

A photograph of a person wearing a striped zip-up jacket and dark pants, watering plants in a raised garden bed on a rooftop. The person is holding a red watering can, and water is spraying from the nozzle onto green plants and pink flowers. The background shows a brick wall and some bare tree branches.

# LIVING ARCHITECTURE MONITOR<sup>®</sup>

A GREEN ROOFS FOR HEALTHY CITIES PUBLICATION

VOLUME 16 / ISSUE 3 / FALL 2014

## INNOVATION ISSUE

On the Roof With...Leaders in Water Innovation  
Confessions of a Green 'Starchitect' —Lois Vitt Sale  
Female Leadership in Green Roofing  
Plants That Respond Well to Design Challenges  
GRPs on Innovation Trends





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VOLUME 16  
ISSUE 3  
FALL 2014

# INSIDE

## FROM THE FOUNDER /

1 CALL FOR INNOVATION

## STRATA /

2 GREEN ROOF ADVOCACY  
3 REINVENTING GROWTH

## ON THE ROOF WITH /

4 ON THE ROOF WITH ... LEADERS IN WATER INNOVATION: Warren Gorowitz, Lynda Wightman and Jeffrey Bruce discuss water and green infrastructure innovation

## POLICY AND STANDARDS /

10 LOOKING BACK, LOOKING FORWARD: Reflecting on green roof developments in San Francisco, looking towards Nashville

## RESEARCH /

12 JOURNAL OF LIVING ARCHITECTURE: Issue 4

## PROFILES /

14 DESIGN LEADERSHIP - CONFESSIONS OF A GREEN 'STARCHITECT': Award-winning green architect Lois Vitt Sale shares her thoughts on industry innovation

17 GRP LEADERSHIP - GREEN ROOF LEADERSHIP: 600+ Green Roof Professionals share their thoughts on green roof and wall innovation

18 PLANT - BEYOND THE USUAL SEDUMS: Searching outside the box for green roof plants that respond well to design and climate challenges

20 CONFERENCE - NASHVILLE GREEN: Explore the theme Water: The Key to Everything Green in Nashville this November

24 PROJECT - STEEP CHALLENGE: Lakeside residence in North Carolina gets a green roof solution for its steep site

28 PROJECT - REVOLUTIONARY GREEN: The Clients Speak! about their innovative green infrastructure projects

## GRHC UPDATE /

32 NEW CORPORATE MEMBERS  
34 GRHC BUYER'S GUIDE

## ON SPEC /

35 WOMEN IN A ROOFER'S WORLD: Encouraging female leadership in green roofing

ON THE COVER: A tiny rooftop space at an urban elementary school in New York City, is transformed into an outdoor science classroom, incorporating environmental science lessons into the K-3 science curriculum. There is a kid friendly rainwater storage device. Students track weather patterns, temperatures and rain events, as they gain a preliminary understanding of the impact stormwater issues and management can have on their lives. This innovative project was the winner of the 2014 NY ASLA Design Merit Award; designed by Liz Pulver, landscape architect and designer. Image provided by: Brennan Burke

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VOLUME 16 / ISSUE 3 / FALL 2014

LIVING ARCHITECTURE MONITOR IS PUBLISHED FOUR TIMES PER YEAR BY  
GREEN ROOFS FOR HEALTHY CITIES ([WWW.GREENROOFS.ORG](http://WWW.GREENROOFS.ORG))

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## MISSION

Green Roofs for Healthy Cities' mission is to develop and  
protect the market by increasing the awareness of the eco-  
nomic, social and environmental benefits of green roofs,  
green walls, and other forms of living architecture through  
education, advocacy, professional development and celebra-  
tions of excellence.

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# CALL FOR INNOVATION

One of the reasons I chose to dedicate much of my professional life to greening the building industry and not say, the agriculture or auto sector, is due to its rapid capacity for change and innovation. Green roofs, walls and other forms of living architecture not only have the potential to revolutionize the building industry, but also to help address some serious global challenges, such as drought, flooding and the rising urban heat island. While most people remain ignorant of these threats, many continue to seek innovative solutions in technology, research and policy.

At GRHC, we have been working hard on projects to help create innovative policy and resources for the green roof and wall industry.

This year, we've held local Green Roof Market Development Symposia in Piedmont, St. Paul, Atlanta and Grand Rapids to help convince governments to adopt policies that support green roof and wall installations, which in turn address climate change mitigation and adaptation. These events led to the formation of several Task Forces charged with developing tailor-made policies to support market development locally. This policy work has been supported by our Corporate Leaders Firestone, Columbia Green, Rooflite, Sempergreen, Vegetal ID and Carlisle. In June, we developed and delivered a

free webinar, *Best Practices in Green Roof Policy Implementation*. More than 200 people attended the webinar which is recorded for your use (<http://vimeo.com/99829551>). We are also continuing to work with national organizations to advocate for policies that support the implementation of all forms of living green infrastructure.

For more than five years, we have been developing a core body of knowledge and training around implementing technologies that allow designers and engineers to work towards the goal of achieving Net Zero Water on sites and buildings. This research is led and supported by Jeffrey L. Bruce & Company, Ewing and Hunter. In Nashville, we will be presenting this work in a two-day Net Zero Water Boot Camp on November 11-12 to

kick start *CitiesAlive*. In Nashville, we are also planning a technical workshop on the *Living Architecture Performance Tool*, which aims to create a comprehensive set of performance criteria and metrics for green roof and wall technologies. This tool will act as a catalyst for innovation and more holistic design practices.

This is your challenge, your call to action! Get involved—advocate for policy innovation in your community, implement new research

and integrate innovative design solutions into your next project. Innovation in all forms is essential to the future development and prosperity of the green roof and wall industry and perhaps our very civilization!

Sincerely,



Steven W. Peck, GRP  
Founder & President, GRHC

## THE LAM INDEX: INNOVATION

7,528

US patent applications in environment related technologies from 2008 to 2010

33

Number of North American cities with dedicated green roof and/or wall policies, incentives and/or guidelines

4,045

Certified LEED Platinum projects in the United States

28%

Cost decrease for green roofs and walls in 2017 due to industry innovation

18

Number of Certified Living Building Challenge projects

695

Number of people who have passed the Green Roof Professional exam

Source list: <http://goo.gl/jwNX6>.



# GREEN ROOF ADVOCACY

BY: PAUL ERLICHMAN

This year has been busy for Green Roofs for Healthy Cities' (GRHC) advocacy efforts. With two successful Green Roof Symposia events completed, and one on the horizon, our objective to grow green roof awareness in emerging markets and strengthen supportive policy is paying off.

In March, GRHC partnered with American Rivers, the West Michigan Environmental Action Council and the Lower Grand River Organization of Watersheds to host the *Grand Rapids Green Roof Market Development Symposium*. A Green Roof Task Force, with the objective of delivering recommendations to the City of Grand Rapids on ways that the city can support green roof implementation through policy and programming, was formed as a result of the event. For more information on this Task Force, contact Nate Griswold of Inhabitect,

Inc. at [nate@inhabitect.com](mailto:nate@inhabitect.com).

