LIVING ARCHITECTURE MONITOR®

A GREEN ROOFS FOR HEALTHY CITIES PUBLICATION

VOLUME 17 / ISSUE 2 / SUMMER 2015

CITIESALIVE TAKES ON NYC

OCTOBER 5-8, 2015

ADVANCED AGENDA INSIDE!

WATER ISSUE

Exploring Green Roof Stormwater Modeling Tools

How Washington is Managing Stormwater Through Policy

Confessions of a Green Designer—Eric Corey Freed

+ Can New York City Become The Greenest City in the World?

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VOLUME 17
ISSUE 2
SUMMER 2015

INSIDE

ON THE COVER: Forensic Lab building green roof in Washington, DC.
Image provided by: District Department of the Environment

LIVING ARCHITECTURE MONITOR®

VOLUME 17 / ISSUE 2 / SUMMER 2015

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

NO BLUE, NO GREEN

Ahhh California! A mecca for cool people and lifestyles, an engine of high tech innovation and one of the most important bread baskets of North America, is now firmly in the grip of an unprecedented four year drought. According to NASA scientists, the state has a one year of reserve of water supply left with no signs of significant relief on the horizon. California produces over 55 major food commodities for export, including almonds, walnuts, dairy products, grapes, strawberries and beef. Each of these products takes water to produce, so exporting food is in effect exporting water. To sustain agricultural production as surface water has dried up, ancient aquifer water reserves are being depleted, so much so that in some areas of the Central Valley the land is sinking by as much as a foot each year in response to water withdrawal. Water levels in dams are now so low that the Sacramento Utility District estimates less than half of the normal hydroelectric power will be produced in 2015 and will have to be replaced by natural gas generation resulting in energy price increases.

Voluntary water conservation measures have recently been replaced by mandatory restrictions in urban areas. Urban vegetation is usually the first victim when severe droughts occur. Lawns shrivel up and die, followed by shrubs and trees. These landscapes cannot be sustained without massive water inputs.

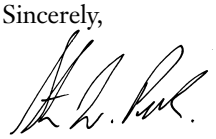
The green roof industry has been preparing for drought conditions for some time. Because extensive green roofs are often harsh and dry environments, they typically utilize sedums, which are naturally drought tolerant. For more than a decade we have encouraged designers to use multiple species of sedums and other plants for additional resilience, and to employ cisterns to capture excess stormwater runoff to use as irrigation during dry periods.

Under the leadership of Jeffrey L. Bruce & Company, with funding and technical support from ASIC, Ewing and Hunter, we have just completed training courses for the design, installation and management of systems that move us toward net zero water use in buildings and landscapes. We've looked at water holistically, exploring all possible sources, what type of treatment methods are needed, what type of storage methods make sense in different applications, how to budget for water use and treatment. The material is technical and complex, but the stakes are also very high. You can register for the full two day Net Zero Water Boot Camp in New York City during *CitiesAlive* in October. We also have plans to put the courses online where they will be easily accessible by the end of this year.

Engineers and designers have an important role to play in developing buildings and landscapes that are resilient to the ravages of drought. Living architecture requires inputs of water: "no blue, no green." Green roofs and walls provide us with a multitude of benefits, such as cooler cities, food, healthier people and energy savings.

The full costs of not adequately addressing climate change, from floods and rising ocean levels to forest fires and droughts are really beginning to mount. Yet without sufficient water resources, it may soon become difficult to sustain life, let alone the good life—a very hard lesson that, it would appear, is beginning to be realized in California.

Sincerely,



Steven W. Peck, GRP
Founder & President, GRHC

"NO WATER, NO LIFE. NO BLUE, NO GREEN."
-SYLVIA EARLE, SCIENTIST, OCEAN RESEARCHER, EXPLORER AND AUTHOR

THE LAM INDEX: WATER

50%

Percent of Los Angeles water used for lawn watering

$4.1 BILLION

2013 value of exported California almonds

1 GALLON

Amount of water to produce 1 almond

Source list: http://www.goo.gl/fwNX6.

GIF DEVELOPING LIVING ARCHITECTURE PERFORMANCE TOOL

The Green Infrastructure Foundation (GIF) is developing the Living Architecture Performance Tool (LAPT) to create consensus-based performance criteria and metrics for living architecture. Building on the success of programs like LEED, the LAPT is designed to articulate the benefits of living architecture, influence policy and funding decisions, recognize achievements in the field and raise the bar for the entire industry.

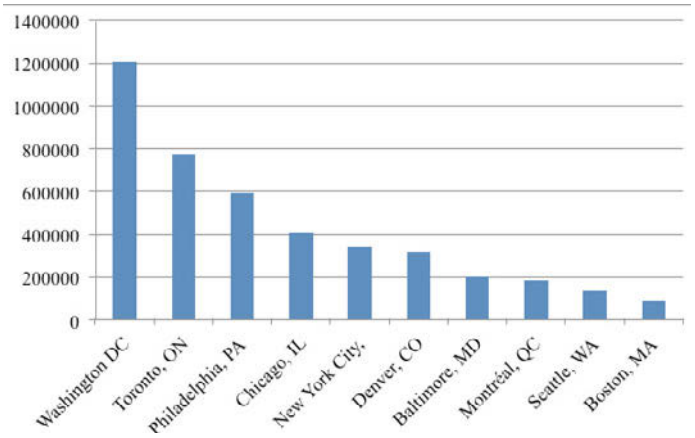
A number of white papers are in development to build a research foundation for the LAPT. The first draft of white papers on the subjects of biodiversity, stormwater quantity management and energy conservation and generation are complete. If you would like to read these papers, provide feedback or learn more about the program, visit greeninfrastructurefoundation.org/lapt or email rlilauwala@greenroofs.org.

