

Greening Rooftops for Sustainable

Communities, Baltimore, MD

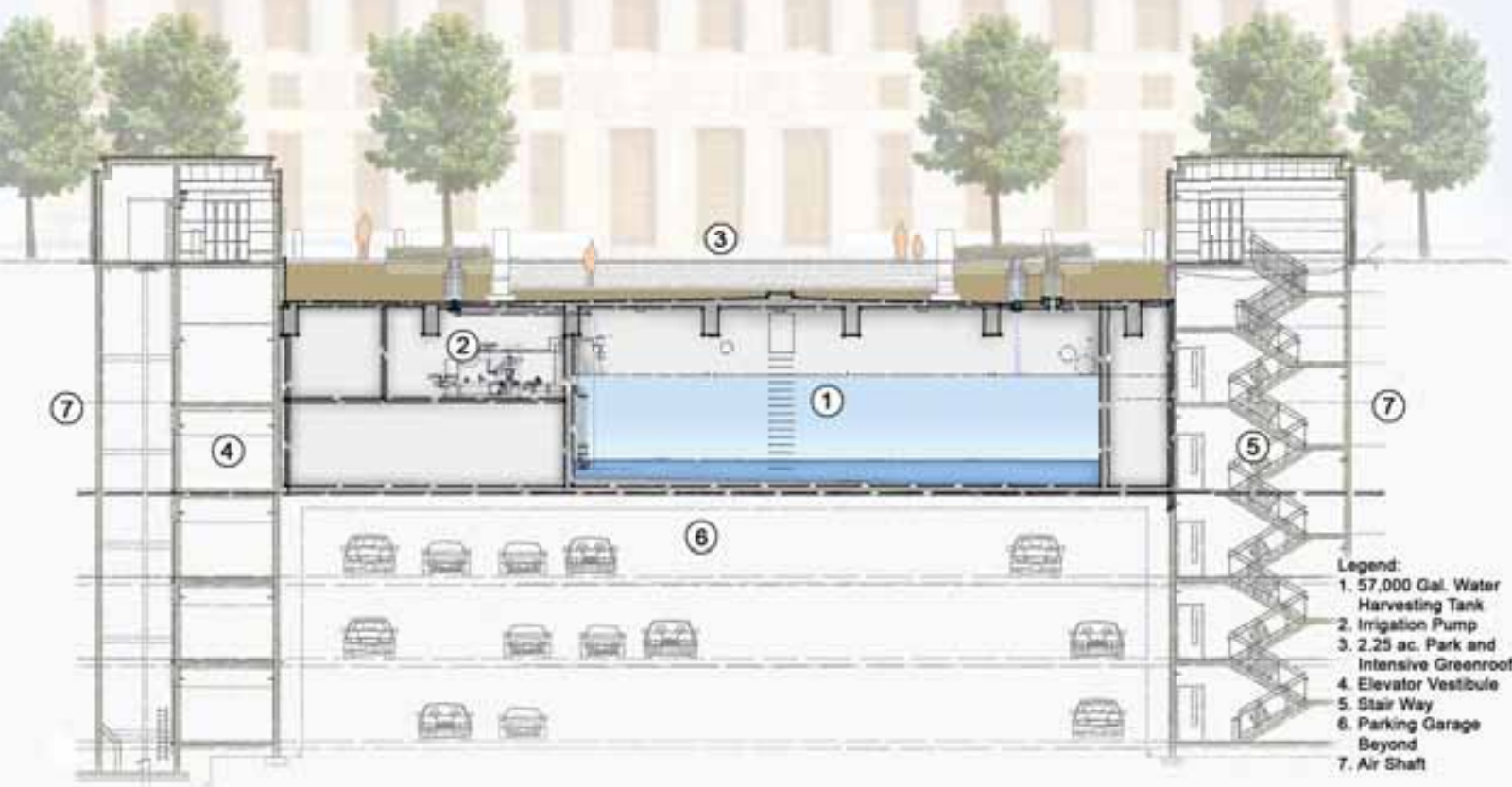
April 30th to May 2nd, 2007

Green Infrastructure Monitor **Roof**

SPECIAL REPORT: 2007 Award Winner Profiles

Wetland Green Roofs

Ed Snodgrass on Water Quality



Rainwater harvesting in Nashville



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Fall 2007 / Volume 9, No. 2

The Green Roof Infrastructure Monitor™

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On the Cover

Detail of award-winning design for Nashville Public Square green roof courtesy of Hawkins Partners, Inc. Street map of Nashville underlay courtesy Wallace Roberts Todd.

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To submit an article to the *Green Roof Infrastructure Monitor™* please contact Caroline Nolan at cnolan@greenroofs.org or Steve Peck, speck at greenroofs.org.

Starting in January 2008, the Monitor will be published four times a year with a distribution of 7,000 printed copies and an estimated electronic distribution of more than 20,000 under the new name of the *Living Architecture Monitor*.

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Brisbane's Lessons for North American Green Roof Industry

Travelling south from the cold of winter is always a treat, but even more so when you are heading to Australia to help kickoff the launch of the *Green Roofs for Healthy Australian Cities*. Last February I was fortunate to be invited to speak at the first green roof conference in Brisbane by Geoff Wilson, who is championing green roofs in Australia.

Brisbane is located in Queensland on the South west coast of Australia. The conference was a huge success, with a pledge by Lord Mayor Newman Campbell of Brisbane to develop green roof demonstration projects and to implement incentives for the private sector.

I want to share with you one exceptional project I saw on the South Bank of the Brisbane River, which was redeveloped in 1999 and features funky shops and restaurants, beautiful riverside promenades. Here, visitors will find the stunningly beautiful green wall/sculpture designed by landscape architect's Gillespies Australia and architects Denton Corker Marshall (pictured right).

The award-winning structure provides a shaded walkway that undulates for more than a mile along the riverside, like the waves of the South Pacific which crash upon the nearby beaches. This blend of twisted steel and *magenta Bougainvillea* borders an intensive green roof that sits above a multilevel parking garage providing well utilized parkland between the shops and the river. Gorgeous.

Sunny Concerns

Australian's sometimes joke that the sun shines 24/7 in their country, and with it incredible opportunities for solar energy, as yet unrealized due in part to the prevalence of low-cost, coal-fired energy generation. The integration of photovoltaic technology and green roofing has truly awesome potential in this sun-blessed land.

However, the sun isn't without its challenges and growing concerns in Brisbane. The reservoir which supplies this city of 1.8 million has not received much rainfall for close to a decade and the city, along with other regions in Australia, is in the midst of the worst drought in living memory. Water rationing has been commonplace for more than a year, with no water use

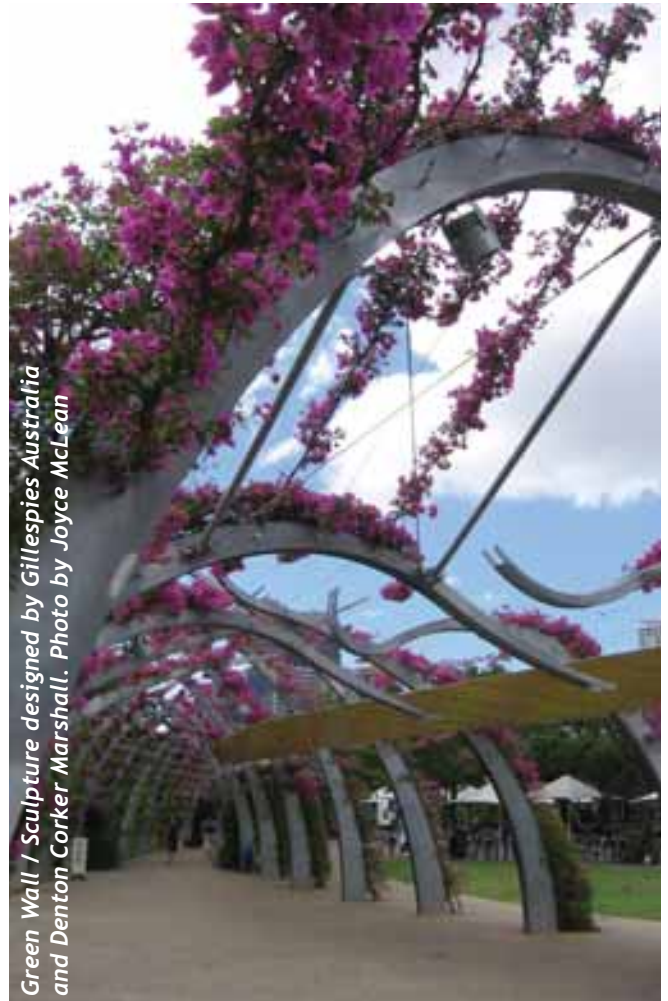
permitted for irrigating lawns or gardens. The average consumption of water by North Americans is about 350-litres per day. In Brisbane, individuals are not permitted to use more than 150-liters per day, as part of the effort to stretch out the remaining water in the reservoir until the much-desired rains hopefully arrive. While many extensive green roofs are designed for minimal or no irrigation, drought conditions definitely have the potential to restrict the use of green roofs in Australia.

Moreover, in the United States, there are currently extreme drought conditions in a number of states with projected water shortages becoming more widespread. Interest in green roofing is blossoming in many of these states, but is tempered by concerns about the potential additional demands on stressed potable water supplies. Fortunately, there are many options for supplying green roofs which don't require ongoing potable water consumption – such as rainwater harvesting. At GRHC, we recently struck a committee to explore current practices and emerging opportunities associated with integrated water management for green roofs.

“Fortunately, there are many options for supplying green roofs which don't require ongoing potable water consumption.”

This issue also features a number of articles exploring leading practices and research associated with integrated water management and green roofs including quality and supply.

Leading green roof design is focused on squeezing the most out of these technologies by blending the talents of



Green Wall / Sculpture designed by Gillespies Australia and Denton Corker Marshall. Photo by Joyce McLean

various disciplines such as architecture, landscape architecture, engineering, horticulture and ecology to name a few. It is within the promise of such design practices and innovation, that the full potential of green roofs and walls will be realized. And with it, the inevitable transformation of the building industry into a powerful force for healing and restoration accomplished!

If necessity is really the mother of invention, then there is no doubt that we can expect significant contributions to this shift to a healing, living architecture from our increasingly parched colleagues down under.

Sincerely Yours,

Founder and President,
Green Roofs for Healthy Cities

Green Roofs in the News

During his Earth Day speech announcing PlaNYC, New York City Mayor Michael R. Bloomberg announced his intention to encourage the installation of green roofs through a new incentive program. The plan notes: "Starting in 2007.... New York City will support the installation of extensive green roofs by enacting a property tax abatement to offset 35 per cent of the installation cost of a green roof. The pilot incentive will sunset in five years, when it will be reassessed for extension and inclusion of other technologies."

An online version of PlaNYC 2030 is available at: www.nyc.gov/html/planyc2030/html/downloads/download.shtml

Earlier this year, one of Casey Trees' projects won an American Society of Landscape Architects 2007 Professional Awards – the "Green Build-out Model." The entire set of Grant Products from this project, including both a data display tool and a mini-model are available at: www.caseytrees.org/programs/planning-design/gbo.html



Toronto Deputy Mayor Joe Pantalone, one of the architects of Toronto's Green Roof Pilot Incentive Program & urbanspace Property Group President Margaret Zeidler atop the 215 Centre for Social Innovation

The Federation of Canadian Municipalities (FCM) and CH2M HILL Canada Limited honoured the City of Toronto's Green Roof Pilot Project with an FCM-CH2M HILL Sustainable Community Award at a recognition ceremony at FCM's 70th Annual Conference and Municipal Expo in Calgary in June. The original Green Roof Pilot Project – the first of its kind in Canada – funded construction of 16 green roofs on a mix of public and private buildings in the city of Toronto (see *Green Roof Infrastructure Monitor*, Spring 2006).

As a result of the success of the original program, the city has approved a new Incentive Pilot Program for 2007 that has increased the incentive to \$50 Cdn per square-metre. To find out more, check out: <http://www.toronto.ca/greenroofs/incentiveprogram.htm>

Sheffield has become the first British planning authority, outside greater London to make the step of taking a green roof policy to Council for incorporation into planning regulations. The policy is currently out for consultation and will benefit from the support of interested parties.

To learn more and read the policy, check: www.thegreenroofcentre.co.uk/pages/news.html#SCCpolicy

University of Auckland, New Zealand engineering student Emily Voyde is embarking on a three year study to find the most suitable materials to use in 'green roofs' in Auckland.

She is the first female Maori PhD student in the University's Faculty of Engineering, and the only PhD student assigned to conduct research on Auckland City's only green roof, which was built on top of the Engineering building in September last year with funding from the Auckland Regional Council (ARC).

"My goal is to find the most effective combination of plants and substrates that release the most amount of water back into the atmosphere in Auckland's conditions," Emily says.

Emily will focus on native plants and locally sourced substrates, such as pumice and zeolites. Using her results, Emily will model the environmental impacts if green roofs were installed across Auckland City.

Magnusson Klemencic Associates has completed an 18-month evaluation of green roofs in the Seattle-area to see how well they perform. The final report is the result of over 1.5 million measurements of data gathered from five green roof test-plots around Seattle's downtown area. The most significant highlight of the report was the finding that green roofs reduced rainwater runoff by between 65 and 94 per cent.

GRHC and SPRI to Develop Wind & Fire Standards

By Kelly Lockett, Green Roof Blocks

During the course of the summer, GRHC's Technical sub-committee was working to pull together draft standards for fire and wind uplift, largely in response to the National Roofing Contractors Association's (NRCA) effort to have these issues included in the 2009 International Code Council's revised Building Code. (See NRCA article on page 32.)

Representatives from GRHC, SPRI, NRCA, ANSI and other interested parties met at SPRI's summer meeting in Rhode Island and reviewed, line-by-line, the two draft standards.

In September, SPRI initiated the process to develop a wind standard under the American National Standards Institute (ANSI). This process involves working towards consensus by circulating drafts of the standard to approximately 30 individuals that represent various stakeholders, including manufacturers, designers and end users. GRHC and the SPRI, under the leadership of Dick Gillenwater and myself, will be responding to questions, concerns and inquiries generated during this process. Given the fact that wind uplift has not been a big issue in Germany, which has over 1.9 billion square feet installed, it is our hope that we can have this standard completed in time to be recognized in the second round of the ICC code setting process.

"It is virtually impossible to test the innumerable variations of plants and growing media that can be found on green roofs."

The fire standard, which is a design guideline rather than a testing protocol will be developed next. It is virtually impossible to test the innumerable variations of plants and growing media that can be found on green roofs. Both standards are important to ensure the green roof industry grows without unwarranted regulatory barriers.

If you are interested in getting involved and have technical expertise in these areas please contact Kelly Lockett, Green Roof Blocks Chair, Technical sub-committee at kelly@greenroofblocks.com.

Green Roofs in the News

A summary of the report (including the reports as they were filed in 2005, 2006 and 2007), can be downloaded at: www.seattle.gov/dpd/GreenBuilding/OurProgram/Resources/TechnicalBriefs/DPDS_009485.asp. There are many other Seattle green resources available on the site as well.

Consulting Firm Davis Langdon has updated their 2004 report on the costs of green construction, following up with more recent data and including the developments that have occurred over the last three years, as sustainable design has grown radically.