In June, GRHC partnered with the Minnesota Green Roofs Council to host the *Minnesota Green Roof Symposium: Protecting Our Watersheds*. The Twin Cities and surrounding regions face numerous stormwater management issues. Speakers presented both case studies of successful green roofs in Minnesota and efforts to use green infrastructure policy to alleviate stormwater concerns. A Green Roof Task Force also resulted from this event. For more information on this Task Force, contact Angie Durh-

man of AD Greenroof LLC at [angie@adgreenroof.com](mailto:angie@adgreenroof.com).

The final symposium will be held in Atlanta at Southface's Home Depot Foundation Training Center on September 15, 2014. The event will feature speakers such as Cory Rayburn, environmental program manager at the City of Atlanta, Chris Faulkner, senior planner at the Atlanta Regional Commission and more. Contact Paul Erlichman at [perlichman@greenroofs.org](mailto:perlichman@greenroofs.org) for more information and visit [www.greenroofs.org](http://www.greenroofs.org) to see the program and to register.

*Paul Erlichman is the membership coordinator at Green Roofs for Healthy Cities.*

## FIND OUT MORE

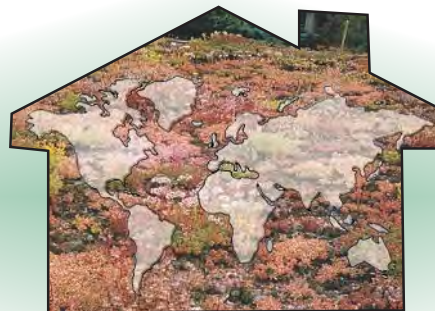
To download reports from these Symposiums, visit: <http://goo.gl/w89vuq>.

GRHC held a free webinar as a part of its Living Architecture Webinar Series on *Best Practices in Green Roof Policy Implementation*. Watch it for free at <https://vimeo.com/99829551>.

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# REINVENTING GROWTH

BY: VINCENT JAVET

Green Roofs for Healthy Cities, the Ontario Parks Association, Landscape Ontario, and the Green Infrastructure Ontario Coalition are pleased to announce the successful completion of the design charrette component of *Reinventing Growth – The Community Green Infrastructure Planning and*

LEFT: JOHN STREET LOOKING SOUTH IN OSHAWA  
Image provided by: Google

RIGHT: CONCEPTUAL REDESIGN OF STREETScape WITH GREEN INFRASTRUCTURE  
Design by: Vincent Javet

THE CHARRETTES WERE FULL-DAY MULTI-DISCIPLINARY EVENTS FOCUSING ON THE CONCEPTUAL REDESIGN OF TWO TO THREE NEIGHBORHOODS WITHIN EACH COMMUNITY.

*Evaluation Project.* The project is a research and community engagement initiative supported by the George Cedric Metcalf Charitable Foundation. Green infrastructure design charrettes were held in partnership with the City of Vaughan, City of Oshawa and City of London as well as at *Grey to Green* in Toronto.

The charrettes were full-day multi-disciplinary events focusing on the conceptual green infrastructure redesign of two to three neighborhoods within each community. The design charrettes brought designers and community leaders together to envision a greener future in Southern Ontario and beyond. Each of the designs will be analyzed for their

costs and benefits through an innovative Cost Benefit Matrix customized for each community. To learn more about the ideas generated from the project, read the comprehensive project report at [www.greeninfrastructurefoundation.org](http://www.greeninfrastructurefoundation.org) in October.

*Vincent Javet is a senior researcher at Green Roofs for Healthy Cities.*

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ON THE ROOF WITH...  
LEADERS IN WATER INNOVATION

WARREN GOROWITZ,  
LYNDA WIGHTMAN  
AND JEFFREY  
BRUCE DISCUSS  
WATER AND GREEN  
INFRASTRUCTURE  
INNOVATION

INTERVIEWED BY: STEVEN PECK



We're entering an innovative time for green infrastructure: energy-generating roofs, vertical forests, net zero water and more. Leading edge research, design and policy discussions around the topic of net zero water innovation will fill the rooms and corridors of the Omni Hotel at *CitiesAlive* in Nashville this year, where the theme of the event is *Water: The Key to Everything Green*. As we approach the conference, we spoke to three water and green infrastructure leaders to give us a sample of what to expect at *CitiesAlive* this November: Warren Gorowitz, vice president of sustainability at Ewing Irrigation, Lynda Wightman, industry relations manager at Hunter Industries and Jeffrey Bruce, owner of Jeffrey L. Bruce & Company.

WHAT DOES THE THEME WATER: THE KEY TO EVERYTHING GREEN MEAN TO YOU?

**LYNDA:** Water is our most valuable resource. Without it, we can't exist. Water keeps our green environments alive and thriving. By being stewards of

this valuable resource, we can direct our future in many ways.

**JEFFREY:** Most of the ecosystem benefits derived from green infrastructure are directly attributable to water. As the world's most precious

resource, I would expand the theme to say Water: The Key to Everything. Considering the challenges society is facing with degradation of natural systems, our only course of action is mitigating the impacts with green infrastructure

which requires a much wiser use of water.

WHAT ARE SOME OF THE CHALLENGES THE WATER INDUSTRY IS FACING WITH REGARDS TO WISE WATER MANAGEMENT AND ITS ABILITY TO

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# WHEN WATER IS PRICED ACCORDINGLY, PEOPLE WILL VALUE IT MORE AS A PRECIOUS RESOURCE.

WARREN GOROWITZ

## MANAGEMENT AND ITS ABILITY TO SUPPORT GREEN INFRASTRUCTURE DEVELOPMENT IN CITIES?

**WARREN:** Green infrastructure development often requires out of the box thinking. Our water policies in many cases are ancient. Alternative water sources will be integral to the future development of green infrastructure. Onsite treatment of waste water for reuse, especially for vegetated areas needs to become a priority and be more cost effective.

**LYNDA:** Energy and water go hand in hand. Unfortunately, many policy decision makers don't understand this correlation. Lack of education is probably the number one challenge that we all face, while trying to deal with the many policies and procedures that are being mandated at a

regional level. New, efficient irrigation equipment is being developed and installed, but until the basic contractor/designer is educated on the purpose of the product and proper installation techniques, water waste will continue to take place.

**JEFFREY:** One of the biggest challenges is revising water rights laws. A few states consider rainfall that falls on your roof as water of the state. This prevents the individual from harvesting or impounding water on their property and using it. Another challenge is recognizing the beneficial use of graywater and adjusting the health codes to better align to the risks associated with its use.