WASHINGTON LEADS NORTH AMERICA FOR GREEN ROOF INSTALLATIONS IN 2014

Washington DC has continued to lead North America for the amount of green roofs installed in a metro region, as reported in the Green Roofs for Healthy Cities' *Annual Green Roof Industry Survey*. According to the survey, the DC metro area installed 1,207,114.56 square feet of green roofs in 2014.

For the first time ever, the City of Toronto ranked second amongst North American cities, with 775,216 square feet of green roofs installed. The Green Roof Bylaw, which requires green roofs on most new buildings, has resulted in 2 million square feet of green roofs. The remaining cities in the top five were Philadelphia, Chicago and New York City. Overall, the growth rate of the industry declined by 12% over the previous year, which is largely attributed to the end of stimulus funding.

TOP 10 NORTH AMERICAN METRO REGIONS IN SQUARE FEET OF GREEN ROOFS INSTALLED IN 2014



Download the full report at http://goo.gl/v63eCS.

LIVING ARCHITECTURE DOCTOR

Many green roofs and walls suffer from design and maintenance issues, creating an emerging market for diagnosis and treatment. The Living Architecture Doctor is a new feature that challenges you to figure out what went wrong and how to fix it. Test your skills—tell us what went wrong on this green roof? Diagnose the problem by emailing editor@greenroofs.org. Your response could be featured in the next issue of the *Living Architecture Monitor* magazine.

IN THE SPRING ISSUE OF THE LIVING ARCHITECTURE MONITOR, WE ASKED YOU TO DIAGNOSE THIS FAILING GREEN ROOF.

YOUR TREATMENTS:

"The green roof doesn't have the right or optimum substrate or the right plants for the life zone conditions."
Victor Menero, San Jose, Costa Rica

"Not enough growing medium for the plants that were selected."
Zach Cross, Phoenixville, Pennsylvania

THE ACTUAL DIAGNOSIS AND TREATMENT:

There was a prolonged drought that took a toll on the sedums. 3,000 plants were replaced and a drip irrigation system was installed.

EDITORIAL REVIEW BOARD

For questions about joining the editorial review board, submitting manuscripts or policies and procedures, contact Dr. Reid Coffman at rcoffma4@kent.edu or Dr. David Tilley at dtilley@umd.edu.

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.

VOLUME 2, ISSUE 1

RESEARCH IN BRIEF

Insect communities on green roofs that are close in proximity but vary in age and plant coverage

A. Steck, S. Morgan, W. Retzlaff and J. Williams

The effects of roof age and plant coverage on insect communities were investigated between three green roofs located on the campus of Southern Illinois University Edwardsville. Insect collections were made using pitfall traps on green roofs that were established between 0.5 month and five years prior to insect collection. The green roof with the greatest insect collection rate was the oldest but intermediate in size and percent plant coverage. The oldest green roof had similar collection rates as a nearby ground-level rain garden; however measures of species diversity and evenness were greater in the rain garden.

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

See what green roof and wall research was published in other journals from February to April 2015: http://goo.gl/jwNX6.

GREEN METRICS

EXPLORING GREEN ROOF STORMWATER MODELING TOOLS

BY: PATRICK CAREY

Since green roofs have been used as stormwater mitigation tools, there have been successive attempts to improve their effect. Government agencies, given the task of evaluating and incentivizing these efforts, have looked for metrics that are both reliable and meaningful. Challenges to these efforts have been both technical and cultural. They have been technical in the sense of properly describing the behavior of green roofs regarding stormwater. They have been cultural in the sense of examining our assumptions and ways of thinking.Though we are far from fully understanding green roof stormwater dynamics, we have made progress.

The culture of stormwater modeling brings some baggage to the world of green roofs. Green roofs live in a region between impermeable surface and soil at grade. In order to mathematically describe the effect of green roofs on stormwater, one has to understand the differences between the influences of their components such as plants that transpire, media that both holds water and allows it to drain, and drainage elements that may hold water or impede its progress to a drain. The effect of these components is dynamic. Plants transpire at higher rates when more water is available. If they are dormant, they have little or no transpiration. Transpiration rates vary with different plants. Plant roots alter the soil profile as they develop. Media evaporates held water and this varies with temperature, relative humidity and wind. Media also impedes the transmissivity (horizontal) and conductivity (vertical) paths of water. Drainage elements such as granular drainage material hold some water but also impede its progress to the drain. These elements are dynamic because rain does not fall uniformly either over time or in one location.

When considering these variables, we soon find that many models previously used to determine stormwater retention (harvesting for reuse) and detention (holding and slowly releasing) are not applicable because they ignore the differences between green roofs and surface conditions at grade. Examples of these are TR-55 and HEC-MS, surface runoff models frequently used by municipal engineers. TR-55 models storm runoff volume, peak rate of discharge, hydrographs and storage volumes required for floodwater reservoirs. HEC-MS is designed to simulate the complete hydrologic processes of dendritic watershed systems.