Significant findings are:

1. Many projects are achieving LEED within their budgets, and in the same cost range as non-LEED projects.
2. Construction costs have risen dramatically, but projects are still achieving LEED.
3. The idea that green is an added feature continues to be a problem.

Please see: www.dladamson.com/USA/Research/ResearchFinder/2007-The-Cost-of-Green-Revisited/

The National Roofing Contractors Association's (NRCA) Roofing Industry Alliance for Progress has partnered with Penn State University, University Park, Penn., to provide \$100,000 for green roofing and solar energy research. The University will use the funding to take part in the U.S. Department of Energy's Solar Decathlon as well as to test green roof specimens at the university and investigate the potential effects and respective market strategies for the roofing industry with regard to photovoltaic technology.

Please see: www.nrca.net/rp/related/nrf/alliance.aspx

Just Add Water: Wetland Green Roofs for Enhanced Performance

by Christine Thuring, MSc and Rana Creek Staff

Typically, the ecological models considered for green roofs include plant communities that occur naturally in exposed ecosystems, such as the rocky alpine. Extensive green roofs often experience similar conditions, including extreme temperature fluctuations, direct solar radiation, unshielded wind, and shallow mineral substrates with little organic matter. For these reasons, hardy, drought tolerant plants like sedums, which grow well in exposed conditions, have become the most successful extensive green roof plants.

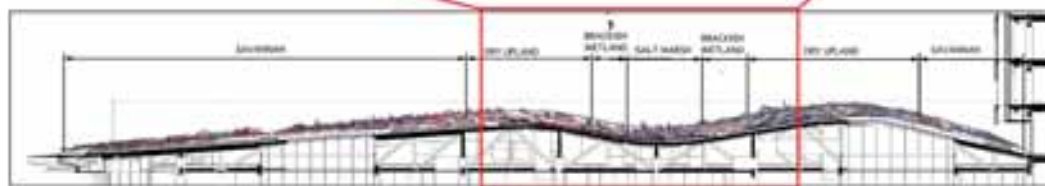
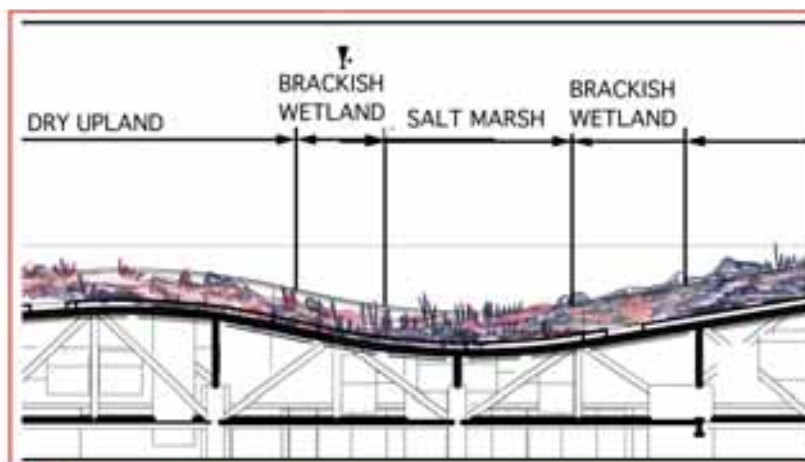
The challenging conditions inherent on most extensive green roofs are exacerbated by the absence of one key element: water. The sensible choice to avoid potable-water use for roof irrigation keeps most green roofs dry. However, a more holistic look at building systems reveals the opportunity in many cases to redirect large amounts of relatively clean wastewater to the roof. With water comes infinitely greater potential. In contrast with their dry counterparts, wet green roofs can offer greater cooling benefits through improved evapotranspiration, support more diverse plant and animal communities, and inhibit fire. Here we discuss wet roof advantages and design considerations, illustrate examples of wet roofs, and delve into some innovative new projects.

Wetland Ecosystem Services

Wetlands are among the most biologically diverse and productive ecosystems in the world. They represent a transition zone, supporting species from both upland and lowland communities while also harbouring unique species (*Outwater, 1996*). Human comfort and health are also inextricably tied to wetlands. The benefits we obtain from them include sediment control, water quality maintenance, macroclimatic regulation, erosion prevention, wildlife support, and recreational opportunities. Throughout the world, and particularly over the past few centuries, wetlands have been drained and converted to farmland, filled for housing developments and industrial facilities, and used as receptacles for waste. Recently, we have begun to rediscover the critical role that wetlands play in supporting life on this planet, and a focus on recreating and restoring them has developed. Roofscapes offer a largely untapped resource in which to carry out these restoration efforts with synergistic benefits such as enhanced cooling and stormwater retention.

Wet Roofs: Cooling Benefits

In the early 1900s, American attempts at air conditioning for buildings were based on the knowledge that roofs bear enormous heat loads. Early inventors found that a single



Section showing analogous ecological communities planned for the Palomar Medical Center Roof (courtesy Rana Creek)

gallon of water evaporated from a roof surface could remove 8,265 BTUs of heat (*Houghten et al, 1940*). Buildings could be most effectively cooled with small amounts of water, and Jim Watson reminds us that many early roofs were designed to hold 4-6" standing water for cooling effects but that the coal-tar pitch used fell out of favour due to health issues. Around the same time, modern energy-intensive air conditioning technology emerged to replace evaporative roof cooling, and the roofing industry moved towards asphalt, which performed well provided a slope of 1/4":12" minimum would remove excess water.

Research demonstrating how hot conventional roofs contribute to problems such as the urban heat-island effect and building-cooling energy consumption has again turned attention towards the benefits of evaporative roof cooling. Schmidt (2006) demonstrated that the evaporation of water in combination with transpiration by plants (evapotranspiration) can more effectively address these problems. These findings are based on extensive green roofs with 3-6" substrate and drought-tolerant plants. The performance results from systems with additional water available for evapotranspiration are even better. Compton and Whitlow's (2006) zero-discharge green roof system studying *Spartina alterniflora* and *Solidago canadensis* had much higher evapotranspiration rates relative to a comparable sedum roof. Cooling and stormwater retention benefits (for a two-year storm) were also greater for the wet compared to the dry system. Salt-tolerant *Spartina* was selected in that study to facilitate irrigation with greywater (water from sinks, cooling towers, and other sources without sanitary contamination), which is a plentiful resource in occupied buildings.

Waterproofing Considerations

When discussing the establishment of wetlands on roofs, one question arises immediately: what about leaks? The success of a wet green roof relies upon high quality waterproofing, but choosing the right product alone, or even a reliable roofing contractor may not be enough. According to Blair Bennett, Technical Representative with Soprema Inc., nine out of 10 waterproofing failures on new construction can be attributed to the trades following the roofer, with design problems and ineffective detailing as the other common culprits. This reminds us that the integrity of a green roof system is best ensured by an integrated and knowledgeable team representing all disciplines, with excellent communication from initial design through completion of construction.

“A number of visionary developments are now calling for closed-loop systems that will capture, reuse and treat water, while minimizing energy consumption and creating habitat.”

The mantra for leak prevention is “slope to drain,” but Jim Watson, Technical Manager for the Roofing Contractor’s Association of British Columbia, welcomes the opportunity for unusual applications and even encourages the investigation of wet roofs, provided they are guided by careful design. Bennett and Watson recommend the following measures to mitigate waterproofing concerns:

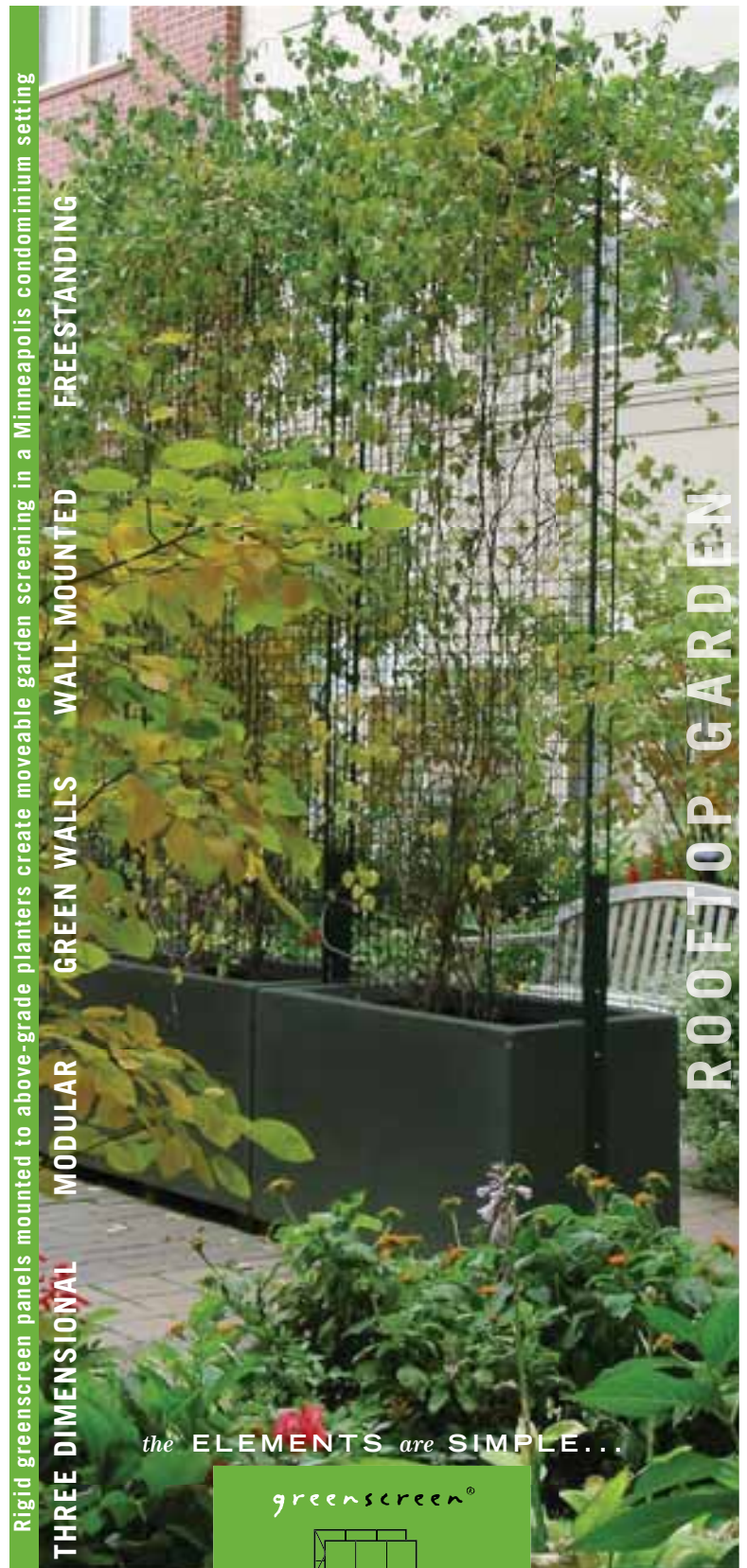
- 1) Verification of roofers’ work (EFVM or flood test) before the other trades hit the scene;
- 2) Over-design and redundant features (e.g. three-ply SBS; two base and a cap) and extra detailing; seamless membrane options with two reinforcements;
- 3) Curbing and waterproofing all materials placed on the roof to at least 4” above the expected maximum water level (all stacks, flashings, etc. should be made of non ferrous metal); and
- 4) Vector-mapping the roof for monitoring to permit immediate response should a leak form.

Research has also demonstrated the potential for green roofs to extend the life of a waterproof membrane to two or more times the standard life expectancy (Wong *et al*, 2002). This is due to green roofs’ tendency to reduce daily membrane expansion and contraction caused by extreme temperature swings on exposed roofs. Wet roofs, with their additional thermal mass and temperature regulating capabilities, can be expected to further prolong membrane life, making leaks even less likely.

Case Studies

Many possibilities exist for vegetated wet roofs, depending as always on the design intent and wishes of the client. In 2003, leaders at John Deere Works in Mannheim, Germany decided to begin treating the wastewater from their manufacturing and assembly operations with a constructed wetland. Because land area was not available at the factory, they decided to install the wetland on a 450 sq. ft. flat roof.

continued on page 8



the ELEMENTS are SIMPLE...



the POSSIBILITIES are ENDLESS!

continued from page 7

The wetland includes a combination of sedges, rushes and irises grown hydroponically in 2" of water. It breaks down carbon and nitrogen compounds present in the wastewater while sequestering phosphates and heavy metals (*Earth Pledge, 2005*). In England, the Green Roof Water Recycling System (GROW©) developed by Water Works UK, is a modular system designed to treat building greywater according to 'reed bed' principles (*Shirley-Smith, 2006*).

Current Work: Ecological Analogues

A number of visionary developments are now calling for closed-loop systems that will capture, reuse and treat water, while minimizing energy consumption and creating habitat. Rana Creek's team of architects, engineers, horticulturalists, ecologists and designers are answering the call with adaptive solutions to issues that are nearly impossible to resolve within the framework of traditional (i.e. segregated) design teams. Two of Rana Creek's projects currently in design include wet roofs that make an effort to



Reusing greywater through GROW system

achieve integrated, sustainable solutions taking inspiration from naturally-occurring wetland ecology.

The Palomar Medical Center in Escondido, California, is conditioned by a cooling tower that sends 15,000 gallons of water to the municipal sewer system every day. Once renovated, Palomar's cooling tower wastewater will instead support a diverse wetland plant community on its podium roof. Using principles of biofiltration and nutrient recycling, this roof will in turn treat the water and return it

to ground level as irrigation. Combined with use of greywater from inside the building as cooling tower make-up water, this system should offset 60 per cent of the building's potable water use. At the same time, it will create wildlife habitat and a scenic view for patients in the tower rooms that overlook the roof. Research on biophilia has demonstrated that hospital patients with views of plants and landscapes heal more quickly than those lacking connection to nature.

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In San Francisco, Calif., the Literacy for Environmental Justice Learning Center will serve as a 'living system' model for the area, ironically located on a capped landfill. Features include photovoltaic panels integrated with a living roof, passive solar design, and innovative water management systems to capture, harvest and convey water throughout the site. Due to the location on a landfill bordering San Francisco Bay, all roof water will be held in rooftop wetland systems, providing habitat for native wetland species and wildlife. Roof plants will be derived from wetland seed collected on site. An onsite living machine will process septic effluent from the facility, which will be used to irrigate native plant restoration areas and ornamental gardens.

Wet green roofs may still be a novelty, but their potential to restore lost ecosystems while delivering multiple client benefits is enormous.

Resources

- Bennett, Blair. Technical Representative, Soprema Inc. Personal correspondences, Aug. 13, 2007. Vancouver, B.C.
- Compton and Whitlow, 2006. A zero discharge green roof system and species selection to optimize evapotranspiration and water retention. 4th annual Greening Rooftops for Sustainable Communities Conference, Boston, MA.
- Earth Pledge, 2005. Green roofs: Ecological design and construction. Schiffer, PA.
- Houghten, F.C. et al. 1940. Summer cooling load as affected by heat gain through dry, sprinkled and water covered roofs. ASHVE Transactions. 46:231-242.