**IF YOU COULD CHANGE ONE PUBLIC POLICY GOVERNING WATER, WHAT WOULD IT BE?**



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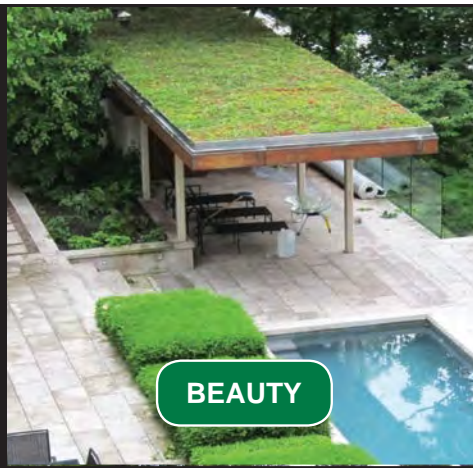
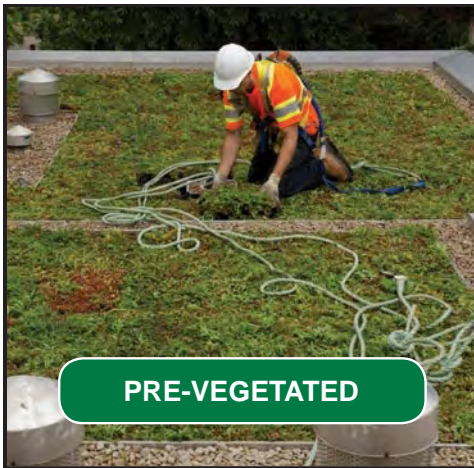


RIGHT: JEFFREY L. BRUCE

Image provided by: Steven Peck / *The Rise of Living Architecture*

**WARREN:** Water pricing. It's quite a complicated and controversial topic, but we need to revisit how water is priced in North America. When water is priced accordingly, people will value it more as a precious resource. In the political realm it's difficult to advocate for raising water prices.

**JEFFREY:** Waste or harvested water can very quickly become classified and subject to regulation which limits its use. Developing a classification system which allows water to be more broadly classified so that different waste water sources could be blended or combined would begin to provide the economic basis to implement the reuse of water on a much wider scale.



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**BRINGING NATURE  
BACK TO THE CITY**





LEFT: WARREN GOROWITZ  
Image provided by: Ewing



RIGHT: LYNDA WIGHTMAN  
Image provided by: Hunter Industries

EXAMPLES OF INNOVATIVE GREEN INFRASTRUCTURE PROJECTS THAT HAVE ACHIEVED NET ZERO WATER OR THAT HAVE MOVED CLOSE TO THIS GOAL?

**WARREN:** The International Living Future Institute has some great resources on their website including best management practices and a guide to navigate the regulatory pathway towards net zero

water.

**JEFFREY:** We are living in an exciting time in terms of water innovation. There are hundreds and hundreds of initiatives at the federal, state and local levels that are attempting to validate the concept of net zero water. Two of the more prominent initiatives are the Department of Defense program to make eight army bases net zero water and a

250,000 square foot multiuse development in Portland attempting to achieve net zero water.

WHY IS WATER SO IMPORTANT TO YOU? HOW DO WE CONTINUE TO BUILD THE INDUSTRY AND SPUR INNOVATION IN POLICY AND DESIGN?

**WARREN:** Water is life! Without water we can't survive. As net zero water projects and other innovative projects are built, we have to take the time to highlight them, create case studies and educate everyone on their benefits and how they work. At some point this just becomes the way projects are constructed and it becomes the norm.

**LYNDA:** Water is what makes us tick. There are many jobs related to the water industry—both landscape and agriculture. More education is required.

**JEFFREY:** The more interesting

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# WATER IS WHAT MAKES US TICK. THERE ARE MANY JOBS RELATED TO THE WATER INDUSTRY — BOTH LANDSCAPE AND AGRICULTURE.

Lynda Wightman

**JEFFREY:** The more interesting fact to consider when looking at wastewater of all types is that a huge volume of water goes unaccounted for in our system. If we can be creative and innovative in managing and treating these sources of water, we can find all the water we need for green infrastructure without increasing demand.

**WHY ARE YOU SUPPORTING THE DEVELOPMENT OF GREEN ROOFS FOR HEALTHY CITIES' NET ZERO WATER BOOT CAMP TRAINING? WHY IS DESIGNING FOR NET ZERO IMPORTANT?**

**WARREN:** Ewing has been supporting the Integrated Water Management program since its inception because we believe that it's the best educational program out there to provide detailed training and knowledge for green industry professionals. The new Net Zero Water Boot Camp training gives the participant a complete education on how to design for net zero water. The manuals that were developed with this class are top notch. Without this program and its focus, future developments will be limited by their water availability.

**JEFFREY:** The green movement has set its sights on water rightfully so, but it has misunderstood the role of water in the urban context. I am of the belief that it is unlikely that the promise of green infrastructure can be achieved in such highly disrupted urban systems without allowing water to be directed to green infrastructure. Net zero becomes the primary mechanism whereby green infrastructure obtains the water it depends on simply by diverting and treating wastewater sources. Its benefits all involved.

*Steven Peck is the president and founder of Green Roofs for Healthy Cities.*

## FIND OUT MORE

Attend *CitiesAlive: Green Roof & Wall Conference, Water: The Key to Everything Green* in Nashville, Tennessee, November 12-15, 2014.  
[www.citiesalive.org](http://www.citiesalive.org)

Attend the launch of the Net Zero Water Boot Camp training in Nashville November 11-12, 2014.  
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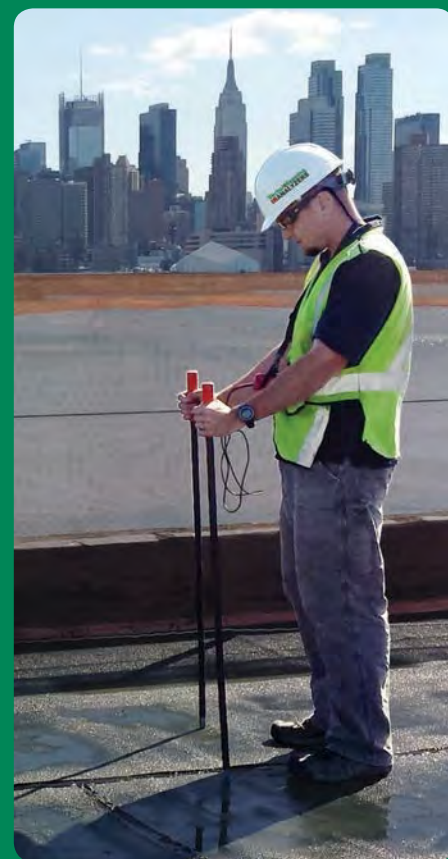


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# LOOKING BACK, LOOKING FORWARD

## REFLECTING ON GREEN ROOF DEVELOPMENTS IN SAN FRANCISCO, LOOKING TOWARDS NASHVILLE

BY: JEFF JOSLIN AND REBECCA DOHN

Every year Green Roofs for Healthy Cities takes its annual *CitiesAlive: Green Roof & Wall Conference* to a new city, to engage local designers, bring together industry leaders and affect local green infrastructure policy. Here we reflect on green roof policy development in San Francisco (where we hosted *CitiesAlive* last year) and look forward to how *CitiesAlive* can help affect change in Nashville this November.