However, to dwell on storm events that are catastrophic in their scale is to ignore over 90 percent of all rain events. Models that fail to incorporate long term averaging of all rain events fail to render the full benefit of extensive green roofs that typically have very high performance in rain events of 25 millimeters or less. Some models that show promise are hydrological models such as SWMM, HSPF, DRAINMOD and HYDRUS.

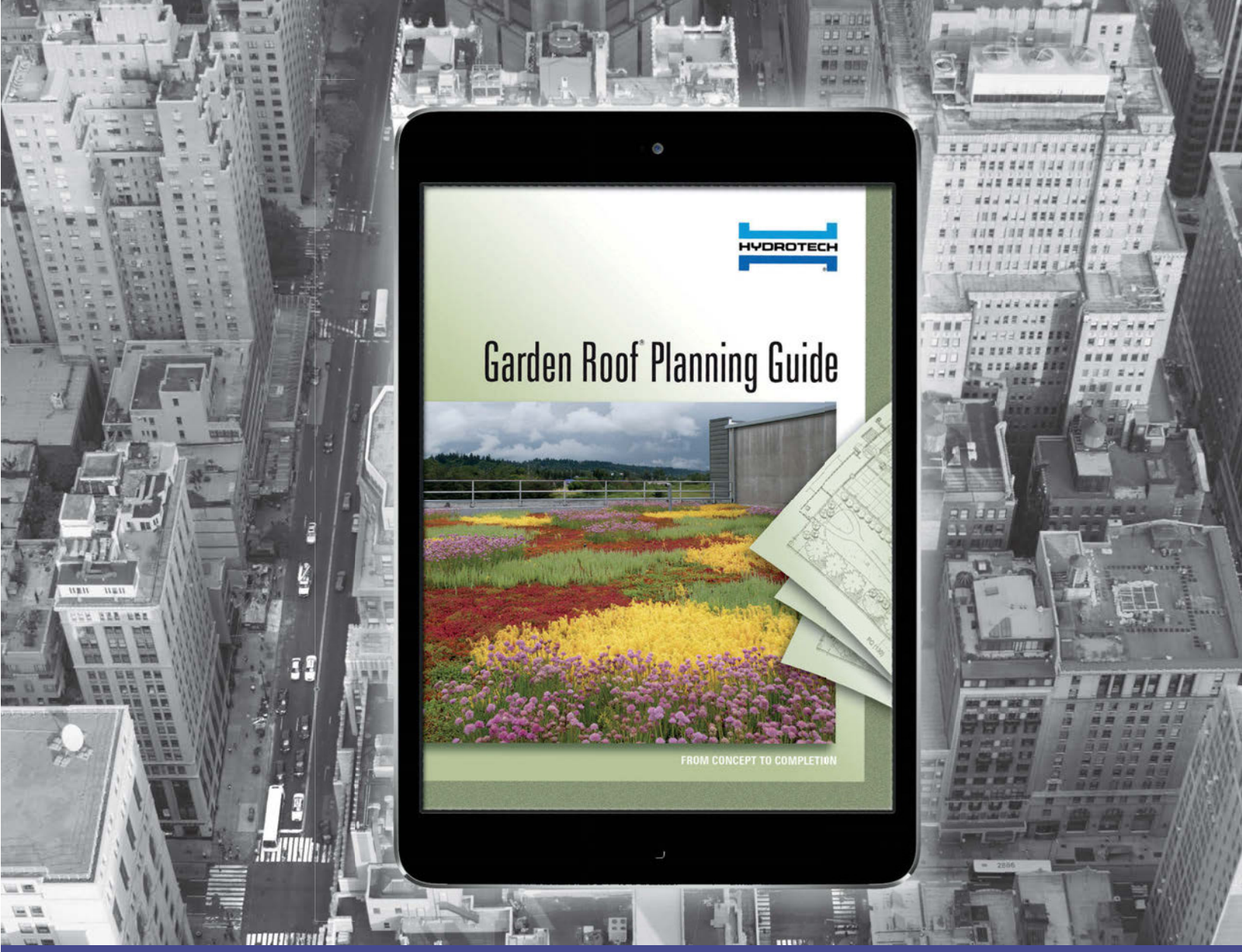
SWMM is a dynamic hydrology-hydraulic water quality simulation model. It is used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. HSPF is an EPA program for simulation of watershed hydrology and water quality for both conventional and toxic organic pollutants. This model uses information such as time history of rainfall, temperature and solar radiation, land surface characteristics and land management practices to simulate the processes of a watershed. DRAINMOD is a model that simulates the hydrology of poorly drained, high water table soils on an hour-by-hour, day-by-day basis for long periods of climatological record. Whereas, HYDRUS implements a Marquart-Levenberg type parameter estimation technique for inverse estimation of selected soil hydraulic and/or solute transport and reaction parameters from measured transient or steady state flow and/or transport data. The procedure permits several unknown parameters to be estimated from observed water contents, pressure heads, concentrations, and/or instantaneous or cumulative boundary fluxes.

Patrick Carey is the principal of Hadj Design and an instructor with GRHC.