The LEJ Living Classroom in San Francisco, California, courtesy of Toby Long Design

- Outwater, A. 1996. Water: A Natural History. Basic Books, New York, NY.
- Schmidt, M. 2006. The Evapotranspiration of Green Roofs and Façades. 4th annual Greening Rooftops for Sustainable Communities Conference, Boston, MA.
- Shirley-Smith, C. 2006. A new green roof water recycling system - 'GROW'. 4th annual Greening Rooftops for Sustainable Communities Conference, Boston, MA.
- Watson, Jim. Technical Manager, Roofing Contractor's Association of British Columbia. Personal correspondence, Aug. 14, 2007. Vancouver, B.C.
- Wong et al 2002: Life cycle cost analysis of rooftop gardens in Singapore. Building and Environment 38 (2003) 499-509

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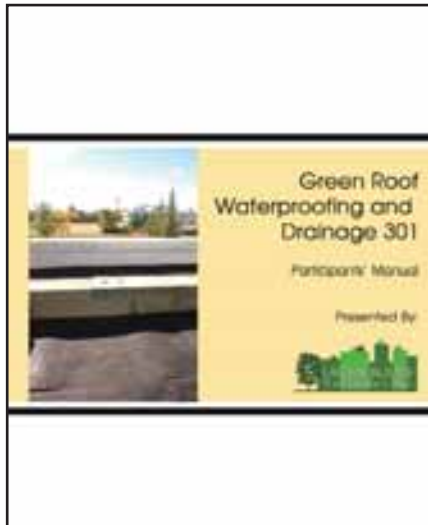
GRHC Launches New 301 Waterproofing and Drainage Course

By Stephen Teal, Flynn Roofing, Chair, Waterproofing and Drainage Course Development Committee

Dated as far back as the Hanging Gardens of Babylon, green roofs are not a new concept. Since that time, the technology has evolved substantially but its fundamental intent – to provide a healthy, living green space while keeping the supporting structure dry – has not.

The creation of these elevated green spaces affects the way that green roof contractors carry out their work. For example, most landscaping professionals may not be familiar with the restrictions that working on a roof may pose, such as limiting the tools that can be used, safety and insurance requirements. Similarly, having the waterproofing membrane buried beneath layers of landscaping components decreases its accessibility for post-construction repair and maintenance thereby elevating the importance of getting the waterproofing job done right.

It is important to view both the “green” growing components and the “black” waterproofing components as a single, complete engineered assembly. A green roof is not a basic roof with “dirt” piled on it as some may wrongly think. Should this simplistic “dirt on a roof” approach be taken to roof greening, major failures will be unavoidable and will likely give the industry a black eye.



Though many of the design and implementation principles for both disciplines may remain the same, their application and the quality of materials used may need to be adjusted to accommodate the requirements of the green roof.

As a part of the *Green Roof Accreditation Program*, *Green Roofs for Healthy Cities* has recently launched the third course in a series of four focusing entirely on the subject of waterproofing and drainage. *Green Roof Waterproofing and Drainage 301* was created by a multidisciplinary team of experts over the past year and a half in order to establish good design practices in these two areas:

- Provide an overview of the many tools and techniques needed to meet project objectives; and
- Equip non-roofing professionals with a basic understanding of the vocabulary and requirements of waterproofing for green roofs.

This course and others in the *Accreditation Program*, such as *Plants and Growing Media* which is currently under development, will serve to help bridge the gap between green roof disciplines by creating understanding of the constraints and requirements of each.

(See page 33 for schedule.)

Children, Wind Mills and Green Roofs

by Ernestine Man & Flavia Bertram, GRHC

This year, working with an environmental theme, the Toronto Peace Theatre summer camp invited *Green Roofs for Healthy Cities* and Toronto Hydro staff to share their knowledge about green technologies. The Theatre, in its sixth year, aims to educate and “honour children and young people in the pursuit of peace through the practice of theatre.”

Throughout the summer, campers learn different creative skills and are exposed to a variety of alternative ideas that explore “conflict and peace in human relationships.”



It was clear that the children were aware of the global issues we are facing and were able to recognize local efforts, such as green roofs and alternative sources of energy, as ways to mitigate these problems.

After learning about the principles and benefits of green roofs and wind turbines, the campers took to the fields, carrying out one of the quickest green roof retrofit

projects in North America. In less than an hour, they installed their very own miniature residential roofs, one intensive and the other extensive, complete with waterproofing, drainage, growing medium, and plants. Within the next hour the buildings were supplied with distributed wind energy.

“Dirt! Yay!” said one enthusiastic camper as she eyed bags of aggregate.

“Growing medium. That’s growing medium not dirt,” corrected GRHC’s Anna Sergeyeva.

This was a very different audience than GRHC’s usual professionals and the shift in perspective benefited all who were present enormously. We plan to get our hands dirty again and soon we hope!



Photos by Joyce McLean



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Green roof system technology and building construction continue to undergo changes, and NRCA's newest technical manual, *The NRCA Green Roof Systems Manual*, provides you with best practices applicable to the design and installation of vegetative green roof systems.

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GRHC's Magazine to Get New Name, New Look and Four Issues a Year

By Steven Peck, GRHC

As those of you who have been supporters of *Green Roofs for Healthy Cities* as well as participants in the burgeoning global green roof industry will know, this publication, the *Green Roof Infrastructure Monitor*, has blossomed over the years into a full-blown magazine.

The Monitor (or GRIM, as it's affectionately called around here), began its life as a four-page newsletter in 1999, but like our industry and association, it has grown by leaps in bounds to a 40-plus page gloss, full-color, respected and trusted magazine for the green roof industry.

However, as the industry continues to mature and expand, it has become ever more obvious to our team that changes were required to further evolve the magazine to better meet the needs of an increasingly sophisticated marketplace.

Enter Caroline Nolan.

She cold-called me one day to ask if I would sit on the Editorial Advisory Board of a new magazine she is launching first-quarter of next year called *Sustain*, targeting socially and ecologically conscious consumers in North America. I invited her to meet with me over a coffee and once I had a better sense of her considerable experience in the areas of marketing, media relation, and publishing, I immediately realized we had found just the person we needed to move the GRIM forward.

An award-winning journalist and magazine editor, Caroline accepted our request to take a long-hard look at our publication – from circulation management to production to editorial content – and produced a solid report brimming with recommendations.



Caroline Nolan, GRHC's new Director of Marketing & Communications in her rooftop garden in Toronto, Canada.

We were impressed by her insight and professionalism, and invited her to help us implement her recommendations.

So we are very pleased to welcome Caroline into our fold as our new Director of Marketing & Communications with responsibility for a number of areas including advertising and media relations. It's only been two weeks since she's joined, but I'm very excited to tell you what's just around the corner in terms of your industry magazine.

Sustainable Production

As part of her research, Caroline conducted an extensive survey of both our corporate members and readers (thank you to everyone who gave their time to participate) and one of the key messages was our audience's desire for us to publish the magazine in a more sustainable manner, to "walk the talk," as they say. In this regard, we are very pleased to announce that with this issue, we have begun

to execute our commitment to sustainability by partnering with North America's first Forest Stewardship Council (FSC)-certified printer, MPH Graphics Inc. of Markham, Ont., a true

leader in the field of green printing and the first in Canada to be "Bullfrog Powered" – meaning they use renewable energy exclusively to power their production plant.

An FSC-certified printer is important as it ensures the chain of custody from forest to print – and this includes custody and care of paper stock. If you look at our masthead on page 2, you will also notice that we



Now - Spring 2007



Then - Summer 1999

have now moved to an FSC-certified paper stock on a permanent basis containing no less than 25 per cent post consumer waste. We are also currently evaluating methods of offsetting our carbon emissions and promise to

communicate this as we move forward on implementation of our new plan.

We've also decided that as of our next issue, we're no longer going to mail out our issues in envelopes, but will affix mailing labels directly onto the magazine to reduce waste. (We invite you to do your part to recycle this magazine if you are not planning to keep it as long-term reference.) Of course, our magazine will be, as always available for no charge on our website as a PDF file.

Increased Frequency

Another learning culled from of our survey was the industry's desire for greater frequency. Currently, the magazine is published twice per year, but as of January 2008, we will begin to publish four times a year.

A quarterly publication schedule will better enable us to provide you, the reader, with timely, informative, leading-edge content including best practices, more in-depth case studies of innovative design and industry information.

As such, we will also have more room for a greater diversity of voices and research in the publication, and welcome inquiries from potential authors and article topics, especially examples of extraordinary design.

*Starting with
the January 2008 issue,
the Green Roof
Infrastructure Monitor
will now be called
The Living
Architecture Monitor.*

Advertisers who commit to all-four issues, of course, will receive more favorable rates – and enable us to provide you with more ways to reach your marketing objectives. (Our rate card for 2008 is forthcoming.)

Announcing - a New Name & Look

Finally, we want you to know that this will be your very last issue of the *Green Roof Infrastructure Monitor* (as you have come to know it) for starting with the next issue we will be changing our name. Starting with the January 2008 issue, we will now be called *The Living Architecture Monitor*.

The new name reflects our commitment to green roofs, green walls and to a new restorative architecture.

With this new name, we will also be introducing a redesign, improving the look and feel of the magazine as well. Among the changes will be a design that is easier to navigate and read.

So, as you can see, there are many changes afoot – and we look forward to delivering four exciting issues of *The Living Architecture Monitor* in 2008.

For more information, and advertising and editorial queries, please contact Caroline Nolan at 416-971-4494, ext. 231 or cnolan@greenroofs.org.

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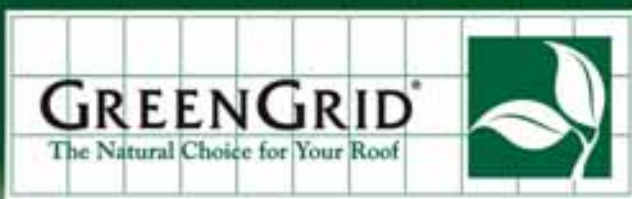
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Extensive Residential

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SPECIAL REPORT: Green Roof Awards of Excellence 2007 Winner Profiles



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Civic Award of Excellence:

Council Member Lisa Goodman
City of Minneapolis, Minnesota (page 23)

A Civic Oasis: Nashville Public Square

Photo courtesy Hawkins Partners, Inc.



In 2003 the City of Nashville undertook a multi-million dollar renovation to its Metro Courthouse complex including a five-level subterranean parking garage and rooftop public plaza. The total downtown site, consisting of approximately 7.5 acres, includes a 2.25-acre state-of-the-art intensive green roof over the parking structure. A cornerstone of the design team's concept was the establishment of a truly civic open space that embodies the term "Public Square." It provides unfettered access to all citizens to this civic hub from which a new pedestrian connectivity to the surrounding city is now realized. This new park complements the renovated 1930s art-deco styled courthouse architecture. It also accentuates its grandeur from all perspectives using rich, timeless materials that are authentic within its contemporary design interpretation.

Project: Nashville Public Square, Nashville, Tennessee

Award Recipient: Hawkins Partners, Inc., Landscape Architects, Nashville, Tennessee

Landscape Architect: Wallace Roberts Todd, Philadelphia, Pennsylvania

Architect: Tuck Hinton Architects, Nashville, Tennessee

Civil Engineer: Barge Waggoner Sumner Cannon, Nashville, Tennessee

Structural Engineer: Walker Parking, Marietta, Georgia

Client/Owner: Metro Nashville Davidson County, Nashville, Tennessee

This in every way is "context sensitive" design. Predominant civic views and axes literally shape the design's expression. At a more philosophical level, there is a subtle but important message sent by the broad civic lawn that stretches in front of the Davidson County Courthouse and Civic Building. From whatever point of entry, citizens reach the "level civic lawn" to stand equal in the sight of our elected government and court system.

"Sensitivity to the stewardship of the environment, including water resources, is an integral part of the design."

Sensitivity to the stewardship of the environment, including water resources, is an integral part of the design. The challenge of a large 2.25-acre impervious roof deck, the substrata of the park, is turned into an asset. Rainwater that falls on this area, as well as water from a garage sump, is harvested into a 57,000 gallon below-grade tank.

The cost of the green roof averages approximately \$30 US per square foot, exclusive of the vertical circulation structures. The project utilizes Tremco's hot applied, rubberized asphalt waterproofing membrane, TREMproof 150 HRA and lightweight aggregate (expanded slate), manufactured by The Carolina Stalite Company, incorporated into three different forms (lightweight aggregate, rooftop mix and fire-lane mix) for areas supporting different intensities of traffic.

Green Roof Awards of Excellence 2007 Winner Profile: Intensive Institutional



Focus on Stormwater Management in Nashville Public Square

All rainwater and irrigation water infiltrates through the growing medium, a light-weight expanded slate product called Stalite to the drainage mat (JDrain). All water then moves to roof drains and on to the harvesting tank for site irrigation use. Groundwater at the basement level of the underground garage is also added for reuse. Harvested water is filtered then pressurized in the site's automatic irrigation system. Unused irrigation water infiltrates through the rooftop planting media and is once again harvested for reuse. Due to this harvesting, it is necessary to employ a maintenance protocol that greatly reduces the use of chemical herbicides and pesticides — maintenance crews primarily utilize mechanical and organic weed and pest control. Only in periods of inadequate supply is the tank supplemented with water from the City's water supply.



Nashville's source of drinking water, the Cumberland River, runs 120-feet away from the site. Mitigating the effect of stormwater runoff on the Cumberland was a significant concern in the design. (Photographer: Bob Schatz)

Thousands of gallons per month of stormwater are recycled instead of being routed into a stormsewer pipe that escapes immediately into the near-by Cumberland River. Water is conserved in this plan using a combination of strategies. Plant material choices are native to the region, adapted to urban environments, and are installed in optimal volumes of planting media to promote unconstrained rooting and long-term vigor. These strategies, along with the intensive green roof design, promote a new cycle of water utilization, then re-utilization, of harvested rainfall that strongly curtails the reliance on the City's water supply as the sole irrigation source. Based on calculations, this equates to the conservation of hundreds of thousands of gallons of potable water annually. The Public Square's design also mitigates the site's previous iniquities in quantity and quality of stormwater first flushed into Nashville's nearby source of drinking water, the Cumberland River, only 120-feet away. The design harvests and redistributes stormwater throughout the site and eliminates from the equation the polluted and heated stormwater from the previous asphalt surface parking lot.

The depth of planting media varies from a minimum of 8" along the central ridge of the structure to a depth of five feet towards the edges. A diverse community of landscape materials is used, totaling 43 different species of which 81 per cent are native to the SE region and 63 per cent are native to Middle Tennessee.

The project reincorporates many historically significant components from the original site. Some of those elements include reuse of granite units (wall caps, veneer, and steps), historical war commemorative monuments, and historical veteran plaques. All installed granite walls, curbs, steps, etc. in closest proximity to the Courthouse terrace are constructed with the original granite.

The Nashville Public Square design reinvents what once was a polluting surface parking lot, and with the resolve of its community leaders, shapes a civic gathering space of dignity and circumstance. It recalls and interprets the historic stories of this location. It accommodates all citizens, offering a barrier-free entry from the surrounding street grid. It turns the liability of a 2.25-acre impermeable subterranean five-story parking garage into an asset that harvests rainwater, conserving hundreds of thousands of gallons of potable water each year ... and it employs green roof technology to make all of this possible.