### SAN FRANCISCO

San Francisco has some of the most expansive, pioneering, renowned and architecturally integrated green roofs in the world. However, it lags behind other environmentally progressive cities in green roof programs, policies and proliferation. Following the *CitiesAlive: Green Roof & Wall Conference* held in San Francisco in October of 2013, the City is now working actively to improve that part of the story.

The mere anticipation of the conference initiated the coming together of agencies, advocates and trade representatives. The process was facilitated by SPUR, a local

policy and planning organization. The result: an aspirational document. *Greener and Better Roofs: A Roadmap for San Francisco* underscores the benefit of green roofs for the city, offers a broad-brush overview of relevant activities elsewhere, and outlines an action plan to assess opportunities, obstacles and a sequence for future action. Announced at the conference, the City's Planning Department has begun to move forward with implementation.

The City is establishing a Green Roof Task Force consisting of representatives from a range of City agencies. Planning staff have been dedicated to work



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LEFT: CALIFORNIA ACADEMY OF SCIENCES GREEN ROOF IN SAN FRANCISCO, CALIFORNIA

Image provided by: Rana Creek

ABOVE: FREEMAN WEBB BUILDING GREEN ROOF IN NASHVILLE, TENNESSEE

Image provided by: Rebecca Dohn

the development of a draft green roof manual, targeting policies and regulatory approaches best suited to San Francisco, framing a public outreach program and initiating a city green roof mapping effort.

San Francisco is looking forward to the day when it will be lauded not just for an array of innovative projects, but also for inventive and effective implementation of regulatory tools equally worthy of study and emulation. With current efforts under way, that day is not too distant.

#### NASHVILLE

In the last five years, Nashville has made strides towards its goal of being the greenest city in the Southeast. All city projects are required to obtain LEED Silver and a Green Infrastructure Master Plan was developed to identify the potential benefits of green stormwater strategies in the combined sewer system. Nashville's most recent push for green infrastructure, the Green Roof Rebate, provides a generous credit of \$10 per square foot for new green roofs.

Unfortunately, not one entity has taken the city up on its offer. There are many

possible reasons for the lack of interest: unfamiliarity with green roof technology, the perceived risk of leaks, limited qualified projects, or the additional cost of installation and maintenance. However, the main cause may be the format of the rebate. It is offered as a credit against a property's sewer bill for five years after the completion of construction. This makes the rebate more attractive to current owners and developers that will own the property, than those who are building for a client or on speculation.

With *CitiesAlive* coming to Nashville this November, the discussion ramps up. As Nashville moves onward to its goal of green, it hopes to launch additional mechanisms to promote and encourage all forms of green infrastructure throughout all its watersheds.

*Jeff Joslin is the director of current planning for the City and County of San Francisco.*

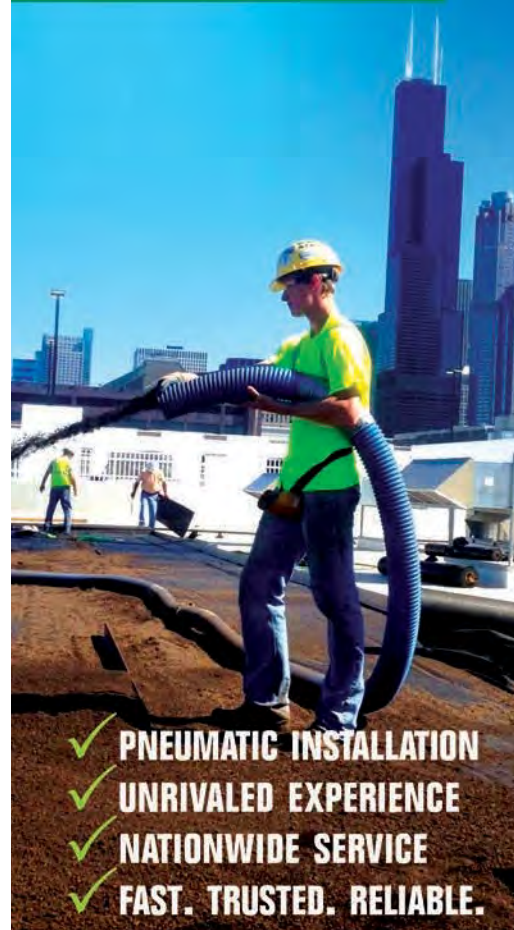
*Rebecca Dohn is an environmental compliance officer at the Metropolitan Government of Nashville & Davidson County.*

## FIND OUT MORE

*Greener and Better Roofs: A Roadmap for San Francisco:* <http://goo.gl/V5JJS>.

*CitiesAlive*, Nashville, Tennessee, November 12-15, 2014 [www.citiesalive.org](http://www.citiesalive.org).

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# JOURNAL

## OF LIVING ARCHITECTURE

*The Journal of Living Architecture* (JOLA) is the official, peer-reviewed journal of Green Roofs for Healthy Cities, an interdisciplinary trade and professional organization, linking research, design and policy with the industry.

The JOLA is written, reviewed, and edited by living architecture research professionals, sharing with their colleagues: successful educational applications, original research findings, scholarly opinions, educational resources and challenges on issues of critical importance to living architecture professionals and educators.

The JOLA is published exclusively on the *Living Architecture Monitor* magazine website. The magazine publishes the abstracts of each published JOLA manuscript, with a link to the full paper online.

# ISSUE NO.4

### RESEARCH IN BRIEF

#### **Substrate loss is minimal in vegetated and un-vegetated extensive roof modules over a 14-month period**

K. Laminack, B. Dvorak and A. Volder

The presence of vegetation is thought to reduce loss of soil substrate after roof installation; however, few attempts have been made to quantify this effect. Twelve green roof modules placed at a 2% slope were used to quantify the effect of wind, precipitation intensity, vegetation and vegetation type on modular green roof substrate depth. The presence of vegetation reduced substrate loss immediately after installation of equipment, yet had little effect on substrate depth once the substrate had settled. Neither wind speed nor precipitation rate had a direct effect on substrate depth, although after some large rainfall events substrate depth increased due to media

expansion caused by the retained water. Overall we observed negligible substrate depth decrease, regardless of vegetation presence, wind speed or precipitation intensity.

Read the entire paper here: <http://goo.gl/o1bk54>.

See what green roof and wall research was published in other journals from May 2014 to July 2014: <http://goo.gl/jwNX6>.

Green Roofs for Healthy Cities is currently soliciting Expressions of Interest from qualified research groups for Living Architecture Performance Tool (LAPT) White Paper development. Please find the Call for Expressions of Interest here: <http://goo.gl/sj7jPJ>.