I have been greatly aided by conversations and correspondence with Charlie Miller, Elizabeth Fassman-Beck, Chris Wark and Brian Taylor, all of whom have a depth of understanding and experience with this subject that is well beyond impressive.

A number of firms are now offering stormwater modeling as a component of their green roof services in an effort to maximize this benefit and meet regulatory requirements for stormwater management.

- Conservation Technology
- Roofmeadow
- American Hydrotech
- Jeffrey L. Bruce & Company
- Columbia Green



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ON THE ROOF WITH...BEN GRUMBLES

UNDERSTANDING THE IMPORTANT ISSUES AFFECTING THE WATER INDUSTRY WITH THE NEW MARYLAND SECRETARY FOR THE ENVIRONMENT

INTERVIEWED BY: JENNIFER FODEN WILSON

Ben Grumbles has decades of experience in energy, climate, air, water and the environment. He was the director of Arizona's Department of Environmental Quality and served as the environmental counsel and senior staff member on the Transportation and Infrastructure Committee and the Science Committee in the U.S. House of Representatives. More recently, Grumbles was the president of the U.S. Water Alliance, a non-profit organization that educates the public on the value of water. In January of this year, the Maryland State Senate appointed him as the Secretary for the Environment. Grumbles, more than anyone, understands the important issues affecting the water industry today, and how green roofs and green infrastructure can help play a role.

WHAT DO YOU THINK IS THE MOST IMPORTANT ISSUE AFFECTING THE WATER INDUSTRY TODAY?

Elevating public awareness on the value of water and the need to invest in its future. When citizens understand the connections of a resource to their everyday lives, they want to protect that resource. Water is the thread that weaves together our daily lives. It keeps our communities healthy, our cities running and our economies growing.

We tend to think about water in separate, disconnected ways, like water for recreation, for drinking, for industrial uses. Folks are willing to invest in clean drinking water and treating wastewater, but they are not yet connected with

PREVIOUS: HAGERSTOWN COMMUNITY COLLEGE
Image provided by: MDE Sediment, Stormwater and Dam Safety Program

ABOVE: BEN GRUMBLES
Image provided by: State of Maryland

the value that rainwater adds. Infiltration of stormwater is a natural part of the water cycle that has been short-circuited. Connecting the circuit requires landscape architects. Organizations like the U.S. Water Alliance and the Value of Water Coalition are attempting to bring the many different users of water together in ways that reunite the thinking about how best to protect, preserve and manage all of our water resources.

DO ARCHITECTS AND LANDSCAPE ARCHITECTS PLAY A ROLE IN WISE WATER MANAGEMENT?

They are essential to effect change in the ways water is considered and used in the design, construction, maintenance and functionality of the built environment.

The University of Maryland is linking stormwater management into its landscape architecture program, and the American Society of Landscape Architects recognizes the importance of managing stormwater as part of the landscape design process. ASLA's assembled case studies include the Annapolis and Chesapeake Bay Visitor's Center, where the parking area includes permeable pavers and permeability has increased from 20 to 100 percent.

But there are still a lot of missed opportunities to better integrate water conservation and reuse into the architectural and landscape design processes. We need to think about water in each step of the development process as well as the opportunities that present themselves as we redevelop older urban and suburban areas around the nation. Incorporation of smart water use into our basic thinking about land use and site design is the key to continued growth in the green infrastructure and green building movements.

HOW CAN CITY GOVERNMENTS BECOME MORE FLEXIBLE WITH THE USE OF STORMWATER?

Many cities and towns were built in large measure before the pollution associated with stormwater and the potential for beneficial reuse of water were understood. Today, these same built environments are struggling with outdated water, sewer and storm drain infrastructure.

In Maryland, the Town of Edmonston transformed a street with such features as permeable paving bike lanes, a native tree canopy and bioretention gardens. Our larger municipalities must find innovative ways to deal with the challenges of their municipal stormwater permits and local water quality impairments. While daunting, the need to retrofit these older, impervious spaces affords opportunities. To accomplish this, local building and plumbing codes could be amended to reduce or eliminate the need for curb and gutter, ensure water conservation measures, implement good housekeeping measures like trash control and street sweeping, adjust requirements for road widths or encourage the installation and use of purple pipe technology. The possibilities are endless and the rewards could be very meaningful.

WHAT ROLE DO YOU SEE FOR GREEN ROOFS AND OTHER FORMS OF GREEN INFRASTRUCTURE IN WISE WATER MANAGEMENT?

Again, in our cities and towns we should be looking at water conservation and reuse from the micro- to the macro-level, from hanging green walls and bioretention cells to the use of highly treated reclaimed wastewater for use on public spaces. In Montgomery County, property owners can receive technical assistance and funding for green roofs and other landscape improvements through the RainScapes Program. The beauty of green infrastructure is that it can simultaneously clean our urban waters and green our streets and cities for a more livable human environment. The National Academy of Sciences is poised to issue a report on the Beneficial Use of Graywater and Stormwater in 2015. I have been involved in the academy's efforts. It's very promising.