Green Roof Awards of Excellence 2007 Winner Profile: Extensive Residential



Photo courtesy Rana Creek

A sustainable home in Carmel, California

Built as an embodiment of Nature's gifts, the Feldman's home, in the Santa Lucia Preserve (a 20,000-acre private preserve in Carmel, California), was designed as an example of sustainable Mediterranean Modernism. The house was designed to integrate itself back into the land through sensitive design including low water use, solar power and habitat enhancement. There are actually three small buildings that are built into the hillside where the hill seamlessly continues onto the green roofs of each one. Rana Creek ensured that an ecological design approach enhanced the project with a sustainable landscape and green roofs that consist mostly of locally adapted, indigenous plant materials already found thriving onsite prior to building. Their oversight of design and implementation focused on stabilizing all disturbed soils by planting grasses and forb mixes approved for the Santa Lucia Preserve, controlling non-native species, and simply allowing natural regeneration of the local plant assemblages. Adaptive management techniques proved to be the most valuable strategy, as the roof that was being "taken care of" by weeding, pruning and irrigation was less successful than the roofs left unattended, due to lack of access.

There are 4250-square-feet of green roof installed at a cost of \$21 US per square foot. The 6" depth of growing medium is composed primarily of sand, lava rock and amendments which allow for both moisture retention and drainage. The

growing media included *mycelial* inoculants and supporting mushrooms that appear in the cool wet winters. The roofs were installed with irrigation to support the initial establishment of the plants and for minimal summer maintenance. The waterproofing membrane is American Hydrotech MM6125 followed by a Hydroflex30 Protection Course and Root Stop WSF40. The Drainage system is Floradrain FD40 underneath the growing medium layer and ¾" to ½" gravel with perforated pipe and surface drains at the roof's edges. The perennial plant species selected for the roof like Sand Sedge, Pt. Joe Fescue, Yarrow and Wild Strawberry are typical of the Oak Woodland understory and representative of

the Monterey Peninsula region flora. A host of annual wildflowers were over seeded in the fall and by Springtime Tidy Tips, Lupine, Poppies, and Goldfields surprised the owners with a colorful spring bloom. These annuals continue to sprout and flower each spring.

Project: Feldman Residence, Santa Lucia Preserve, Carmel, California

Award Recipient: Rana Creek

Project Architect: Feldman Architecture, San Francisco, California

Landscape Architect: Blasen Landscape Architecture, Sausalito, California

Client: Dan & Sandy Feldman, Palo Alto, California

The green roof design for the Feldman's Hill House emphasizes low-water use, sustainable landscape techniques and use of native plant materials. The green roofs are designed to provide usable landscape, filter and store rainwater, attenuate sound, increase thermal insulation and provide site sensitive beauty for the

Feldman's home. The Feldman's benefit by reducing their energy consumption up to 30 per cent during the summer months from the insulation of the green roofs. With a growing media depth of 6" the sound is reduced by approximately 43 decibels. The sounds from the humans and their activities within the buildings are also being buffered to protect the wildlife, given the sensitive nature of the habitat in the Preserve.

The Feldman residence is a superlative example of green roof potential to limit environmental disturbance and integrate architecture with ecology – the 33 species of native plants used have made for a successful recovery after the disturbance caused by building on the site. The ecology of the site will continue to become more complex and resemble the natural analogs that were emulated in the design.

Green Roof Awards of Excellence 2007 Winner

Profile: Extensive Industrial / Commercial



Photo courtesy Calamos Investments

Calamos Investments is a diversified global investment manager with a proven record of delivering top-tier results across a range of strategies. Calamos Investments was interested in the green roof concept as a beneficial alternative to conventional roofing options. They felt a green roof would be an excellent choice to replace the ballast rock covered roof area surrounding their 10th floor rooftop patio.

10th floor makeover in Illinois

Removal of the existing ballast rock and existing insulation was completed before the insulation was reinstalled for the new system. Then the roofing components were installed in the following order: drain layer (Hydrodrain 302), root barrier (WSF40), 4" of insulation, air layer (AL), moisture retention mat (SSM45), flora drain (FD25), and system filter.

Four inches of extensive growing media were covered with a pre-vegetated mat. The mat grown by Xero Flor America, LLC presented an "instant" green roof. It was healthy and lush from the time of its installation and incorporates 12 different species of sedum. The cost to entirely retrofit this 3,088 square-foot roof was \$30 US per square-foot.

The green roof can be viewed from the rooftop patio and be seen out of conference rooms and executive offices offering an attractive viewscape within the workplace. The presence of plants and green space has proven to be successful in improving employee productivity in the work

environment. The rooftop patio provides a place where people can retreat to relax and reduce stress during the workday.

Project: Calamos Investments, Naperville, Illinois

Award Recipient: Intrinsic Landscaping, Inc.

Client/Owner: Calamos Holdings LLC, Naperville, Illinois

The green roof provides added insulation to the building, reducing energy costs and ensuring greater roof longevity by protecting the membrane from the elements. It also minimizes storm water run off and

improves air and water quality, while providing habitat for birds and insects. Lower surface temperatures on the green roof help to mitigate the local effects of the urban heat island, reducing contributions to global warming.

"The project is an excellent example of a simple and elegant green roof retrofit, providing a visible and accessible replacement for an otherwise unattractive and undistinguished rock ballast roof."

The Calamos Investments project is an excellent example of a simple and elegant green roof retrofit, providing a visible and accessible replacement for an otherwise unattractive and undistinguished rock ballast roof. It also highlights the outreach potential inherent in the commercial/ industrial category.

By creating a green roof that is visible and accessible for a company on the forefront of real estate and development, Calamos Investments is well positioned to enjoy its many benefits and can translate the idea into future projects.

Green Roof Awards of Excellence 2007 Winner Profile: Extensive Institutional



Photo courtesy Sanitation District No. 1

Stormwater management in Kentucky

When Sanitation District No. 1 took on the additional responsibility of stormwater management for three Northern Kentucky counties, the District realized the need to expand the size and scope of the District's facilities. One of the key components of the District's vision was serving as a regional example of storm water best management practices (BMPs), and incorporating a green roof in the expansion of the administration building. But rather than seeing the green roof as an isolated BMP, the District and the design team conceived of a system of linked BMPs that would nurture storm water from the time it hit the roof to its outfall into Banklick Creek. The green roof would, in essence, be at the headwaters of the entire site's hydrology, and any runoff would flow off the roof and into a series of BMPs (i.e. first into a naturalized wetland, then to a retention basin, a detention basin, step pools and finally into the creek).

The roof assembly was comprised of 3,600 square-feet of "Savannah Type III, Extensive," installed at approximately \$13.50 US per square foot. In addition, the facility supports a 3,600 square-foot conventional roof to serve as a control for monitoring purposes. The green roof supports two inches of growing media and an additional two inches of granular drainage media. The plant list consists of low-maintenance, drought resistant plants, including ornamental grasses, chives and sedums.

Runoff from both roof systems is collected and conveyed through a series of network piping to the District's Storm Water Laboratory. In the lab, a series of parallel pipes constructed of 10" clear PVC were installed and retrofitted to allow the installation of water quality and flow sampling equipment. This will enable the District to generate qualitative and quantitative data during wet weather conditions. Once data is collected, the District will analyze both roofs and determine the effectiveness of its green roof as a stormwater management practice. The data will be collected year-round to determine the seasonal effectiveness of the green roof.

The District also wanted to tie the green roof into their educational mission. During the 2005-2006 school year alone, the District hosted over 2,300 students to its' environmental education site, Public Service Park, as well as various Girl Scout and Cub Scout groups. During their visit to the park, students play the role of a scientist following the journey of a drop of water. This path leads them through a wetland, a Native American Creek Trail, across porous pavement and eventually to the top of the vegetated roof.

The District's adult educational programming provides Public Service Park tours to groups such as professional engineers, civic groups and other municipalities. Additionally, the roof serves as a regional example for university students interested in the application of green roof technologies and other innovative storm water practices. The green roof incorporates artificial landforms and a paving system to enable visitors to walk throughout and experience the green roof. Educational signage is provided to visitors that describes the various layers and components of the green roof.

The Sanitation District No. 1 project beautifully expresses the multiple potentials of an institutional green roof – a project that embraces and explores not only the possibilities for efficiency and utility, but also research, education and inspiration.

Project: Sanitation District No. 1, Ft. Wright, Kentucky

Award Recipient: Sanitation District No. 1, Ft. Wright, Kentucky

Architects: Humpert Wolnitzek, Covington, Kentucky

Design & Installation: Roofscapes, Inc., Philadelphia, Pennsylvania

Landscape Architect: Human Nature, Inc., Cincinnati, Ohio

Client: Sanitation District No. 1, Ft. Wright, Kentucky

Green Roof Awards of Excellence 2007 Winner Profile: Intensive Residential



Situated in downtown Portland, Oregon, The Louisa is a residential high-rise apartment building with 242 apartments including ground floor retail. The building reflects the design vision of developers, architects and landscape architects, while responding to the needs of the tenants and reaching sustainable goals. The center of the retail podium houses an intensive and an extensive green roof which reduces storm-water runoff, mitigates the urban heat-island effect and provides visual interest when viewed from the upper floors.

The Louisa also features high-efficiency glazing and balconies on the south, east and west sides, which double as shading. Other features include operable windows that allow for natural ventilation, water-efficient fixtures such as dual-flush toilets, low-toxicity building materials and finishes such as agrifiber cabinetry and bamboo flooring, an interior recycling facility, and the use of recycled content and locally-sourced construction materials and finishes. The Louisa also supports various forms of transportation: regional light rail, the Portland Streetcar, several bus stops are within a few blocks, and a bicycle-commuter locker room is provided.

Because the Louisa was planning for LEED certification, the objectives for the project were outlined early on through the LEED process. Apart from requirements of certification, the design team felt it was important for the green roofs to reach out to the surrounding neighbors by providing an enjoyable tapestry of plant textures and patterns for viewing. The intensive green roof is 100 per cent accessible and programmed to allow residents to have outdoor parties and barbecues.

The intensive growing media has a 12-24 inch depth, composed of sand loam, pumice and organic matter (compost). The total costs of the green roofs (including membrane, insulation, drainage, growth media, irrigation pavers and plants) were \$15 US per square-foot for the extensive portion and \$25 US per square-foot for the intensive area. Environmentally appropriate landscaping, with drought-tolerant and native species, populate the intensive and extensive green roofs. The area of the intensive green roof gardens is 8,071 square-feet.



Photo courtesy Walker Macy Landscape Architects

Sustainable residential green roof on condominium in Portland

Project: The Louisa, Portland, Oregon

Award Recipient: Walker Macy Landscape Architects, Portland, Oregon

Architects: GBD Architects, Portland, Oregon

Client/Owner: Gerding Edlen Development, Portland, Oregon

The roof gardens are reviewed four times per year by a landscape maintenance contractor. The primary beneficial maintenance task is the manual removal of weeds in lieu of herbicidal removal of nuisance plants. The fertilizers used contain no phosphorous. Water is judiciously applied with a low-volume drip irrigation system only during the summer months when the evapotranspiration rates are at their peak. The green roofs are being monitored by landscape architects along with the maintenance contractor to verify long-term soil composition changes, plant health, and irrigation balancing. The information

gained will be used to inform the design and maintenance teams for other green roof projects.

These green roofs have been on display for countless tours by professionals in the sustainable design industry, soil scientists, horticulturists, landscape architects, city officials from Portland and other cities on the west coast. In addition to the numerous other sustainable strategies included at The Louisa, the benefits of the green roof are conveyed to residents via a *Green Resident Manual* which they receive upon moving in.

Lush and flourishing, the Louisa has grown into a beautiful and accessible residential green roof system, one which is well-integrated into the design and philosophy of the building, embracing an ethic of sustainability from conceptual design to ongoing maintenance.



Green Roof Awards of Excellence 2007 Winner Profile: Intensive Industrial / Commercial



Photo courtesy Barrett Company

An employee oasis in Chicago

The green roof and terrace areas on the 6th floor podium of the ABN AMRO Plaza at 540 West Madison Avenue in Chicago were built primarily for the enjoyment of employees. This is the first major green roof installation by the noted developer, Gerald Hines Interests, Houston, Texas, on one of their high-end commercial properties.

Designed for maximum accessibility, the roof has 50 per cent green roof and 50 per cent pavers and plantings which are a mix of trees, perennial plants, and annual flowers in planters of mixed heights. Tree shaded areas are complimented by an open lawn planted with sod. The trees were planted fairly large and have grown quickly, so the green roof looks mature and gives a true garden feel. All employees can benefit from this green roof which also contributes to the overall greening of Chicago.

The growing media is PM35: General Purpose Amended Top Soil Blend, provided by Midwest Trading, with growing media depths of 18 to 24 inches in the sod area and perennial planters, and 36 inches around the other planters. The project covers 74,700 square-feet at a cost of over \$100 US per square foot. The plant list includes trees, shrubs, perennials and groundcovers. Various annuals and seasonal plantings have also been installed including summer annu-

als, spring bulbs and fall mums. The "Greenroof-Roofscape®" waterproofing assembly, supplied by the Barrett Company, consisted of 215 millimeter thick Barrett "Ram Tough 250" rubberized asphalt membrane made with recycled tire crumbs, polyester reinforcement, SBS protection course, 60 pounds per square inch extruded polystyrene insulation, and a root barrier.

The green roof will preserve the integrity of the roof membrane by eliminating damage from the sun's ultraviolet light, eliminating thermal shock and all mechanical damage. The monolithic rubberized asphalt waterproofing membrane can with-

stand constant water immersed conditions and hydrostatic pressures while providing long term physical and chemical stability in an environment subjected to water, fertilizers, root growth and chlorides.

The irrigation system is a combination of two styles of emitters. The pop up sprinklers irrigate the perennial and annual display area and turf areas with a spray. The remaining tree, shrub and groundcover beds are irrigated using a drip hose that weeps water.

Three seasons of maintenance are required; spring consists of an initial clean-up after the winter months followed by summer weekly service which begins in April and ends at the end of September. Lastly, the fall clean-up starts in September and lasts until the end of November.

A solid addition to Chicago's green roof success story, with Mayor Daley's stated objective of making Chicago America's greenest city, the 6th floor podium on the ABN AMRO plaza contributes towards making Chicago a cleaner, healthier, more energy-efficient environment for its' citizens and demonstrates the potential of green roofs to provide a pleasing, tree-lined refuge in the center of an exciting bustling city.

Project: ABN AMRO Plaza, 6th Floor Podium, Chicago, Illinois

Award Recipient: Barrett Company, Millington, New Jersey

Architect: De Stefano and Partners, Ltd., Chicago, Illinois

Landscape Architect: Christy Webber Landscape, Chicago, Illinois

Client/Owner: LaSalle Street Capital, Chicago, Illinois

Green Roof Awards of Excellence

2007 Winner Profile: Civic Award of Excellence



Changing longstanding practices and public policies does not happen easily, and it rarely happens in government without either a crisis or a committed champion. In Minneapolis, that champion has been Council Member Lisa Goodman who has led the City's efforts to promote green roofs on a number of fronts. Her efforts have made Minneapolis a champion on its own and a leader in the promotion and implementation of green roofs both within the region and across the country.