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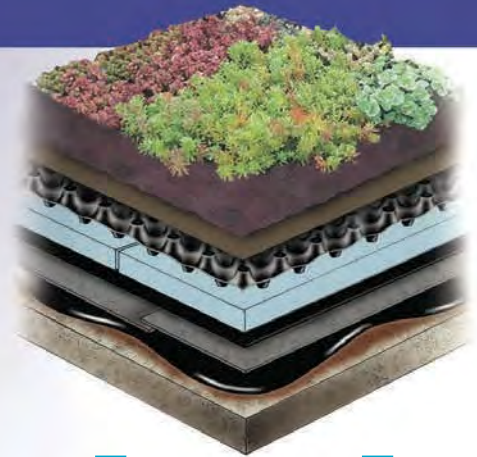
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DESIGN LEADERSHIP PROFILE

# CONFESSIONS OF A GREEN STARARCHITECT

AWARD-WINNING GREEN ARCHITECT LOIS VITT SALE  
SHARES HER THOUGHTS ON INDUSTRY INNOVATION

INTERVIEWED BY: JENNIFER FODEN WILSON





LOIS VITT SALE ON THE GREEN ROOF THAT COVERS HER ILLINOIS HOME.

*Image provided by: Brad Temkin / The Rise of Living Architecture*

For over two decades, Lois Vitt Sale has been committed to utilizing and promoting sustainable design solutions. Vitt Sale, the senior vice president and chief sustainability officer at Wight & Company, an integrated design and construction firm based in Chicago, has over 70 LEED accredited projects in her portfolio and counting. She has worked extensively on developing the green building industry, including teaching for the US Green Building Council and co-chairing the Green Roofs for Healthy Cities' executive committee that is developing the Living Architecture Performance Tool, a consensus-based performance criteria and metric system for all major types of living architecture.



WHAT IS YOUR PROUDEST ACCOMPLISHMENT/PROJECT?

I could count my achievements based on the number of green buildings I have designed or teams to whom I have served as a resource. With some thought, I could translate my work into avoided carbon, gallons of water saved or tons of waste diverted from landfills. I could count the number of healthy environments I have helped to create. But, by far my proudest achievement is the number of people I have helped educate about green buildings.

WHAT IS THE BIGGEST OBSTACLE FOR DESIGNERS AND ARCHITECTS TO OVERCOME WHEN AIMING FOR LEED GOLD OR PLATINUM?

Not beginning soon enough in the design process to account for achieving LEED Gold or Platinum. In order to achieve LEED Platinum, the intention to embed sustainability must be woven into the project's DNA.

WHAT WAS THE DRIVING FORCE TO INSTALL A GREEN ROOF ON YOUR HOME IN ILLINOIS?

What would you rather see when you look out of your window—an asphalt roof or a garden? I had an opportunity to create something beautiful that also provides ecosystem services. And as the roof is sloped (6:12) and visible to the public, I had the opportunity to show my neighbors that rooftops could be more than just a way to keep out the rain.

WHY ARE YOU CO-CHAIRING THE COMMITTEE THAT IS WORKING TO DEVELOP THE LIVING ARCHITECTURE PERFORMANCE TOOL? AS A LEADING DESIGNER, WHY IS THE TOOL IMPORTANT TO YOU?

I firmly believe that living architectural systems provide multiple benefits in the built environment. And yet, as a designer, it is very hard to put metrics to those benefits so that our clients understand why they should pay the premiums for the integration of these systems. And there is very little guidance to designers about the design of those living systems. I think the Living Architecture Performance Tool is needed to provide this guidance. My goal is that more and more buildings will integrate these systems into our architecture and we will understand their contributions.

WHAT DO YOU THINK IS THE MOST INNOVATIVE DEVELOPMENT IN BUILDING DESIGN PRACTICE TODAY? WHAT DO YOU THINK IT WILL BE TOMORROW?

I think we practice in a time where the development of technology helps us see our buildings in three dimensions, take tours of the places we will build, run building construction sequences and collision detection, daylight models and predicted energy use. The suite of tools that is rapidly developing to bring our buildings to life in design is really gaining in momentum and pushing the design and construction industry forward. These tools help us to communicate to our clients and understand the environments we are creating better than ever.

What will tomorrow's innovation be? I hope the innovation will be to develop new tools and new thinking that studies and predicts how buildings work in community. Instead of thinking of a building as a standalone project and place, I hope we will be able conceive buildings as part of a fabric—like a tree in a forest instead of on its own, not only for its environmental function, but also for its contributions to creating healthy communities.

*Jennifer Foden Wilson is the editor of the Living Architecture Monitor magazine.*

## FIND OUT MORE

Living Architecture Performance Tool: <http://goo.gl/gbwY2X>.



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# GREEN ROOF LEADERSHIP

WE ASKED 600+ GREEN ROOF PROFESSIONALS TO SHARE THEIR THOUGHTS ON GREEN ROOF AND WALL INNOVATION

WHAT ARE THE MOST INNOVATIVE GREEN ROOF AND WALL PRODUCTS IN THE MARKET?	WHERE ARE EMERGING NORTH AMERICAN GREEN ROOF AND WALL MARKETS?	WHAT GREEN ROOF AND WALL DESIGN TRENDS DO YOU SEE HAPPENING IN THE MARKETPLACE?
<p>STREAMLINED WATERPROOFING ASSEMBLIES</p> <p>ELECTRONIC LEAK DETECTION</p> <p>RETENTION DRAINAGE SYSTEMS</p> <p>NEWLY EMERGING SOIL MIXES</p> <p>MOVEABLE GREEN WALL SECTIONS</p>	<p>DENVER</p> <p>MISSISSAUGA</p> <p>WATERLOO</p> <p>VANCOUVER</p> <p>PHILADELPHIA</p> <p>NEW JERSEY</p> <p>CALGARY</p> <p>BOSTON</p> <p>ASPEN</p> <p>WASHINGTON</p> <p>CHATTANOOGA</p> <p>SAN FRANCISCO</p> <p>TORONTO</p> <p>NEW YORK</p> <p>CHICAGO</p>	<p>IRRIGATION</p> <p>GREENHOUSES</p> <p>FOOD PRODUCTION</p> <p>GREEN FACADES</p> <p>LIVING WALLS</p> <p>NATIVE SPECIES</p>

*Size indicates frequency of mentions.*







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# BEYOND THE USUAL SEDUMS

SEARCHING OUTSIDE THE BOX FOR GREEN ROOF PLANTS THAT RESPOND WELL TO DESIGN AND CLIMATE CHALLENGES

BY: MARGUERITE WELLS

Plant people like me are always looking for new plants to introduce to the market and new ways to use the same old plants. Green roofs and walls have been an exciting new venue for horticulturists to explore, since familiar plants behave differently on roofs and walls than they do at grade. Green roofs and walls also offer a new environment to learn about different plants than one might otherwise get to know

in more traditional gardening circumstances.

Some green roofs receive no long term irrigation, but in certain climates in the United States, that is impossible if plants are to survive. Irrigation of a green roof can be a good outlet for greywater reuse and other site runoff, if it is harvested. Using greywater is of increasing interest in the drive to make sites more sustainable, but it often comes with soaps

and salts in it that can kill many plants over time.