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

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CONFESSIONS OF A GREEN DESIGNER

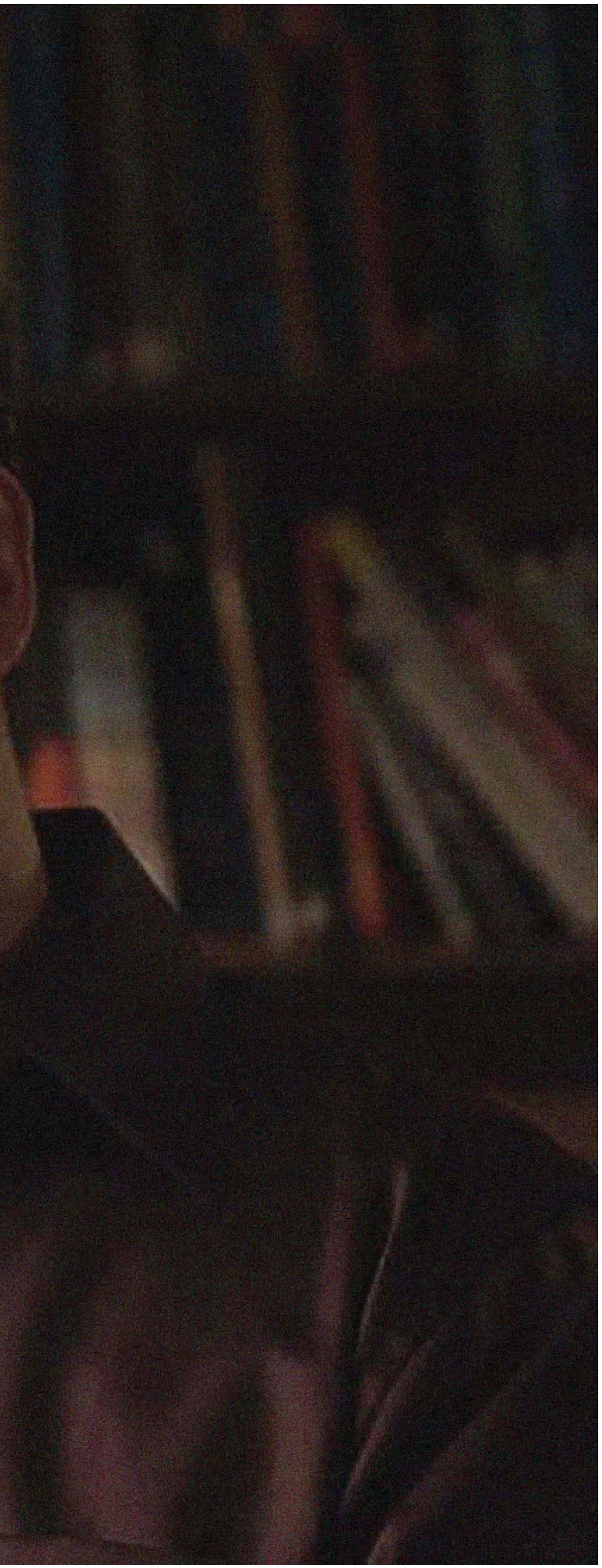
ERIC COREY FREED TALKS ABOUT MAKING THE BUSINESS CASE FOR GREEN BUILDINGS, NET ZERO WATER AND MORE

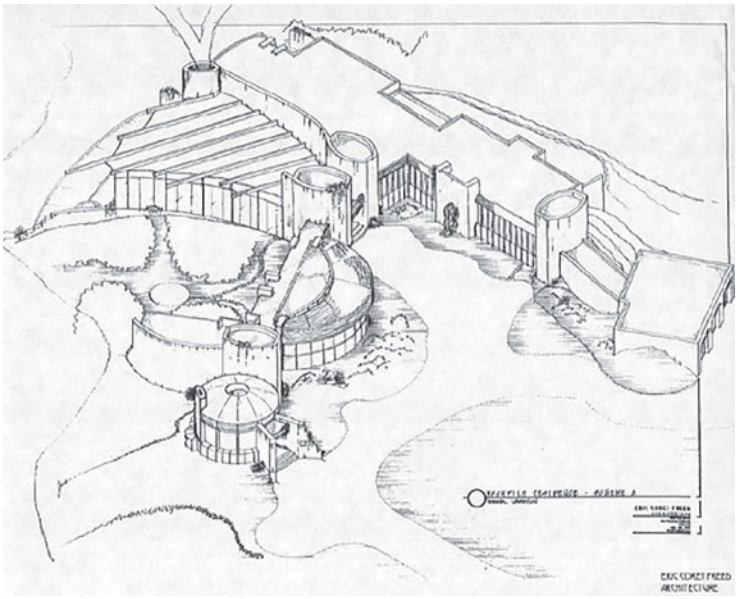
INTERVIEWED BY: JENNIFER FODEN WILSON

FAST FACTS

Eric Corey Freed, vice president, global outreach, International Living Future Institute

CLAIM TO FAME: Was the founding principal of the green architecture firm organicARCHITECT





WHAT DO YOU CONSIDER YOUR MOST IMPORTANT ACCOMPLISHMENT AND WHY?

Oh, that is not a good question! Sorry. It's a fine question for a normal, healthy functioning human, but not for me. I am unable to enjoy accomplishments. I'm always focused on what's next. When I complete a book, I can't just sit and enjoy it. I'm immediately obsessed about figuring out the next book. So I can't really answer this in any specific way.