In 2004, Council Member Goodman was introduced to green roofs and their potential to improve the city. The next summer, she used funds from her own office budget to hire a graduate student at the University of Minnesota College of Landscape Architecture to work on green roof issues. At the time, Minneapolis was working to establish a new stormwater utility that would impose fees on property owners based on their impact on the municipal stormwater system.

The stormwater utility model was an attempt to align the costs of maintaining the public infrastructure for storm water with the amount of stormwater coming from each piece of property. Council Member Goodman saw an opportunity for the new model to encourage property owners to incorporate green roofs as part of their developments and to reduce the new stormwater utility fees for properties that included green roofs. She pushed for the project to include a 100 per cent fee abatement, the most aggressive fee-based incentive of any major city in the country and without her role as champion, it would not have happened.

As adopted policy, the City will abate 100 per cent of the stormwater fee if a development project has a best management practice with both a quality and quantity reduction in stormwater runoff.

Since then, Council Member Goodman has advocated to allow green roofs as alternative compliance to the City's at-grade greening requirements and supported efforts by the City Planning Division to draft performance standards for green roofs that clarify how green roofs will be evaluated as part of site plan reviews and other aspects of the City's land use process. She also supported a feasibility study of constructing a three-acre-plus green roof on the Target Center, the city-owned arena in downtown.

Council Member Goodman has led the efforts to construct an advanced demonstration green roof at City Hall, a project that was just getting underway as the *Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show* came to town.

In fact, it is unlikely that the Conference would be in Minneapolis if it was not for Council Member Goodman who

wanted to keep the energy and momentum growing for green roofs by bringing hundreds of green roof advocates together in the 'City of Lakes' for this event. Once again, she has played a leadership role in the conference by identifying key partnerships, shaping the agenda, and raising the funds for a successful conference.

To get a picture of what would be required for a good conference; she went with Hennepin County Board Chair, Randy Johnson, another important green roof champion, and other City leaders to Boston, for the 2006 green roofs event.

Her goal, of course, was to make sure that Minneapolis stayed in the lead on green roofs by having the best conference ever.

Lisa is a member of the Minneapolis City Council, elected to her first term in 1997 and re-elected in 2001 and 2005. She represents the seventh ward, including all of downtown Minneapolis. She is a native of Chicago, Illinois, and graduated from the University of Wisconsin-Madison with a degree in Political Science and Labor Relations in 1988.

Currently, Lisa is the Chairperson of the City Council's Community Development Committee and the Minneapolis Community Development Agency. During her tenure, she led the successful effort to merge the City's Planning Department and Development Agency to form the Community Planning and Economic Development Department (CPED).

Additionally, she has been active on boards and commissions at the state and national level including the Planning and Implementation Committees for the New Twins stadium and the New Downtown Central Library, the Board of Directors of the Midwest Health Center for Woman, Medica Skyway Senior Center, Hennepin County Animal Humane Society, the Family Housing Fund and Meet Minneapolis.



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Lisa Goodman,
City of Minneapolis,
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Recycling Urban Stormwater: 1050 K. NW Street - Washington, DC

Lucille C. Lanier, LA, FASLA and Neal Beasley, VCH; Timmons Group

Let's explore the synergistic relationship in this innovative LEED/green roof/plaza stormwater design for 1050 K Street, a projected 11-story office building in the heart of downtown Washington, D.C. The owner/developer assembled a comprehensive team including landscape architect, civil engineer, architect, horticulturalist, irrigation specialist and construction administration team. The project is currently in the early stages of construction.

Complex stormwater systems, driven by sustainable goals, are an integral part of the project's successful accomplishment of projected LEED Gold Certification. Washington, D.C. plans to use this plaza as a demonstration site for sustainable design (as of February 2007, the site sheeting and shoring is underway). The existing site is 97 per cent impervious. The project design reduces impervious area to 67 per cent of the site. Only in a major storm event will there be runoff from the property due to a complex, well thought out system. Driven by the building architecture, it was also imperative that aesthetics not be sacrificed to obtain LEED status.

Stormwater is captured within the two-tiered Garden Roof® system and released slowly through small apertures in the tray system. That overflow, chiller water from all 11 stories of the building and plaza runoff is collected in a cistern located within the building footprint. Cistern water is

"Overflow, chiller water from all 11 stories of the building and plaza runoff is collected in a cistern located within the building footprint."

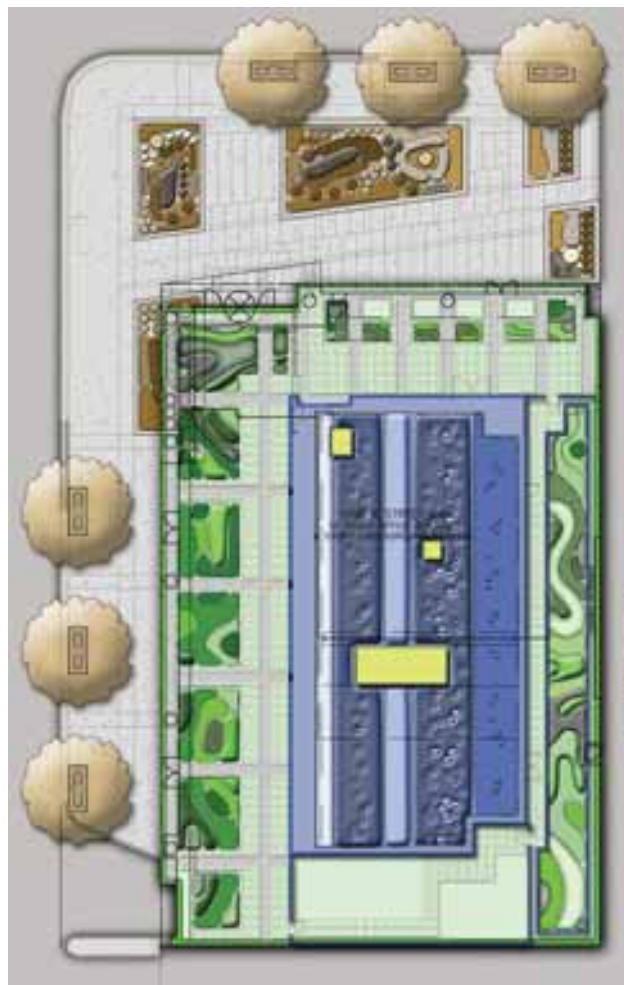
then filtered and pumped through the plaza water feature and a series of three constructed urban bioretention basins or throughout the site to be used for irrigation. Bioretention areas allow absorption back into the soil to cleanse and absorb the storm water. Any runoff is again collected in the cistern to

recycle through the system. In case of a major storm event, drains are located in the cistern that will allow runoff to be released into the storm sewer system. Two LEED credits were earned for this (6.1: *Balance aesthetics and functionality while reducing peak flow rate and stormwater leaving site by 25 per cent* and 6.2: *Utilize cistern to collect site stormwater & bioretention to filter suspended solids and phosphorous.*)

Careful consideration was given to the design and final selection of plants for the urban streetscape area in a bioretention application, choosing plants tolerant of the urban climate, which would enhance overall beauty while also achieving functional requirements. Green roof design involved selection of the most durable plant varieties considering potential for four seasons of coverage and flower color while not straining the infrastructure. The architecture offers a two-tiered opportunity with the lower tier (8") serving as an outdoor terrace accessible by patrons.

The upper tier (4") will cover mechanical services and was considered primarily for its functional duties. The 8" semi-intensive soil depth offers a more diverse palate of plants with increased texture and color. Long-term success of plant materials made selection a challenge. In addition, interactive use by patrons accessing the roof made aesthetics and beauty a must. An inspiring visual connection with the streetscape 11 floors down was accomplished with large planters fronting the streetscape, giving an edge of green along the building ridge.

Cistern water will be utilized for irrigation on an as-needed basis. Drip irrigation has been designed for the green roof as well as plaza areas to conserve and optimize use of water. The control system utilizes state of the art Evapo-Transpiration referenced



This plan view represents the three primary planting areas. The 4" depth roof planting is in blue. The 8" depth roof planting is green and the bioretention/streetscape is brown. (Carl Hecksher, Visualization Specialist, Timmons Group, Richmond, VA)

programming via satellite, which downloads information from local NOAA weather stations.

The complex water quality and quantity treatment strategies vastly improve the stormwater runoff rates, volumes, and quality leaving this small, ultra-urban site without negatively affecting the beauty and display of the landscape.

For the full text of this paper, including greater detail on specific design elements, see the GRHC CD of the proceedings of the 5th Annual Greening Rooftops for Sustainable Communities Conference available at www.greenroofs.org

Green Roof Runoff Water Quality

Robert Berghage, David Beattie, Albert Jarrett from Penn State Department of Horticulture, Penn State Department of Agricultural and Biological Engineering; and Thomas O'Connor UWMB, WSRD, ORD, USEPA

Significant water quality and quantity issues result from stormwater runoff from developed areas in North America. Development results in both increased volumes of water and creates water quality impairment issues throughout the affected watershed.

Rooftop greening has been suggested as a method to reduce these impacts by reducing the impervious surface within a developed zone (Scholtz 2001). The stormwater benefits offered by green roofs include not only direct retention of a portion of the rainfall, but also delaying the runoff peak and decreasing the peak rate of runoff from the site (PACD, 1998) (Carter & Rasmussen, 2006).

Growing medium depth and porosity plays an important role in stormwater retention and plant growth. Plants provide shade to the surface below the foliage, intercept rainfall, and slow the direct runoff from sloped roofs (Miller, 1999). Annual reductions of runoff of 38 to 54 per cent, and 38 to 45 per cent have been reported for only 3" thick roof media (Miller, 1998) and 40 per cent retention of the two-year storm for 2.5" media (Scholz, 2001), the two-year storm being a primary metric for stormwater conveyance design. Many other studies including ours have demonstrated similar stormwater retention and detention results (Denardo et al. 2006; Rowe et al. 2003) In addition to reducing runoff water quantity green roofs also have the potential to influence runoff water quality.

Runoff samples were collected at the Center for Green Roof Research at Rock Springs, Penn. during the period from January 2005 through May 2006. Samples were collected from five small (4.4m²) buildings, three green roofs and two non-greened control roofs covered with rolled asphalt roofing. The test green roofs, from the roof deck up, consisted of a drainage mat (Enkadrain, Colbond USA), 3.5 - 4" of media (Paygro, Hydrolite based medium, Garick Corporation USA) and Sedum spurium and Sedum album plants. At the time of the study the plants covered 95-100 per cent of the roof surface and were 80 per cent *S. spurium*.

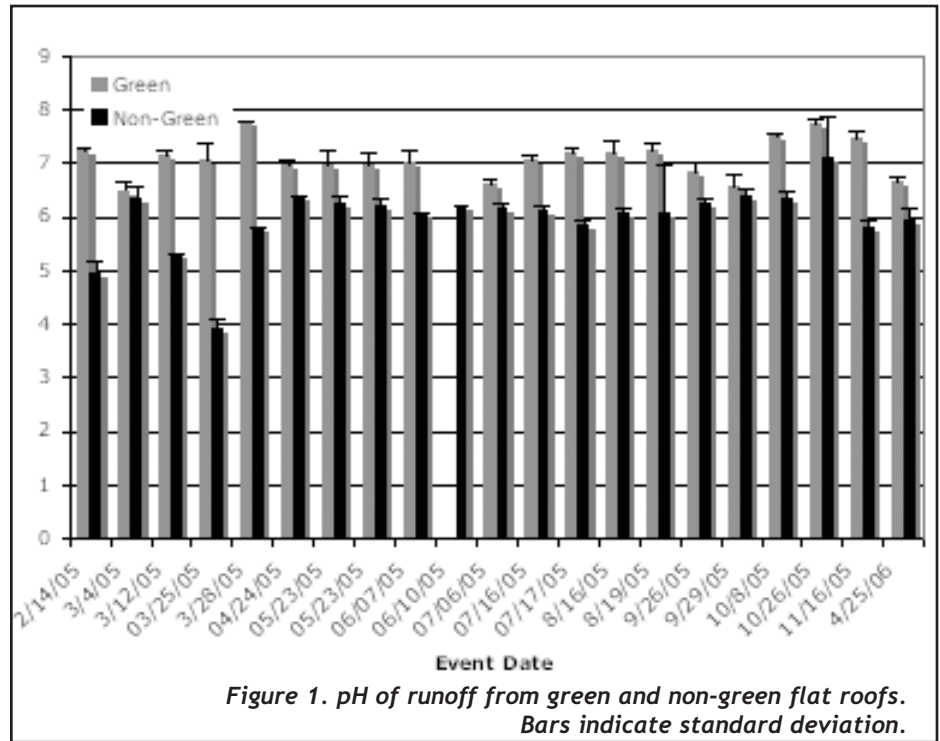


Figure 1. pH of runoff from green and non-green flat roofs. Bars indicate standard deviation.

Samples were analyzed in-house for pH, electrical conductivity (EC), turbidity, color, and nitrate and/or were tested for various plant nutrients and other ions using an inductively coupled plasma mass spectrometer in the Penn State Agriculture Analytical Laboratory. Ions evaluated by ICP were calcium, cadmium, copper, iron, potassium,

“The most consistent benefit was increasing the pH of the runoff – neutralizing acid rain.”

magnesium, manganese, molybdenum, sodium, nickel, phosphorous, lead, and zinc. In addition samples from two events were analyzed for sulfur. Runoff nutrient loadings in pounds per acre were calculated from measured concentrations and measured runoff quantities. Sampled precipitation events ranged from 0.07" on 3/4/05 to 3.2" on 10/8/05. Total precipitation from the sampled storms was 16.15". Sampled events included rain, snow and freezing

rain. Runoff water quality varied with both sampled event and roof type.

Green roofs had a number of positive impacts on stormwater runoff quality in this study. The most consistent benefit was increasing the pH of the runoff (neutralizing acid rain – see fig.1). Another major benefit was a significant reduction in the observed nutrient loading rate for nitrate, due to reduced runoff volume – it is clear that there is great potential for green roofs to reduce nitrate output from some urban areas.

Total loading for metals tested was also reduced, however the concentrations of these ions was sufficiently low in the runoff that the practical significance of this reduction is probably not important.

The concentration in runoff solution and total loading of other common soil and fertilizer salts, P, K, Ca, and Mg was increased in the runoff from green roofs, however it appears likely that the total output of these nutrients is seasonal and is similar to what might be expected as leaching from any other planted system in the landscape.

The consistent yellow color of the runoff from green roofs was the most consistent negative impact of the green roof on runoff quality. Although probably not environmentally important, the leached humic acids might provide a poor public image for the quality of the runoff from the green roof if collected and reused.

Additional research and sampling is needed in different parts of the country where the input levels of these and other pollutants are different to more fully quantify the potential water quality benefits to the use of green roofs.

For the full text of this paper, including greater detail on specific design elements and monitoring initiatives,

see the GRHC CD of the proceedings of the 5th Annual Greening Rooftops for Sustainable Communities Conference available at www.greenroofs.org.

Disclaimer: Any opinions expressed in this review are those of the author and do not, necessarily, reflect the official positions and policies of the USEPA. Any mention of products or trade names does not constitute recommendation for use by the USEPA.

