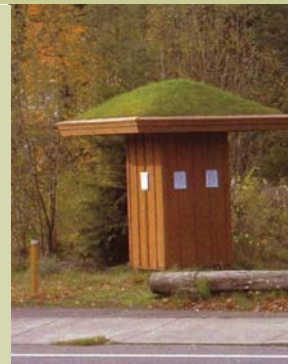
September 26

Washington, DC

September 30

Toronto, ON

Some dates and locations may be subject to change - see www.greenroofs.org for updates and details!



A few of Portland, Oregon's unique green roofs.

Thanks again to the City of Portland for helping to make the second annual Greening Rooftops for Sustainable Communities Conference a huge success!

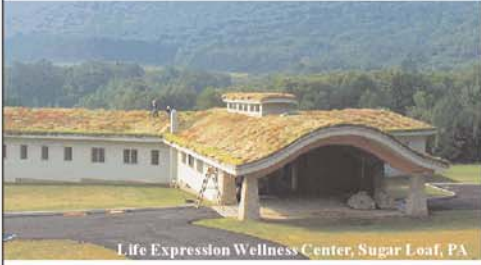
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If you would like to receive the *Green Roof Infrastructure Monitor*TM, subscriptions are included in individual memberships. Please contact Alex Johnston at ajohnston@greenroofs.org or by phone at 416-971-4494. Memberships are complimentary for registrants at a Green Roof Design 101 Introductory Training Course.

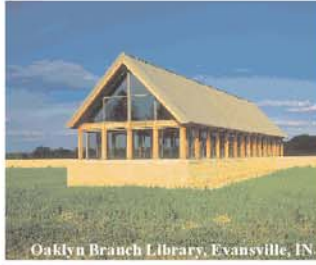
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Green Roofs goes to Washington...



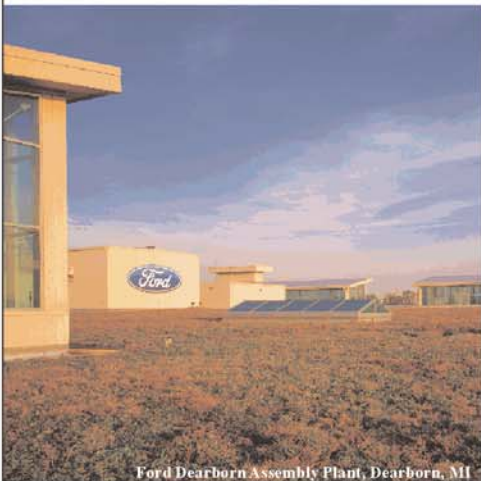
Life Expression Wellness Center, Sugar Loaf, PA



Oaklyn Branch Library, Evansville, IN



Solaire Building, New York, NY



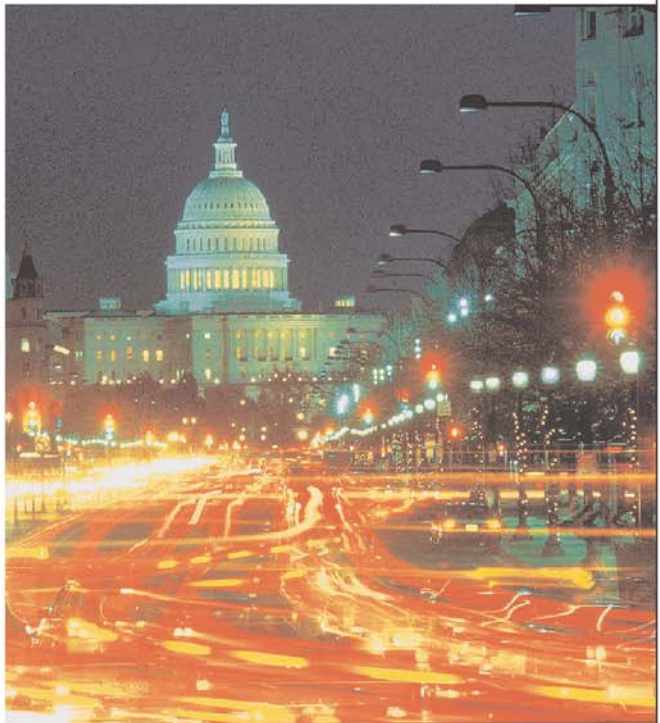
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