Ralph Waldo Emerson is one of my favorites, and he wrote: "To be yourself in a world that is constantly trying to make you something else is the greatest accomplishment." My entire career is filled with well-intentioned friends, colleagues and mentors pushing me to have a "traditional" career. The wonderful secret of this type of pressure is that it diminishes a little each year you can hold out doing your own thing. For example, at age 22, all of my professors told me I was wasting my talents focusing on "this green thing." Now, 23 years later, it's only my parents that say that! So, to steal from Emerson, keeping true to myself is my greatest accomplishment.

HOW WOULD YOU DESIGN A GREEN BUILDING FOR MAXIMUM STORMWATER RETENTION?

To design for maximum stormwater retention, you start by asking: how does nature collect water? From there, a series of solutions emerge that start to influence the shape of the roofs, the contours of the site and the materials used.

Next, I seek out ways to turn the expense into an opportunity. Traditional stormwater management requires large pipes, retention ponds and graded asphalt. Clients forget these cost money, so if I eliminate these costs, they can be applied to a green roof, permeable pavers, gibbons or bioswales.

HOW DO YOU MAKE THE BUSINESS CASE TO CLIENTS TO INSTALL A GREEN ROOF AND/OR WALL?

There are two parts to selling the client on a green roof or

LEFT: ERIC COREY FREED
Image provided by: organicARCHITECT

ABOVE: ROCKPILE RESIDENCE DESIGN IN SONOMA
Image provided by: organicARCHITECT

IF PEOPLE PAID PRICES FOR WATER THAT WERE MORE IN LINE WITH THEIR TRUE COST, THE PAYBACK FOR WATER REUSE SYSTEMS WOULD BE SO MUCH SHORTER.

living wall. The first is to sell it on benefit. Before showing the design to the client, I'll do some extra work upfront by calculating the life cycle cost and projected savings. You have to factor in the energy savings from the added insulation and cool roof, the comfort savings from the added thermal mass and the HVAC savings from a smaller mechanical system. Having these numbers in advance of your presentation to the client is key in getting them to sign off.

The second step is to sell them on beauty. We probably won't put a green roof on a spot where it can't be seen and enjoyed. We use living walls as design features and focal elements. Considering them as part of the design solution is vital to getting the client to fall in love with the idea.

WHAT ARE THE LIVING BUILDING CHALLENGE REQUIREMENTS WHEN DESIGNING FOR NET ZERO WATER?

Under the current Living Building Challenge standards, the intent of the Water Petal is to meet all water demands within the carrying capacity of the site. The design should mimic natural hydrological conditions, using appropriately sized and climate-specific water management systems that treat, infiltrate or reuse all water resources on-site.

The requirements are pretty straightforward. One hundred percent of the project's water needs must be supplied by captured rainwater and/or by recycling water. Reused water must be purified as required without the use of chemicals.

All stormwater and water discharge, including grey and black water, must be treated onsite and managed either through reuse, a closed loop system or infiltration. Excess stormwater can be released onto adjacent sites under certain conditions.

Acceptable sources of water supply for potable and non-potable needs include harvested rainwater, on-site groundwater, condensate from the air, surface water sources such as ponds, recycled process water, and grey and black water collected on site and treated appropriately for reuse.

WHAT DO YOU THINK THE GREATEST CHALLENGE OR CHALLENGES ARE TO ACHIEVING THE NET ZERO WATER REQUIREMENT OF THE LIVING BUILDING CHALLENGE?

Income! Given the current drought in California and much of the Southwest, the biggest challenge will actually be the incoming rainwater (what we call "income"). Ironically, at a time when we need net zero water the most, this drought is making the calculations much harder to pencil out. We rely on rain and stormwater catchment in order to make net zero water work well.

The relatively inexpensive cost of municipal water also isn't helping matters. If people paid prices for water that were more in line with their true cost, the payback for water reuse systems would be so much shorter. As we've seen in the solar market, states with high municipal electricity costs are leading the way in solar installations. Other states with cheap electricity, such as Wyoming (with a 100 percent coal based energy portfolio), are lagging behind.

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

FIND OUT MORE

Living Building Challenge: living-future.org/lbc.

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Image provided by: District Department of the Environment

PROTECTING BLUE THROUGH GREEN

HOW WASHINGTON, DC IS MANAGING STORMWATER THROUGH GREEN INFRASTRUCTURE POLICY

BY: DR. HAMID KARIMI

As an ultra-urban area, almost half (43 percent) of the land in the District of Columbia is covered in impervious surfaces. A typical large rainstorm can overburden city infrastructure and send pollutants, trash and sewage directly to the District's rivers and streams. The force and volume of the water also erode stream banks and cause occasional flooding. To put this into context, a single 1.2 inch storm results in approximately 525 million gallons of runoff.

To address these problems, the District has taken several policy approaches resulting in voluntary programs aimed at retaining and filtering stormwater by increasing green infrastructure. Residents pay a monthly impervious area fee as part of their water bill and can reduce this fee by removing hard surfaces (such as paving, walkways and driveways) and installing green infrastructure (such as green roofs, rain gardens, pervious paving and shade trees). The District Department of the Environment uses the fee revenue to provide rebates and incentives through its RiverSmart programs to help residents, schools, churches and community organizations pay for green infrastructure. A similar incentive for green roofs is currently under consideration. The District has also surveyed its building inventory to determine the feasibility for installing green roofs on schools, fire stations and libraries as existing roofs near the end of their life cycles and need to be replaced.