Making the Case for Green Roof Infrastructure - Greensave Calculator

By Steven Peck, GRHC

One of the principal challenges for green roof designers, manufacturers and other advocates is to justify the additional costs of a green roof assembly, compared to traditional roofing assemblies. Generally speaking, there are four ways in which green roof costs can be lowered, some of which can be controlled by design professionals, and others which will naturally evolve. As the industry becomes more mature in different markets, there will be a greater degree of familiarity among installation professionals, and competition, which will naturally help to reduce costs.

Another way to lower green roof costs is the evolution of the technology. With greater innovation and the combining of system functions, such as drainage and supplemental irrigation, coupled with greater economies of scale, we can expect prices of materials to decline over the next decade. This has certainly been the German experience.

Thirdly, there is public policy. *Green Roofs for Healthy Cities* continues to lead the charge to have green roofs acknowledged through policies and programs that reduce higher first costs for homeowners, while recognizing the measureable and practical public benefits of cleaner air, water, energy conservation and improved green spaces.

The final area, one that we have focused on heavily in our courses, deals with integrated design. We explore how designers of green roofs can "squeeze" out the most benefits possible for their clients through integrated solutions such as the use of photovoltaic panels, precooling of air condition intake air, horticultural therapy, marketing, and sale of useable private or shared roof space. Such integrated benefits are realized through multidisciplinary



GreenSave Calculator now on www.greenroofs.org.

design-team approaches to green roofing and the ability to think outside the box.

In order to facilitate these integrated approaches and realize these benefits, we have developed the free, web-enabled *GreenSave Calculator* with the generous support of Tremco and the expertise of the Athena Institute in Ottawa, Ont. It can be found on our website at www.greenroofs.org.

The *GreenSave Calculator* enables users to compare three different roofing systems from a cost and benefit perspec-

tive over the lifecycle of the project. Users may select any variables they wish and model the impact on costs and benefits. It also provides a platform to begin to incorporate a wider range of soft benefits in addition to harder benefits such as an annual stormwater fee-bate and membrane durability.

Users are also invited to share with us information they have in their possession that can help us build a wide number of case studies which demonstrate the many practical, economic benefits of integrated green roof design and installation.

Annual Green Roof Industry Survey Shows 24 per cent Growth in North America

Alex Johnston, GRHC

Over the late winter and early spring of 2007, *Green Roofs for Healthy Cities* surveyed our corporate members to learn about how the green roof industry had changed since our first annual survey in 2006. The tremendous interest that the first survey generated made a second one inevitable. As the industry grows, the interest in data on the size, composition and geographic distribution of the industry grows stronger.

As in previous years, GRHC's corporate members felt that it was very important that the information collected be unbiased, accurate and respect the confidentiality of its members so Kendon Light, EA, was hired to administer the results and provide third-party validation.

One of the improvements for this year was that members filling in information about their projects included the street address of the projects when sending the information to Mr. Light, who then checked the addresses to ensure there was no duplication. We will continue to refine the process in the coming years to improve on accuracy, accountability while respecting the confidentiality of our members.

Fourteen completed surveys were received – consistent with the previous surveys in which we received 13 for 2004 and 14 for 2005. Once again, Several of our members were unable to complete the survey because they did not have ability to collect the data requested for various reasons.

We estimate that the actual growth rate significantly exceeds the 24 per cent shown here. The actual number of square feet of completed projects in 2006 in North America is also higher than what is reported here, because of two factors:

- Not all of our members' projects are reflected in the data.
- Our Corporate Members do not currently represent the entire green roof industry. We estimate that this survey captures approximately 75 per cent of the market activity.

GRHC and its member companies will work to improve the rate of participation in the industry association and the

annual survey in 2007. We project much greater increases in industry growth and coverage in the years ahead, particularly as more public agencies begin to invest in this important new infrastructure.

2006 Survey Highlights

Square footage of green roofs completed in 2006 for North America and USA by General Green Roof Type:

	North America Total
Total:	3,064,200 s.f.
- Extensive:	1,957,217
- Intensive:	1,033,196
- Mixed/Semi-intensive:	73,787

Percentage growth in square footage from 2005 to 2006 for North America and USA by General Green Roof Type:

	North America Total
Total:	24%
- Extensive:	10%
- Intensive:	112%

Top ten cities, by square footage planted in 2006:

City	State/Province	Total square footage
1.	Chicago, IL	358,774
2.	Washington, DC	301,751
3.	Wildwood Crest, NJ	240,000
4.	Dulles, VA	230,000
5.	Kansas City, MO	178,008
6.	Phoenix, AZ	168,517
7.	Milwaukee, WI	79,513
8.	New York City, NY	67,898
9.	Portland, OR	64,442
10.	Columbus, OH	58,025

A number of these jurisdictions, such as Chicago, Washington and Virginia have policies and programs in place which support green roof implementation, hence their continued leadership.

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- Influence and win the loyalty of public and private decision-makers; and
- Reinforce your status as an enlightened and visionary corporate citizen.



For more information, please contact Jennifer Sprout: 416-971-4494 or jsprout@greenroofs.org

Propagating Knowledge One Branch at a Time

By Flavia Bertram, GRHC

The Green Roofs *Tree of Knowledge*, a free, searchable database of research papers and GRHC policy summaries, is rooted and growing.

With the addition of numerous papers over the past year and more to come in the next, the *Tree of Knowledge* is becoming the place to post and find research papers and summaries.

It has proven to be a very effective public-education tool about green roof technology. Over the summer months, numerous policy makers, designers and other curious professionals have been elated to discover the existence of this resource. It has not only enabled them to lessen the time spent carrying out basic research, but has also allowed them to focus their efforts on those aspects or processes they wish to pursue.

With the dissemination of green roof information on the rise, GRHC can help ensure the further development of the industry and strengthen its role in the mainstream. After all, knowledge is power.

If you have recently published research or you know of a research paper that has not been included as of yet in the database, you are invited to create a summary using one of our custom templates. For more information or to set up a contributor account please send an email to grtok@greenroofs.org.



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- Extensive corporate recognition through our website (logo and hotlink to your site; website has recorded more than one million hits per month); at our training courses – more than 70 courses presented per year (product samples & contact listing in manuals); at our Local Market Development Symposia – five symposia presented per year (exhibition space; time on the agenda; in the registration kit); at our Annual International Conference (signage; listing in Conference Program); in relevant media releases (usually regionally based)
- Access to green roof professionals for marketing: our current individual membership database totals 4000+ individuals; additional delegate lists from symposia and the conference are distributed to members post event – you can easily anticipate more than 3000 real leads from us in 2007
- Participation on our Corporate Members Committee which appoints a member to sit on our Board of Directors (currently Rick Buist, Landsource Organix), and which helps guide the association in supporting and setting policy in relation to corporate members and their requirements
- Project profiling of members' projects on our website and at symposia and in the bi-annual magazine *Green Roof Infrastructure Monitor™*
- Discounted fees for training, association materials and events, including 50 per cent discount on trade show exhibition at symposia; 50 per cent discount on Training Courses; 25 per cent discount on advertising space in our *Green Roof Infrastructure Monitor™*
- Additional individual memberships – five free individual memberships for distribution to employees at discretion of corporate members

Individual Membership Benefits

\$125 US

- \$25 discount on purchase of one of our four Conference Proceedings CD-Roms
- Contact information and products and services profile on our new searchable online membership database.
- Opportunity to participate on Committees

- Receive the bi-monthly electronic newsletter on the latest green roof developments
- Membership listing in our Members' Directory distributed at the *Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show*.
- Mailed subscription to the *Monitor* – quarterly in 2008!

Sponsored Content

SABMag helps advance green roof cause

by Don Griffith, SABMag



Sustainable Architecture & Building magazine [SABMag] is helping to advance the use of green roofs across Canada. It is written for Canadian architects, engineers, building owners and contractors. Green roofs are a natural fit with SABMag's overall editorial purpose of educating on green building, and celebrating excellence in sustainable design.

SABMag's September/October issue will have a Tech Note article on the basics of green roofs – benefits and construction.

www.sabmag.net

Several of the building case study articles published in SABMag have featured green roofs. One, the extension to the Toronto Botanical Garden, may seem as an obvious choice for a green roof but other projects have included the Toronto Fire and Emergency Training Facility, and the Electronics Arts Building Phase 2 in Burnaby where a green roof was specified as an employee amenity.

SABMag will continue to collaborate with *Green Roofs for Healthy Cities* to communicate the applications and benefits of green roofs in Canada.

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Stormwater Management And Sustainability Education Goes Through The Roof

Mark Hieber, ASLA, LEED AP and Paul Goldsmith, AIA, LEED AP

Expressing a forward-looking image for Lawrence Technological University (LTU) in Southfield, Michigan, the three-story, 42,000 square-foot A. Alfred Taubman Student Services Center with its green roof is LEED certified.

The University's construction programs of the late 1990s had applied a "do no harm" philosophy in terms of stormwater issues. Loss of additional green space was minimized by building over existing parking lots as well as the creation of a detention sediment pond to capture stormwater before entering the Rouge river. By early 2000, the City of Southfield stated that the University's "do no harm" approach was not good enough – the University would need to improve stormwater management before any new construction could proceed.

LTU called in the design firm of Harley Ellis Devereaux and partner companies Spectrum Strategies and GreenWorks Studio to address design, strategic planning and sustainable design opportunities. First, a Strategic Campus Master Plan for the 125-acre campus was developed. Then, a stormwater master plan was developed that focused on innovative stormwater infiltration strategies. A new Student Services Center was identified as the first building for implementation of the new plan, and as a future project, the improvement of the quadrangle.

The 10,000 square-foot sedum covered green roof and greywater cistern that recycles roof water and bioswale stormwater infiltration system are key features of this environmentally friendly building and its adjacent quadrangle. With normal rainfall, about 60 per cent of the water is absorbed by the green roof of the Taubman Student Services Center, while the remainder drains into a 12,000 gallon cistern to be used as greywater for flushing toilets. Over



A. Alfred Taubman Student Services Center (Picture by Ryan Southen)

69 per cent of the Taubman Center roof area is vegetated.

Rich Gagnon of Schreiber Roofing, roofing contractor for the LTU green roof, states, "To not consider a green roof in general is wasteful. It is a civic duty. The gain, the savings, and the amount of retained energy are phenomenal."

"To not consider a green roof is wasteful. It is a civic duty."
– Rich Gagnon, Schreiber Roofing

Working in combination with the green roof to address stormwater management at LTU is a bioswale, ringing the perimeter of the elliptical-shaped quad center lawn. Receiving the surface water from the quadrangle, the bioswale consists of a series of stepped and landscaped weirs that seek to slow water down, infiltrating and cleansing it of nutrients and pollutants before it reaches the piped drainage system that discharges into one of two creeks that run through campus on their way to the Rouge River. The strategy contributes to the regional effort to control stormwater drainage and improve the water quality and biodiversity of this portion of the Rouge watershed. In addition, stormwater will drain down

below grade in the bioswale within 24 hours of a large rain event, preventing the breeding of mosquitoes that require longer periods of standing water.

Working with members of the Department of Civil Engineering, LTU is obtaining data to compare three different roof conditions/colors present on the campus: the light colored, conventional gravel faced built-up roof on the connecting bridge linking the Student Services Center to the Science Building; the

black felt and bitumen roof on an existing boiler house on campus; and the new green sustainable roof of the Taubman Center. Inserting water quantity and quality monitors in existing drains, LTU will assemble data on volume, quality and content of rainwater runoff on the three roofs.

Joe Veryser AIA, Lawrence Tech's University Architect and Associate Dean of the College of Architecture and Design, emphasizes, "At the end of the day, we will answer the City's question – how much better have we made our environment through this project."

LTU's green roof and stormwater management have also resulted in the City looking at the project as a new benchmark for future development in Southfield, and the potential for municipalities, planners, and property owners across the country to see these innovations as a replicable model for the creation of healthier cities.

For the full text of this paper, including greater detail on specific design elements and monitoring initiatives, see GRHC's CD of the proceedings of the 5th Annual Greening Rooftops for Sustainable Communities Conference available at www.greenroofs.org. More information about Harley Ellis Devereaux and partner companies is available at www.harleyellisdevereaux.com.

NRCA, International Code Council and Green Roofs

By Mark Gaulin

Few people in the roofing industry doubt that we are at the beginning stages of enormous change, brought about mostly by the green building movement and the realization that buildings in general (and roofs in particular) play a vital role in conserving energy and protecting the environment.

As those changes occur, the National Roofing Contractors Association (NRCA) understands it has a crucial role to play: providing the best and most current information to its members, serving as an industry advocate and attempting, wherever necessary, to be sure the interests of its members are protected.

One way NRCA protects its members' interests is to be certain new roof systems meet the requirements for industry-accepted codes and standards. When roofing contractors apply roof systems that are not explicitly covered by the relevant building code, they can assume additional liability – so NRCA tries wherever possible to be certain that code language is clear.

That is the reason – and the only reason – for NRCA's recent actions with the

International Code Council (ICC): to be certain its chapter on roof assemblies and rooftop structures applies specifically to green roofs. NRCA has encouraged advocates for and manufacturers of green roof systems to develop and conduct the necessary testing to comply with the relevant section of the code. As an interim step, NRCA suggests the code's alternative materials provisions be used to meet code compliance requirements. Typically, these include Evaluation Reports to substantiate code compliance.

NRCA has been pleased to see the manufacturing community working to develop the standards necessary for inclusion in the International Building Code, and NRCA also hopes to be able to cooperate with those manufacturers and manufacturer associations involved in that effort.

In the meantime, NRCA has published its own Manual of Green Roof Systems, and is preparing to launch a new Center for High Performance Roofing, both very powerful demonstrations of NRCA's commitment to being an important part of the changes that are occurring in the industry.

These changes, of course, go beyond building code requirements. The roofing industry will need to develop new training programs for its new technologies. It will need to identify research needs, and see that the research gets done. It will need to advocate for reasonable positions of public policy. And it will need to be certain the roofing industry continues to own the roof.

Those are efforts that go well beyond the scope of NRCA. They necessarily involve the entire industry, and all of its constituents. As all of these changes develop, NRCA looks forward to working with *Green Roofs for Healthy Cities* and other industry stakeholders to enable the industry to develop while ensuring that its members' interests are protected.

Mark Gaulin is the founder of MAGCO, Inc., a TECTA America company in Jessup, Maryland. Mark is also the Chief Operating Officer for TECTA, and the immediate former president of the National Roofing Contractors Association.

Grow Your Green Roof Library!