Another idea is to design a green roof for zero-runoff. Not many roofs can take the weight loading that implies, but some can. Some older urban buildings were built to have 'swamp coolers' on their roofs (no drainage), making a pond on the roof to cool the building, long before air conditioning was invented. These buildings are great candidates

for zero-runoff green roofs. Both greywater irrigation and zero-runoff conditions can lead to salt build up in the growing media that might be flooded or dry. Two plants have been tried successfully in these conditions: one is a familiar green roof plant to many; the other is less used on roofs but familiar to any beach-goer.

The genus *Portulaca* has a number of species, both native and not, which are very



LEFT: AMMOPHILA

Image provided by: Marguerite Wells

RIGHT: PURSLANE

Image provided by: Karen/Flickr

drought-tolerant, love the heat, and can stand a great deal of salt. *P. oleracea* is a common weed, known as *purslane*, and found in many gardens and green roofs. It is often cultivated for salads; and outside North America, *purslane* is a common cooked and fresh green.

*Portulaca pilosa* is native to Florida, Mexico and the Caribbean. *P. grandiflora* is the common cultivated type with many flower colors; and is native to Brazil. Because they are not hardy after frost, *portulacas* should not be the dominant species on roofs in cold climates. However, their brilliant colors and love of heat and salt mean they are a good member of a mixed species palette. They can be planted as seeds or plugs; and are fast growing plants. They do self-sow freely and tend to return year after year.

*Spartina alterniflora* is a familiar plant to anyone who has enjoyed a coastal wetland—where tidal pools and streams



## AS WE CONTINUE TO GROW AS AN INDUSTRY, WE NEED TO CONTINUALLY PUSH THE ENVELOPE OF WHICH PLANTS WE CAN USE IN RESPONSE TO DESIGN AND CLIMATE CHALLENGES.

flow: the expanse of grasses are almost entirely made of *Spartina*. The other coastal grass, the common dune grass (that inhabits the edge of beach and land) is called *Ammophila breviligulata*. *Spartina* and has much greater tolerance of standing water and *Ammophila* is better with dry conditions. Both are graceful, native, easy to grow and incredibly salt-tolerant.

They have been trialed on some experimental green roofs, and have shown themselves to be tough and resilient. Both plants grow readily from seed, however, it is most common to plant them as plugs on green roofs, and let them spread into dense stands.

As we continue to grow as an industry, we need to continually push the envelope of which

plants we can use in response to design and climate challenges like flooded conditions or excess salt. Horticulturists can help to expand the plant palette used on green roofs, beyond the usual sedums, into the broad range of native species North America has to offer.

*Marguerite Wells is the owner of Motherplants.*

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# NASHVILLE GREEN

EXPLORE THE THEME WATER: THE KEY TO EVERYTHING GREEN IN NASHVILLE THIS NOVEMBER



TOP: NIGHTLIFE IN NASHVILLE, TENNESSEE  
Image provided by: Jeffrey Salazar

BOTTOM: MUSIC CITY CENTER GREEN ROOF  
IN NASHVILLE, TENNESSEE  
Image provided by: Greenrise Technologies

Water, essential to the cycle of life, is a hot topic on the minds of a range of sustainable building professionals seeking solutions to mitigate the impacts of climate change. Come to *CitiesAlive* to explore the new technologies, evolving policies, inspiring designs and emerging approaches to address onsite and district-scale water management.

Join us in Nashville, a rapidly expanding marketplace with one of North America's best green roof rebates. Gain practical tools for harvesting, treating, distributing, storing, using (and reusing) water on site at the launch of our new Net Zero Water Boot Camp. Hear from over 60 expert speakers, and meet them later over BBQ and beer to expand your professional network. View the incredible Music City Center and its 4 acre green roof, and tour other local green roof and wall projects. See and hear about new technologies and services at the *CitiesAlive* industry trade show. Celebrate excellence in integrated design and installation, and outstanding contributions in research and policy, at the Green Roof & Wall Awards of Excellence. All while earning up to 11.5 continuing education units.



# CITIESALIVE ITINERARY AT A GLANCE

ALL CITIESALIVE PROGRAMMING TAKES PLACE AT THE OMNI NASHVILLE HOTEL UNLESS OTHERWISE INDICATED

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## TUESDAY NOVEMBER 11

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8:30 am – 5:00 pm Net Zero Water Boot Camp Day 1 (at Civic Design Center)  
Announcing the launch of a Net Zero Water Boot Camp at *CitiesAlive*, a comprehensive 2-day program that adopts a net zero water approach to harvesting, treating, distributing, storing, using and reusing water on site.

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## WEDNESDAY NOVEMBER 12

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8:30 am – 5:00 pm Net Zero Water Boot Camp Day 2 (at Civic Design Center)  
10:00 am – 12:00 pm Green Roof Professional Exam  
1:00 pm – 5:00 pm Green Roofs for Healthy Cities' Corporate Members Committee Meeting  
2:00 pm – 6:30 pm Registration Open  
6:00 pm – 8:00 pm Opening Plenary and Keynote – Nancy Stoner, Office of Water, EPA (invited) and Scott McGaughy, Greenrise Technologies  
The Great Debate: To irrigate, or not to irrigate? THAT is the question! Featuring Lois Vitt Sale, Wight & Company, Lynda Wightman, Hunter Industries and Vanessa Keitges, Columbia Green Technologies

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## THURSDAY NOVEMBER 13

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7:30 am – 5:00 pm Registration Open  
7:00 am – 11:30 am Exhibitor Move-In  
8:30 am – 10:00 am Sessions #1 - Research, Design, Policy, 'On the Roof With' ("The Politics of Water")  
10:00 am – 10:30 am Coffee Break  
10:30 am – 12:00 pm Sessions #2 - Research, Design, Policy, 'On the Roof With' ("Green Walls Panel")  
12:00 pm – 2:00 pm Trade Show Opens / Lunch on Trade Show Floor  
12:15 pm – 2:00 pm Poster Session  
2:15 pm – 3:45 pm Sessions #3 - Research, Design, Policy, 'On the Roof With' ("Tools to Make the Economic Case for Green Roofs")  
4:00 pm – 5:15 pm Awards of Excellence  
5:15 pm – 7:00 pm Dedicated Trade Show Floor Time

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## FRIDAY NOVEMBER 14

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7:30 am – 5:00 pm Registration Open  
9:00 am – 10:30 am Sessions #4 - Research, Design, Policy, 'On the Roof With' ("Selecting the Right Waterproof Membrane")  
10:30 am – 11:00 am Coffee Break  
11:00 am – 12:30 pm Sessions #5 - Research, Design, Policy, 'On the Roof With' ("What Makes a Green Roof?")  
12:30 pm – 2:30 pm Trade Show Opens / Lunch on Trade Show Floor  
2:30 pm – 6:00 pm Exhibitor Tear Down  
2:45 pm – 4:15 pm Sessions #6 - Research, Design, Policy, 'On the Roof With' ("Best Practices for Rooftop Farming")  
4:30 pm – 5:30 pm Closing Plenary  
5:30 pm – 8:00 pm Closing Networking Reception: BBQ at the Whiskey Bent Saloon  
Nashville is famous for country music and BBQ. Enjoy both at the *CitiesAlive* Closing Reception at the Whiskey Bent Saloon.