GREEN ROOF APPROVALS

Calendar Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 *(Jan–Mar)*
SWM - total approvals	4	13	8	18	6	14	13	30	26	47	15

Green roof approvals for all DC projects that were required to have construction plans approved by DDOE for stormwater management and/or Green Area Ratio.

THE MOST INNOVATIVE FEATURE OF THE NEW STORMWATER REGULATIONS IS THAT REGULATED PROJECTS HAVE THE FLEXIBILITY TO ACHIEVE UP TO 50 PERCENT OF THEIR RETENTION REQUIREMENT OFF SITE.

While incentives and rebates have been successful, their impact has been limited because they typically generate small projects that are dependent on availability of government funds, and it is relatively expensive to do these projects as retrofits. Each year, voluntary programs retrofit approximately 1.5 million square feet, while regulated construction projects with stormwater management requirements present an opportunity to impact an average of 15 million additional square feet annually. The District recognized that requiring development projects to convert impervious area and install stormwater retention practices would not only increase stormwater retention tremendously, it would also create a public-private approach to financing stormwater improvements.

In June of 2013, the District enacted comprehensive stormwater management regulations requiring large construction and renovation projects to retain the volume of the 1.2 inch storm (or in some cases, 1.8 inch) instead of detaining it to release later. Similarly, the District recently enacted the Green Area Ratio zoning regulation that requires development projects to meet a target score specific to their zone using a menu of green infrastructure options, including green roofs.

The most innovative feature of the new stormwater regulations is that regulated projects have the flexibility to achieve up to 50 percent of their retention requirement off site. This approach creates the opportunity for non-regulated sites to install green infrastructure voluntarily and generate Stormwater Retention Credits (SRCs) to sell to regulated sites. In turn, this approach promotes installation of green roofs and other green infrastructure beyond the downtown core of the city, in areas where costs are lower and aesthetic improvements are greatly needed.

While it is too early to determine the full impact, the number of green roof construction projects approved to meet the stormwater regulations and Green Area Ratio is very promising. There is also a greater incentive to retrofit smaller buildings with green roofs to generate and trade SRCs in the open market. It is clear that a healthy mix of voluntary programs and regulatory requirements is essential to promoting green roof construction in the District and realizing long-term benefits to the area's water bodies.

Dr. Hamid Karimi is the deputy director of natural resources administration at the District of Columbia Department of Environment.

FIND OUT MORE

District Department of the Environment – Stormwater Management: ddoe.dc.gov/stormwater.

WATERTIGHT INSTALLATIONS

ADVANCED ELD TECHNIQUES ENSURE ACCURATE LEAK DETECTION

BY: PETER BROOKS

In the same way that modern surgical techniques have made many procedures safer and less disruptive, Electronic Leak Detection (ELD) has become the gold standard for integrity testing due to its advantages over flood testing. Where flood testing can be time-consuming and expensive, and has the potential to stress structural integrity and cause water damage, ELD testing is a non-invasive alternative. Low Voltage testing requires only wetting, not flooding and High Voltage inspections are conducted on a dry surface.

Not only is ELD testing significantly simpler and less risky, it's also more precise and versatile, pinpointing breaches for immediate repair and retesting. Electronic testing is also ideal for testing vertical surfaces, saves time and expense by eliminating the need to dam sloped areas, and can usually be conducted on roofs with overburden.

PRINCIPLES AND APPLICATIONS

ELD testing requires only two conditions for accurate readings: a grounding medium must be present beneath the membrane (typically a structural concrete or metal deck), and the membrane must be electrically nonconductive. While most roofing and waterproofing membranes are excellent candidates, EPDM rubber is an exception because it contains the conductive material carbon black. Also nonconductive materials between the membrane and deck (e.g. insulations or vapor barriers) require the addition of alternative grounding mediums like metal meshes or conductive primers.

ELD works by creating electrical fields on the membrane surface and separately in a ground in the system, with the nonconductive membrane acting as an insulator between the two sides of the circuit. If the membrane has no breaches the two sides of the circuit will never connect. However, when an electric field on the membrane surface encounters a breach, current connects through the breach to the ground and the testing equipment alerts the technician that a breach has been detected. Although voltages vary, all ELD equipment generates very small

amounts of current to minimize electrical hazards.

LOW VOLTAGE OR HIGH?

Many people are familiar with Low Voltage Vector Mapping using sensor poles and a trace wire on a wetted surface, but may not realize that there is an additional test methodology called High Voltage ELD. Each type has advantages and limitations. Selecting the most appropriate technique for the application minimizes costs and yields the most thorough and accurate test results.

High-voltage ELD (HV) is performed on a dry membrane surface and uses the ability of high voltage electricity to "arc" through the air. By varying the voltage, membranes from a thickness of a few mils up to 5/8 inch can be safely tested. HV Testing utilizes a broom-like metal brush connected to one terminal of an electric generator, and an insulated wire to connect the generator's other terminal to the grounding medium. Walking in straight lines across the membrane, the technician pushes or pulls the electrically charged brush across the roof surface. When the brush passes over a breach, current travels through the breach to ground, completing the circuit. An alarm alerts the technician, who then pinpoints and marks the precise breach location.