Now available to order: 2003 Chicago, 2004 Portland, 2005 Washington, 2006 Boston and 2007 Minneapolis
Greening Rooftops for Sustainable Communities Conference Proceedings - The most comprehensive compilation of green roof information available! Order on-line at www.greenroofs.org

2007	2006	2005	2004	2003
				
	Boston Proceedings Include: <i>Fast Track Permitting and Incentives for Residential Green Roofs in Chicago - and more!</i>	Washington Proceedings Include: Green Roofs and the LEED Green Building System - <i>and more!</i>	Portland Proceedings Include: Plants as Design Elements - <i>and more!</i>	Chicago Proceedings Include: Developing Local Green roof Markets - <i>and more!</i>
Minneapolis Proceedings Include:				

Incentivizing Green Roofs through Parcel-Based Stormwater Fees; Minneapolis Earns Stars and Scars by Charging for Hardscape; City of Toronto Green Roof Design Standard; Lessons Learned from a Green Roof Grant Program in Washington DC; Feasibility of Rooftop landscaping and Agriculture in Urban Hawai'i; Green Roof Establishment in Extreme Conditions: Two Case Studies; Recycling Urban Stormwater: 1050 K. NW Street, Washington, DC; Stormwater Management and Sustainability Education Goes Through the Roof!; Life Cycle Cost Project for Green Vegetative Roofs; Sustainability With Style: The ASLA Headquarters Green Roof; Hot Trends in Design: Chic Sustainability, Unique Driving Factors & "Boutique" Green Roofs; Green Design and Implementation: Vertical Gardens and Living Walls; Monarchs in Metropolis: A Case Study; Fugacity-based Model of NOx within Green Roof Systems; Evaluation the Runoff Quantity and Quality Performance of An Extensive Green Roof in Toronto; The Green Build-out Model: Quantifying Stormwater Benefits of Trees & Green Roofs in Washington, DC; Developing a Web-based Tool for Assessing Green Roofs; Positive Interaction between PV-systems and Extensive Green roofs; The Dynamics and Visual Impact of Herbaceous Perennial Species on a Green Roof; The Psychological and Physiological Stress Relief Effect of the Green Roof; The Effects of Green Roofs in a Sub-Tropical System; Ecoroofs as Habitat? Assessing biodiversity across green roof class - *and more!* **\$ 75 Non-members ; \$ 50 Members**



Your Green Roof Industry Association

Green Roof and Wall Fall & Winter Course Schedule

To register for these courses, visit www.greenroofs.org

Why Become an Accredited Green Roof Professional?

More than 3 million square feet of green roofs were built in 2006 and the demand for experts in the industry is increasing. As an *Accredited Green Roof Professional*, you will be able to distinguish yourself from your colleagues with an understanding of the challenges and special requirements of designing, installing and maintaining a green roof.

The **Green Roof Accreditation Program**, due to be launched in spring 2009, is designed for individuals who want a career in this prosperous, expanding industry. Designers and implementers alike will benefit from understanding the complex requirements of installation. Currently, three of the four courses are available. The fourth, Design for Plants and Growing Medium 401, will be launched in the spring of 2008.

Course Participants receive a complimentary, one-year Individual Membership in Green Roofs for Healthy Cities – a \$125 value!

"If you have any interest in participating in this explosive industry, this program will provide you with a solid foundation from which to implement successful projects. GRHC has taken a leadership role in assembling this critical knowledge base, which can't be found anywhere else."

Jeffrey L. Bruce, FASLA, LEED, ASIC
Jeffrey L. Bruce & Company

Design 101 Introductory Course (2nd Edition)

This course covers the components and benefits of green roofs; how to design a project for maximum client benefits; how to cost estimate; important design principles and designing for maximum LEED™ credits. This course includes the most up-to-date green roof research and design practices as well as award winning case studies.

Tuition: \$395.00

"I found the 101 course very interesting and filled with an abundance of information."

Thomas Bertotti, Project Manager, Bertotti Landscaping Inc.

Design and Installation – 201

(Pre-requisite: Design 101)

This course covers the many different steps that must be understood and incorporated into any successful green roof design and implementation, including actors' roles and responsibilities, construction contracts and their administration, and how to avoid common installation errors. This course is suited to those who have already taken Design 101 or who already have a good general understanding of green roof design.

Tuition: \$395.00

"This course is very informative with regard to the technical aspects of the green roof construction process."

Bruce Zaretsky, Owner and President, Zaretsky and Associates, Inc.

Waterproofing and Drainage – 301

(Pre-requisite Design 101)

This course provides an overview of waterproofing and drainage construction and maintenance for green roof assemblies. It lays out the technical vocabulary and the various benefits of different waterproofing materials and presents detailed design solutions and implementation best management practices for waterproofing and drainage in green roofs.

Tuition: \$395.00

As a landscape architect, it was invaluable to hear how waterproofing and roofing experts view the drainage and waterproofing of green roofs."

Dawn Easterday, ASLA, RLA, LEED, Senior Project Manager/Landscape Architect, Belt Collins Hawaii Ltd.

Green Walls 101 – Introduction to Systems and Design

This course familiarizes participants with existing green wall technologies, their environmental benefits and issues related to their design and construction. It provides design details and exercises on: major functions and components; the various advantages of different green wall systems; market drivers; and designing for maximum benefits and LEED™ points.

Tuition: \$395.00

"Having had a limited understanding of green walls prior to Green Walls 101, the course provided me with a basic understanding of the various systems and their design and construction considerations. This formal introduction has made it possible for me to focus my research more effectively since the course."

Chris Wegscheid, Associate, Cermak Rhoades Architects

Course Locations: Fall & Winter 2007 (check web site, dates subject to change)

Design 101

Portland, OR (Oct. 11)
Baltimore, MD (Oct. 24)
Edmonton, AB (Oct. 24)
Kansas City, MO (Oct. 30)
Charleston, SC (Nov. 2)
Eugene, OR (Nov. 14)
Omaha, NE (Nov. 28)
Cleveland, OH (Dec. 4)
Miami, FL (Dec. 5)
Las Vegas, NV (Dec. 6)
Tampa Bay, FL (Dec. 7)

Design 201

Austin, TX (Oct. 4)
Portland, OR (Oct. 12)
Toronto, ON (Oct. 23)
Calgary, AB (Oct. 26)
Baltimore, MD (Oct. 26)
Atlanta, GA (Nov. 1)
New York, NY (Nov. 2)
Chicago, IL (Nov. 7)
Hartford, CT (Nov. 8)
San Diego, CA (Nov. 14)
Oakland/San Jose (Dec. 11)

Design 301

Boston, MA (Oct. 2)
Denver, CO (Oct. 22)
Portland, OR (Oct. 26)
Cincinnati, OH (Oct. 30)
Raleigh, NC (Nov. 15)
Ann Arbor, MI (Nov. 29)
Baltimore, MD (Nov. 30)
Toronto, ON (Dec. 4)

Green Walls

Chicago, IL (Oct. 15)
Boston, MA (Oct. 17)
New York, NY (Oct. 19)
Washington, DC (Oct. 23)
Vancouver, BC (Oct. 30)
Atlanta, GA (Nov. 8)
Phoenix, AZ (Nov. 13)
Toronto, ON (Nov. 27)

AIA, RCI and ASLA offer 7.5 education credits and others!

www.greenroofs.org



Welcome New Corporate Members

Campbell Enterprises - www.campbellenterprise.com



Campbell Enterprises Inc. is a professional sod producer and installation specialist with over 14 years of experience and 300 acres of sod in production. Campbell Enterprises offers a wide array of turf products including its proprietary blend of Majestic Turf Fescue and Majestic Turf Blue Grass Blend. Campbell Enterprise also offers the latest in turf technology by offering Majestic Clean 'n' Lite washed sod, turf grown on plastic and Turfgrid reinforced sand.

Campbell Enterprises is an innovative leader with proven experience in Green Roof Technology. Campbell Enterprises Inc. also offers a patented erosion control product in our STAYTurf and STAYTurf SS Products. STAYTurf is the only fully vegetative erosion control product in North America. Having passed TTI Testing it offers protection at a flow rate of 51253 gpm, sheer force of 12 psf, and a velocity of 39.75 fps. STAYTurf can be produced with any variety of turf or native grasses to meet site specifications needs. Campbell Enterprises is a family incorporated business whose primary mission is to meet the needs of our customers by offering quality products and service at a reasonable price.

CETCO - www.cetco.com



CETCO waterproofing products have been effectively used in landscaped and "green" roofing structures since the 1970's. We now offer GreenScapes™ greenroof assemblies to combine the performance of our proven waterproofing systems with membranes, drainage, growing media, and plants, all from one source.

CETCO is a diversified construction and environmental technologies company providing innovative, environmentally responsible waterproofing and roofing systems with more than 45 years of experience in over 60 countries. Architects, engineers, specifiers, and contractors know they can depend on CETCO for proven products and technologies. Ultraseal® and Voltex® waterproofing systems have been long recognized for performance and value, while the new Coreflex® waterproofing membrane utilizes active waterproofing technology for an even higher level of performance. And for the ultimate in protection, the HydroShield® Quality Assurance Program provides design assistance, training, approved applicators, inspections services, as well as one of the finest material and labor warranties in the business.

EMCOR - www.emcorgroup.com



A *Fortune 500* company with over \$5 billion in annual revenues, EMCOR Group, Inc. (NYSE: EME) is a global leader in mechanical and electrical construction, energy infrastructure, and facilities services. EMCOR gives life to new structures and sustains life in existing ones by its planning, installing, operating and maintaining the sophisticated and dynamic systems that create facility environments – such as electrical, mechanical, lighting, air conditioning, heating, security and power generation systems – in virtually every sector of the economy and for a diverse range of businesses around the world. EMCOR represents a rare combination of global reach with local execution, combining the strength of an industry leader with the knowledge and care of 140 locations worldwide. The 27,000 skilled employees of EMCOR have made the company, in the eyes of leading business publications, amongst America's "Most Admired" and "Best Performing." EMCOR's diversity – in terms of the services it provides, the industries it serves and the geography it spans – has enabled it to create a stable platform for sustained results.

Fiberweb (Biobarrier®) - www.fiberweb.com



Biobarrier Root Control System combines a controlled release herbicide and a water permeable geotextile fabric to inhibit root penetration into the drainage layer of roof gardens. The product is flexible and can be easily cut with normal scissors. Biobarrier was originally intended to protect low-level nuclear waste sites from tree root intrusion and has been sold in the U.S. and several other countries since 1986. The product has a money back 15-year warranty that roots will not penetrate the fabric and damage any protected area (see warranty copy at Biobarrier booth).

GE / ZENON - www.gewater.com



GE Water & Process Technologies brings over 25 years of experience to the property development industry, delivering simple, reliable and cost-effective onsite wastewater treatment and water reuse solutions. With over 200 wastewater reuse installations worldwide, GE's ZeeWeed Membrane Bioreactor (MBR) Packaged Plants feature state-of-the-art membrane filtration technology that has revolutionized the wastewater treatment industry and is the best available technology to assist you in attaining higher LEED™ certification status. Compact, odor-free, and highly automated ZeeWeed systems consistently produce crystal clear effluent that meets the most stringent water reuse or

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discharge standards. The systems are proven in some of North America's most renowned green buildings including The Solaire, Battery Park City, New York; the Vancouver Convention Centre, British Columbia, and the Lawrence Convention Center, Pittsburgh, Pennsylvania.

Kandiyohi Development Partners - www.kandiyo.com



Working across all sectors, we advance markets in sustainable land use, renewable energy and clean technologies.

- Green commercial and residential buildings
- Renewable energy systems and facilities
- Community planning, urban design and redevelopment
- Eco-industrial development

Kandiyohi Development Partners, LLC is a multidisciplinary development and consulting firm based in Minneapolis, MN that focuses on renewable energy and urban, mixed-used redevelopment projects

Kandiyohi offers a fresh approach for businesses, government and communities seeking green solutions that they can afford to implement and can rely on over time. We help with all the steps necessary to deliver complex projects from conception to completion – vision, design, government and community relations, marketing, project management, financing, and operations consulting.

Our multidisciplinary and multisector experience orients us toward creative, holistic approaches. In addition to experience in professional services, state and local government, non-profits and community groups, the firm's principals have a depth of connections to international networks, keeping us current with the best thinking on sustainable development.

We call on specialty partners as necessary to supplement inhouse capacity. This flexible approach makes Kandiyohi particularly responsive to the needs of projects as varied as neighborhood-level redevelopment and cutting-edge renewable energy initiatives.

Resource Conservation Technology

www.conservaiontechnology.com

Resource Conservation Technology Inc. has supplied advanced green building technology throughout North America since 1984, including a wide range of products related to green roofing. In cooperation with Optigrün of Germany, a world pioneer in green roof technology, we offer a full line of green roof drainage components and accessories. We custom fabricate root-resistant rubber membranes to eliminate most field seams in roofs up to 10,000 square feet, and we supply heat-weldable EPDM sheets that offer state-of-the art waterproofing for larger roofs. We are the market leaders in rainwater collection technology in North America, providing storage tanks, filters, pumps, and control systems to facilitate high performance, low maintenance solutions for rainwater filtration, storage, and reuse.

Tournesol Siteworks - www.tournesolsiteworks.com



Whether on, in, or around, Tournesol Siteworks's complete range of commercial-grade siteworks products enhances a building and its environment with fully integrated, end-to-end solutions, from our groundbreaking Container Irrigation Systems to our selection of standard and custom hanging planters, pots, furnishings, and environmentally sound green roof components.

We believe that putting a green roof system up should be made simpler, not more complex. We offer a wide range of green roof trays for modular installations at a fair price. While we can provide you with the support you need, we don't insist that our product is part of a system sale like most other manufacturers do. If you need help with other components, we can help you to find reliable, reasonably priced supply partners.

Every product we manufacture is fully supported with all-around service. Our inhouse sales team will help you identify the best solution for your needs, while our regional representatives help ensure that the solution you've chosen works in your building environment and continues to meet your satisfaction from installation and beyond.

Zinco USA - www.zinco-usa.com



Since 1957, ZinCo Group has been the leading international pioneer in designing and manufacturing extensive, intensive, and hybrid green roof systems. Headquartered in Germany, ZinCo Group has offices in over 17 countries throughout Europe, Asia, and North America, including the United States. We install over 15 million square feet of green roof systems annually on commercial, residential, industrial, and institutional buildings. Our full range of services provides developers, architects, contractors and other industry professionals with a one-stop-shop for designing, developing, and installing green roof systems.

ZinCo products – particularly our well-known Floradrain® drainage layers – have been used widely in the United States since the mid-1990s. In 2006, ZinCo Group established a U.S. Division – ZinCo USA, Inc. – to better serve the full range of green roofing needs in the United States. Through ZinCo USA, based in Newton, Massachusetts, a wide range of the time-tested and proven ZinCo products will be available directly for U.S. projects. Such products include Floradrain® FD25 for the Sedum Carpet build-up, Floradrain® FD40 for the Ornamental Sedum and Perennial Garden build-ups, Floradrain® FD60 for intensive Roof Garden build-ups, Georaster® for the Pitched Sedum build-up (slopes up to 35°), Stabilodrain® for Recreational Parks on rooftops, and Elastodrain® for Driveways build-ups that need to support heavy traffic.

Green Roof and Related Events

Green + Design Conference and Expo: Oct. 1 – 2, 2007 in Atlanta, Georgia

With the demand for incorporating eco-friendly elements into design exploding, Green + Design Conference and Expo will provide designers, architects and project managers information on the products, services and methods that will help them implement these concepts. The Green + Design exposition floor will feature over 15,000 square feet of exhibit space dedicated to green products used in sustainability design. Attendees will learn about environmentally aware design methods and have access to the products and services that will help them achieve their objectives. see www.greendesignexpo.com.

The 7th Annual Environmental Performance Summit: Oct. 3 – 5, 2007 in Arlington, Virginia

Measuring and managing performance in environmental and natural resource programs in government.

Featuring four comprehensive tracks:

- Show Me the Measures
 - Partnering for Performance
 - Performance Management Systems
 - Public Transparency on Environmental Performance
- Visit www.performanceweb.org/environment.