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## SATURDAY NOVEMBER 15

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8:30 am – 12:00 pm Morning Training Courses - Living Architecture & Sustainable Energy / Introduction to Rooftop Urban Agriculture  
8:30 am – 4:30 pm Full Day Training Courses - Green Roof Waterproofing & Drainage / Green Roof Plants & Growing Media  
9:00 am - 12:00 pm Living Architecture Performance Tool Technical Workshop  
9:00 am – 12:00 pm Walking Tour  
9:00 am – 12:00 pm Bus Tour  
9:00 am – 4:30 pm Green Roofs for Healthy Cities' Committee Meetings  
1:00 pm – 4:30 pm Afternoon Training Courses - Green Walls 101: Systems Overview & Design / Advanced Green Roof Maintenance

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# STEEP CHALLENGE

LAKESIDE RESIDENCE  
IN NORTH CAROLINA GETS A  
GREEN ROOF SOLUTION FOR  
ITS STEEP SITE

BY: DAVID AQUILINA



## GREEN ROOF MAINTENANCE

The green roof installer, Living Roofs, Inc., made ten maintenance visits during the first year. They now visit the roof six times a year. The roof is irrigated with water from the lake from early May to early October. At every visit, Living Roofs tests the automated irrigation system for proper coverage, pressure and timing and adjusts it for seasonal temperatures and rainfall. They shut off the system and winterize it in the autumn. The maintenance routine includes yearly soil testing and fertilization. "The upper slope along the ridgeline dries out more quickly than lower portions of the vegetative field," said Emilio Ancaya, GRP, co-founder, Living Roofs, Inc. "We anticipated that, watched it carefully, and in the first year, adjusted the irrigation pattern to more frequent, short bursts of water."

With 646 acres of surface area and a 14-mile shoreline, Lake Toxaway is the largest private lake in North Carolina. Situated at an elevation of about 3,000 feet in the Appalachian Mountains in the western part of the state, Lake Toxaway is adjacent to more than 10,000 acres of wilderness areas.

The couple from Nashville knew what they wanted (and what they didn't) for their new seasonal home on the lake. "Many other homes on the lake look like they belong on a broad expanse of ocean beachfront, not nestled on a serene lake in the mountains," said the homeowner. In short, they wanted a home that would be modern yet fit into the natural surroundings.

The 6,700 square foot (sf) home features natural materials that complement its setting and makes full use of its unique location. Windows across the length of the home face the southern vista out over the lake. To provide enjoyment throughout the day and into the evening hours, the home also offers views to the west toward the adjacent rock face and

**THE ARCHITECT HAD AN INSPIRATION: A VIEW OF A GREEN ROOF, RATHER THAN PLAIN ROOFTOP, FROM THE ROAD WOULD HELP VISUALLY INTEGRATE THE HOME INTO ITS SETTING.**

sunsets over the mountains.

The lot on which the home is situated is narrow and steep, dropping down from the road to the lake. The floor of the house is 20 feet below the road. That makes the top of the roof level with the roadway. With the dimensions of the home, a long expanse of roof is visible

from the road and driveway entrance. The architect had an inspiration: a view of a green roof, rather than a plain rooftop, from the road would help visually integrate the home into its setting.

Roof slope angle is a significant design factor in any green roof project. Roofs sloped

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PREVIOUS SPREAD: GREEN ROOF ON LAKE TOXAWAY HOME

Image provided by: Xero Flor America

RIGHT: GREEN ROOF STABILIZATION GRID

Image provided by: Xero Flor America

from 10 to 45 degrees require green roofs with more depth and specialized components to retain and stabilize the growing medium layer against erosion and slippage. Thus, the 3:12 slope of the roof on the Lake Toxaway required a stabilization solution.

“Before the growing medium was added, a supplemental stabilization grid was integrated within the green roof assembly. It was installed over the water retention fleece and anchored on the aluminum edging at the perimeter of the roof,” said Clayton Rugh, Ph.D., general manager and technical director, Xero Flor America. “The cells of the grid hold the growing medium on

the slope.”

After considerable discussion, a six-species plant palette was selected for the 3,959 sf green roof project. The six species provide sufficient diversity, and the *Sedum spurium* and *Sedum album* give the roof reddish colors in the fall. The green roof also enhances the lake’s water quality: it annually prevents an estimated 99,850 gallons of stormwater from

running off into Lake Toxaway. The green roof was completed in April 2012 and has been through three growing seasons. “We cannot imagine our wonderful home without the green roof,” said the homeowner. “It just wouldn’t be the same.”

*David Aquilina is a business communications professional who represents Xero Flor America.*

## FIND OUT MORE

Green roof installation video:  
<http://ow.ly/wyho9>.



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# REVOLUTIONARY GREEN

## THE CLIENTS SPEAK! ABOUT THEIR INNOVATIVE GREEN INFRASTRUCTURE PROJECTS

INTERVIEWED BY: JENNIFER FODEN WILSON

**FRANCISCO ZAMORA,**  
DIRECTOR, COLORADO RIVER DELTA  
LEGACY PROGRAM, SONORAN  
INSTITUTE

**DANICA DJURKOVIC,**  
DIRECTOR OF FACILITIES  
PLANNING AND DEVELOPMENT,  
CITY OF VANCOUVER

### WHAT INSPIRED YOU TO TAKE ON THIS PROJECT?

**FRANCISCO:** The Sonoran Institute, with our partners, is involved in creating a new recreation-oriented community park in Baja California, Mexico on the Colorado River corridor about 45 miles south of Yuma, Arizona. Using local

resources, we are transforming depleted, underutilized land into a destination-style community park. The project was inspired by our desire to reconnect communities and people to the wonders and benefits of nature. Our idea is that if we can engage and build local appreciation for the natural assets

of a community, such as water, river-ways and wildlife, these resources become the building blocks for jobs, economic activity and community building.

**DANICA:** In a context of The City of Vancouver and Vancouver Park Board Facilities long-term renewal plan and our

commitment to sustainability to become a Greenest City by 2020, VanDusen was a perfect location to create a living building. The Visitor's Centre is designed to be self-sustained, off the grid and with the net zero impact to the existing eco system. It was important that City show leadership in sustainable

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VANCOUVER, BRITISH COLUMBIA

OPENED 2011

DANICA DJURKOVIC, DIRECTOR OF FACILITIES PLANNING AND DEVELOPMENT, CITY OF VANCOUVER

buildings, particularly because of the significant educational value for the many visitors of the botanical garden.

**WHY IS THIS PROJECT INNOVATIVE?**

**FRANCISCO:** This project is innovative because it will only succeed through local engagement and ownership. We are directly involving nearby communities and their residents in

the required restoration activities to transform a depleted area into a lush, thriving place for tourism and recreation. In addition, the project links the economic benefits it generates through restoration job opportunities to the quality of life of nearby communities.

**DANICA:** This facility is designed to be net zero energy, with a combination of solar

and geothermal systems in place to generate heating and electricity. Natural ventilation in a building is enhanced by a “heat sink”—the asymmetrical perforated aluminum panel installed inside the glazed oculus. When possible, local resources were utilized. Rainwater collected on the roof is used for toilets and landscape irrigation through on-site percolation. Stormwater from the entry

plaza is channeled through a small creek where plants act as a biofilter to remove contamination in wastewater. Blackwater and greywater are being treated on site and reused. The planting/grasses as well as the growing medium on the green roof were carefully selected to provide a relatively maintenance free roof. A green roof that could survive the wet and dry climates of the Pacific



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FRANCISCO ZAMORA,  
DIRECTOR, COLORADO  
RIVER DELTA LEGACY  
PROGRAM,  
SONORAN INSTITUTE



*Image provided by: Francisco Zamora / Sonoran Institute*

Northwest without the need of irrigation. This was as much of a technical response to the Living Building Challenge as it was also an aesthetic choice that results in a roof that changes dramatically and naturally through the seasons.

**GIVEN THE INNOVATIVE NATURE OF THIS PROJECT, HAVE YOU ENCOUNTERED ANY CHALLENGES THAT YOU HAD TO OVERCOME?**

**FRANCISCO:** We expected challenges since community-building that is sustainable takes

time. We initially encountered vandalism at the site, but we are experiencing this less and less as the community becomes engaged and takes ownership and pride in the park. Local volunteers worked to educate community members.

**DANICA:** Due to the Federal funding, tight timelines required fast track delivery of a fairly intricate building. The project team had to be creative and use innovative approach to pre-fabricate roof panels complete with insulation, most

# ReNew

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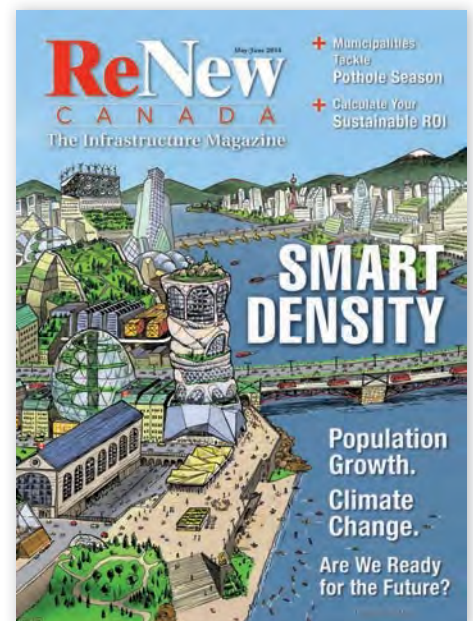
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DESIGN SCHEMATIC OF VANDUSEN BOTANICAL GARDEN GREEN ROOF

Image provided by: Perkins + Will

mechanical and electrical services, including finishes. Architects, engineers and contractors used 3D modeling to design and deliver the complex nature of the roof forms. These panels were pre-assembled in an off-site plant, shipped and installed on site in a record timeline.

WHAT ARE SOME OF THE PERFORMANCE BENEFITS OF THIS PROJECT?

**FRANCISCO:** There are several economic, social and environmental benefits to this project, including, but not limited to employment generation, tour-

ism and recreation, increasing property value, community building, improving the quality of life and creating habitat.

**DANICA:** Interpretive material within the building helps to inform and educate visitors of the building's innovative and sustainable systems, as well as the importance of plants, diverse ecosystems and conservation.

*Jennifer Foden Wilson is the editor of the Living Architecture Monitor magazine.*

FIND OUT MORE

To read about the teams who worked on these projects visit: <http://goo.gl/jwNX6>.



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**Left:** Eco-Mat being installed on a 1.5 acre hospital green roof in San Diego, CA.



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# WOMEN IN A ROOFER'S WORLD

## ENCOURAGING FEMALE LEADERSHIP IN GREEN ROOFING

BY: ANGIE DURHMAN

I entered the workforce with an academic education in green roof research. Over the years, I found tremendous value networking in the green building industry, attending cross-disciplinary conferences, communicating with industry colleagues and volunteering on environmental boards. Should someone want to enter the industry and become a leader, it takes a blend of intellectual credibility and passion to succeed. I don't expect any contracts because my company holds WBE (woman-owned business) certifications; but would rather get hired based on my success from hard work, years of experience and connections within the industry.

I think one main reason our industry is considered "male-dominated" is many large construction companies have found it beneficial to sell green roof systems. Historically, the roofing industry has filled the workplace with men because of labor challenges and family businesses being passed down. Traditionally, women's roles tend to be more administrative and navigating the "good 'ol boy" world can be challenging. Female project managers and executives are starting to rise up in these firms, however.

During the design and construction phase of projects, I am often the only female at those meetings, and am usually remembered as being the "green gal." This

is an advantage, as there are usually certain expectations put on me as the project manager that I'm often prepared for. By taking the time to get to know certain folks ahead of time, understanding their motivations, and connecting them to others in the group, I can often build a solid team and push the creative design without needing to do all the work myself. Another advantage is that women are often rational problem solvers, and we think holistically when making decisions. For example, firms often enjoy designing with the right products to achieve performance goals that can also be installed efficiently. We create marketing campaigns utilizing social media to highlight the owners' missions—which provides a much needed value-added service—and can provide complete maintenance services to maintain performance goals.

Construction is only one part of our industry. Green Roof Professionals (GRPs) are involved in many aspects of projects. My consulting firm works with advocate agencies, architects, sustainability groups and policy makers. Unlike the construction field, these agencies tend to have more balanced diversity, with room for advancement based on experience.

The green roof industry can do a better job encouraging women to enter the field by way of mentoring, exposure in college

ANGIE DURHMAN

*Image provided by: Metropolitan Council, St. Paul, MN*

and recruiting. For example, my firm AD Greenroof hires interns who have some knowledge of green roofs from class, and then provides them with project training. This brings real world experience to the intern, as well as networking opportunities. Other women in our industry may be more inclined to help each other out or find that working as a team may be more beneficial in certain cases. However, younger professionals (regardless of demographic or gender) should not be "entitled" to a job. In addition to a degree, work experience and communication goes a long way in my book, and likely other future employers.

While females are a minority in the industry, we should be able to find abundant opportunities. If you have the education and experience, and communicate in a professional manner, there should be no reason you cannot become a successful green roof leader.

---

*Angie Durbman, GRP is the owner of AD Greenroof LLC. She is also chair of the Minnesota Green Roof Task Force.*





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