2007 ASLA Annual Meeting & EXPO Oct. 5 – 9, 2007 in San Francisco, California

Join us in San Francisco for what is sure to be the largest gathering of landscape architecture professionals ever held! This year's event will offer an unparalleled location, exceptional education sessions, tours of San Francisco's amazing landscape architecture, the biggest product EXPO in the industry, and the opportunity to connect with leading landscape architecture professionals from around the world. Visit www.asla.org.

25th Anniversary Excellence in Building Conference & Expo: Oct 9 – 11, 2007 in St. Paul, Minnesota

In 1982 a handful of passionate building professionals had a vision for building homes that respected the resources of the planet and the

individuals who lived in them. Through their commitment to the gathering and disseminating of building science education, the Energy & Environmental Building Association began. While sharing their knowledge and passion, they changed the way homes were being built in America. We will honor the accomplishments of these individuals, share their knowledge and challenge one another to continue the quest to build "houses that work."

See www.eeba.org/conference.

GRHC Local Market Development Symposia

Omaha October 25

Las Vegas November 12

For more details, updates or to register, please visit www.greenroofs.org

BCA Convention and Exposition:

Oct. 14 – 16, 2007 in Jacksonville, Florida

Riding on the success of last year's event, the Building Commissioning Association (BCA) will be hosting the 2007 BCA Convention & Exposition, already one of the major industry events on the calendar. Commissioning providers, building operators, facility managers and construction professionals will come together for this exceptional educational and networking opportunity. To reflect the growth and diversity of the commissioning industry, the BCA will be expanding this year's agenda to include tools and technologies, education for owners and providers, and the business side of commissioning. Join us! Visit www.bxca.org/events/expo2007.

Greenscapes – Sense and Meaning: Oct. 18 – 21, 2007 in St. Catharines, Ontario

We welcome submissions for an international and interdisciplinary conference on gardens and designed landscapes. This conference will bring together scholars from all disciplines and a wide range of professional

landscape architects, urban planners, activists and artists to discuss the subject of 'The Garden in the City.' As a living space, the garden is often considered to be the antithesis of the urban, built area, yet increasingly cities seek to incorporate garden space into their infrastructure as part of their urban density. The conference will explore the ramifications of this development, while examining ways in which urban garden space in contemporary and historical environments acts a focus for social aspirations and anxieties. Visit www.brocku.ca/greenscapes.

Canadian Sustainable Operations Summit: Oct. 28 – 30, 2007 in Niagara on the Lake, Ontario

The invitation-only summit will bring together key leadership from Canada's largest and most influential organizations to promote various initiatives that benefit both the environment and the bottom line. See www.sustainableoperationssummitcanada.com for more information.

Toronto Regional Green Building Festival: Oct. 24 – 25, 2007 in Toronto, Ontario

GBF 2007 is a two-day event focused on bringing green building to the mainstream. This year's program, Building Performance, Building Value looks at the real world impacts of green building. The Green Building Festival Conference presents the very best of green building design and execution with a focus on proven performance and value. Visit www.greenbuildingfest.com.

Ecological Landscaping: From Scientific Principles to Public Practices & Policies: Oct. 28 – 31, 2007 in Cleveland, Ohio

This conference seeks to bring together a diversity of people interested in the environmental and sociocultural aspects of urbanized landscapes and provide a venue for sharing, discussing and synthesizing information about the study and practice of urban landscape design and management. A key focus will be on fostering discussion of issues from multiple disciplinary and management perspectives. The central objective of

Green Roof and Related Events

the conference is to explore how ecological and sociocultural principles derived from basic research can guide on-the-ground practices of sustainable urbanized landscape design management and the development of public policies that foster such practices. This conference will be distinguished from others by its emphasis on implementation and integration of scientific principles into the real-world design and management of urbanized landscapes. Visit www.oardc.ohio-state.edu/ulep/Conference.htm.

ASA-CSSA-SSSA Annual Meeting: Nov. 4 – 8, 2007 in New Orleans, Louisiana

The International Annual Meetings of the American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA) bring together 3,500+ people from 50+ countries representing academia, government and private industry, including a large contingent of undergraduate and graduate students. ASA's Centennial celebratory spirit will be highlighted throughout the meetings with a dessert cruise and reflections on the history of ASA with special events, featured speakers, and historical displays. For information about the annual meeting, see www.acsmeetings.org.

Greenbuild International Conference and Expo: Nov 7 – 9, 2007 in Chicago, Illinois

The U.S. Green Building Council's Greenbuild is an opportunity to connect with peers, industry experts, and influential leaders as they share insights on the green building movement and its diverse specialties. At Greenbuild 2007 the theme will be "Accelerating Green Communities." The conference includes educational sessions, exciting speakers, special events and tours, and an exhibit hall. Visit www.greenbuildexpo.org.

Symposium on Building Envelope Technology: Nov 8 – 9, 2007 in Boston, Massachusetts

The Symposium on Building Envelope Technology is a two-day educational program offering cutting-edge

information regarding design, construction, maintenance and repair of modern and/or aging older building envelopes.

The event's open, inclusive environment encourages attendees to ask questions and stimulates dialogue. Speakers offer relevant solutions by referencing real-world examples and specific case histories. See www.rci-online.org/symposium.html.

Build Boston 2007: Nov 13 – 15, 2007 in Boston, Massachusetts

Build Boston is a regional tradeshow and convention for the design and construction industry, attracting suppliers of building technologies, products and services. The conference is for architects, specifiers, contractors, engineers, interior designers, renovators, facility managers, building owners and other professionals in the design and construction industry. Visit www.buildboston.com.

Canadian Waste and Recycling Expo Nov 28 – 29, 2007 in Vancouver, British Columbia

Join us this November in Vancouver and connect with industry peers, network with buyers and prospects, see the latest innovative products and services and be educated and entertained at our informative seminars and industry networking functions. This event will draw thousands of buyers representing collection, hauling, disposal service companies; construction / demolition companies; consultants / engineers; facility / site operators; ICI (industrial, commercial & institutional); landfill operators; manufacturers with waste streams; property managers; recycling coordinators; transportation / fleet maintenance personnel; waste managers; federal, provincial and municipal government employees responsible for waste management and public works; airport managers; road supervisors; lawyers related to the sectors; industry publishers and industry associations. See www.cwre.ca.

Green California Schools Summit: Dec. 4 – 6, 2007 in Pasadena, California

The Green California Schools Summit and Exposition will include over 190 exhibit spaces and showcase areas, more than 80 breakout sessions and 10 pre-conference workshops, and a model green school building constructed in the center of the exhibit hall floor. The event will focus on the strategies, technologies and services that will ensure that new and existing public schools are models of sustainability and provide healthy learning environments for the students. Visit: www.green-technology.org/gcschools

Ecobuild Fall and AEC-ST Fall Dec. 10 – 13, 2007 in Washington, DC

Ecobuild Fall and AEC-ST Fall covers green building, sustainable design, renewable energy, environmental planning processes and information collaboration strategies for commercial, industrial, institutional and residential construction. See www.ecobuildamerica.com.

USCC's 16th Annual Conference and Tradeshow: Feb. 9 – 12, 2008 in Oakland, California

The US Composting Council will be hosting the 16th Annual National Composting Conference and Exposition. During this time, the Marriott, Oakland City Center, Oakland, California, will attract the largest group of composting and organics professionals in the country to participate in a comprehensive program of workshops, training courses, and educational and technical sessions designed specifically to provide you with the information needed to solve your composting challenges. Join us for the largest conference and exhibition in North America for the composting, wood waste and organics recycling industry. Visit www.compostingcouncil.org.

23rd RCI International Convention & Trade Show: Feb. 28 – Mar. 4, 2007 in Phoenix, Arizona

Convention & Trade Show will be held at the Hyatt Regency Phoenix Hotel and Phoenix Convention Center and will mark the 25th anniversary of RCI. Visit www.rci-online.org.

New Board of Directors for GRHC

By Peter Lowitt, Chair

In August 2007, the Board of *Green Roofs for Healthy Cities* renewed itself with the election of two new corporate members and the appointment of two new members who will Chair the Research and Policy committees.

Special thanks to outgoing members – Leslie Hoffman, Monica Kuhn and Steve Skinner – who helped us during the early years in our association's development. Your knowledge and expertise will be missed, but we look forward to working with you in other ways as we continue to develop this industry.

Our new board is multidisciplinary (members' bios follow) providing considerable depth and breadth of expertise and knowledge.

Richard J. Buist, President, Landsource Organixs Ltd., Hornby, Ont.

For over 20 years, Richard has been involved in the horticulture industry, mostly as an entrepreneur developing and starting businesses from start-up to sale. During this time, he has also been active in training and development in both an official and volunteer capacity. Currently chairing the Growing Media sub-committee, Richard will now assume the Chair of the Corporate Member committee.

Peter D'Antonio, National Sales Manager, Sika Sarnafil Inc., Canton, Mass.

Peter is the National Sales Manager for waterproofing at Sika Sarnafil, responsible for a large and growing sales organization with significant sales revenue. A large percentage of the company's growth over the past five years is a direct result of the expansion and success of its' green roof system project development. As both a green roof advocate and successful entrepreneur, Peter recognizes the immense value that GRHC brings to a membership that needs state of the art technology and continuing education. He has served as a board member for both SWRI and CSI and will be Chair of our new committee on Membership.

Karen Moyer, Environmental Coordinator, City of Waterloo, Waterloo, Ont.

Karen Moyer is an ISA Certified Arborist with 16 years municipal experience. Currently, she holds the position of Manager of Special Projects with the City of Waterloo. Her education includes diplomas in forestry, transportation engineering and GIS specialist training. She is involved with the development and implementation of Waterloo's environmental strategic plan as well as watershed monitoring. Recent projects include managing research for Waterloo with an emphasis on promoting sustainability such as

green roofs, alternative fuel studies and wind energy. Karen is the President of the Ontario Chapter of the International Society of Arboriculture and the recipient of the 2005 GRHC Civic Award of Excellence. She will be Chairing the Policy committee.

Paul Kephart, Executive Director, Rana Creek, Carmel, Calif.

Restoration ecologist and resource planner Paul Kephart joined Rana Creek in 1996 and founded what we know now as Rana Creek Habitat Restoration and Living Architecture. Paul has more than 20 years of comprehensive consulting experience in land-use planning and resource management. A trained biologist, Paul has a profound understanding of natural processes, sustainability, and how they impact our developed landscapes. Through botanical surveying, biological assessment, project mitigation, land management planning and land-stewardship programs, he uses art, ecology and science to reclaim our natural resources. Paul is uniquely committed to restoring biodiversity in our cities and suburbs. As a registered contractor and horticultural expert, he works closely with architects, contractors, and landscape design teams on the multifaceted process of land use, permitting and sustainable site design. Paul will Co-Chair the Research committee with Dr. Brad Bass of Environment Canada.

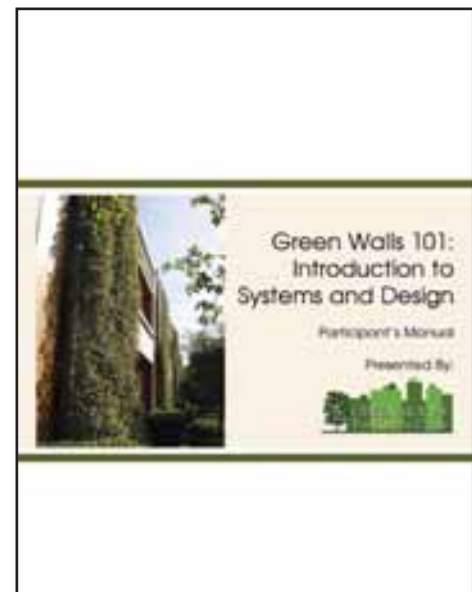
New Green Wall Introductory Course Launched

By Steve Peck, GRHC

Last year, manufacturers of various green wall systems came together to form a Green Wall committee, Chair by Reuben Freed, of GreenScreen. The first project they agreed on was to join forces to develop a comprehensive green wall course that can be used by a wide variety of designers and implementers. Green walls convey many of the same benefits of green roofs, without the same structural loading issues. This course, which is taught by green wall design experts Randy Sharp, L.A., Sharp and Diamond and George Irwin, who has worked in the landscape contracting industry for over 20 years. The course will cover the following:

- Different green wall technologies, such as living walls and green facades;
- Benefits of green wall systems;
- Cost factors associated with green walls; and
- Design principles and options for green walls.

See page 33 for dates and locations.



Green Roofs, the Blue Planet and Making Choices

By Ed Snodgrass, Emory Knoll Farms



We live on a planet dominated by water and whether we are aware of it or not we interact with water all the time. For those of us that work with

green roofs, water is in our lexicon. We use water to establish plants on the green roof, we use green roofs to retain stormwater, we design green roofs to dampen peak flow and we hope green roofs will help with water quality. Keeping all these perspectives and relationships can be a daunting task. It is impossible to optimize all these different performance criteria at the same time in the same design, and of course make them look like beautiful gardens. We do have to make design choices. I have been talking lately with Dr. Bill Hunt at N.C. State University and with Dr. Rob Berghage at Penn State University, both experienced green roof researchers, about these choices.

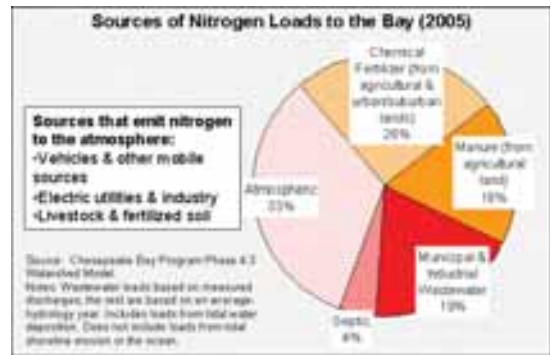
The first thing to consider is that you cannot completely separate these things when thinking about green roof design and performance. For example, even a green roof that seemingly performs

poorly on a water quality analysis test can still be very effective for overall water quality. That is because you can't separate nutrient loading from the volume and velocity of the water coming off a roof. A roof that is only discharging 30 to 40 per cent of the volume of stormwater that would normally discharge, can be at twice the nutrient loading of rain water and still result in discharging fewer overall nutrients in the watershed.

The second thing to consider is your local conditions. For example, in the Neuse River watershed in North Carolina, urban storm water accounts for only about eight per cent of the nitrogen loading with agriculture contributing 50 to 60 per cent. If you greened all of the available rooftops in the urban area (assuming eight per cent have the loading capacity), the portion of nitrogen loading from green roofs would represent far less than one per cent. Hence, focusing on relatively minor nutrient loading from green roofs to the detriment of other green roof performance areas doesn't make sense from an ecological perspective. This is not an invitation to put plant

material on a roof that can only survive with regular and high levels of chemical fertilizer, but rather, a call to build healthy green roof growing media appropriate to the design intent of the roof and to assure long-term plant health.

I feel strongly that we, as green roof professionals should consider the context in which we are working and that design intent should be defined as clearly as possible. There will always be trade-offs in design, let's try to make the most of our green roof efforts. Clearly we, as an industry, are a long way off from having a measurable impact on our stormwater problems. We need to count green roof area in square miles not square feet for that to be the case, but let's understand where our green roof systems are most effective while we are still a relatively small industry.



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