HV testing does not require a trace wire, personnel to spray water, or isolation of penetrations and located breaches from the rest of the test area. It often costs less and takes less time than Low Voltage testing, particularly if there are many grounded penetrations and/or breaches. It's also excellent for testing vertical surfaces such as curbs, parapets and foundation walls. However, HV testing must be performed directly on the membrane surface, so Low Voltage testing is required for systems with installed overburden, such as vegetation, pavers and ballasts.

COMPLETE COVERAGE

Combining the two techniques creates a unique opportunity. While Low Voltage Vector Mapping is an excellent technique for integrity testing on larger open areas, High Voltage ELD can be used to advantage testing areas that require the most careful and conscientious work: parapets and curbs, flashings and transitions from horizontal to vertical surfaces. By using a two-pronged approach—testing all vertical and transition areas with High Voltage, and then overlapping them with Low Voltage testing of horizontal surfaces—complete test coverage is assured.

BRIGHT FUTURE

ELD is quickly becoming standard practice on both roofing and waterproofing membranes. All stakeholders—owners, manufacturers, specifiers and contractors—benefit greatly from sound, watertight installations and Electronic Leak Detection can help deliver higher quality, more trouble-free assemblies. Designers can ensure that new systems are ELD-compatible by utilizing appropriate membranes and specifying alternative grounding mediums in insulated systems.

Peter Brooks is the president of IR Analyzers / Vector Mapping.

ABOVE: HIGH-VOLTAGE TESTING WAS AN EXCELLENT TECHNIQUE FOR TESTING VERTICAL SURFACES AND CONGESTED AREAS AT 50 UN PLAZA IN SAN FRANCISCO.
Image provided by: IR Analyzers

TALL AND TOUGH

TWO WILDFLOWERS FOR WATER-CONSTRAINED GREEN ROOFS

BY: SCOTT MACIVOR

Most will agree that no two green roofs are alike. Some conditions make plant selection tricky (and sometimes seemingly random). On shallow and water-constrained green roofs, *Sedum* have been and remain to be the go-to plants. Although great to include when presented with trying green roof conditions, they aren't the only option, nor are they the best performing or useful for wildlife. In fact, studies, such as 2010 research conducted by Lundholm, MacIvor, MacDougall and Ranalli, have found the best strategy is to include mixtures of plant types, including *Sedum*, grasses and wildflowers.

There are many grasses that are attractive, and survive and perform effectively on water-constrained green roofs, but here I'd like to highlight two of my favorite tall and tough wildflowers. These are the blazing star (*Liatris spicata*) and evening primrose (*Oenthera biennis*). Both grow in many settings: from natural meadows and rocky areas, to roadside ditches, urban parks, and even pollinator gardens. Because they are found in a variety of open and sunny habitats, exhibit drought tolerance, are widely available in horticulture, and are attractive in landscape design, each are great candidates for certain extensive green roof projects.

BLAZING STAR
LIATRIS SPICATA

Liatris spicata is found naturally throughout North America. These are thin-leaved and tall-stalked perennials, each stalk containing numerous flowers

ONCE ESTABLISHED ON THE GREEN ROOF, THE TWO-YEAR BLOOMING CYCLE STAGGERED BETWEEN DIFFERENTLY AGED PLANTS CAN CONTRIBUTE TO A UNIQUE AND DYNAMIC AESTHETIC.

that are purple or white. At certain points in the year *L. spicata* might look like a tuft grass, but these flowering stalks do regrow each year from a basal corm that also stores water after rainfall for use during dry times. Because of the number of flowers per stalk, *L. spicata* is in bloom for many weeks through July and August, providing long-lasting resources for many bees and visiting butterfly species whose activity peaks at different times in the summer.

Apart from their beautiful colors and contribution to wildlife, keeping *L. spicata* stalks intact adds to structured green roof vegetation that if left intact improves reduction in heat loss through the roof in winter months.

EVENING PRIMROSE
OENTHERA BIENNIS

These plants are tall, with bright yellow flowers that bloom in the second year of a two-year lifecycle. The first year is spent as a rosette at the surface of the growing media. Once established on the green roof, the two-year blooming cycle staggered between differently aged plants can contribute to a unique and dynamic aesthetic. *Oenthera biennis* is also widely distributed: native across North America and naturalized in many other areas of the world.

Oenthera biennis loves full sun and can withstand 'baking' on hot green roofs in July and August. The plant spreads and is successful on green roofs in part because they produce numerous seeds that drop near and around the mother plant. These new plantings can be left alone, thinned out, or transplanted to other areas on the roof. The seeds are highly attractive to birds. For pollinators, *O. biennis* is attractive not only because it provides nectar (using ultraviolet patterns to guide

PREVIOUS: OENTHERA BIENNIS BLOOMING IN ITS SECOND YEAR AT GRIT LAB
Image provided by: GRIT Lab

ABOVE: LIATRIS SPICATA FLOWERING IN AN EXTENSIVE GREEN ROOF MODULE LOCATED ON THE GRIT LAB
Image provided by: GRIT Lab

bees) but also pollen grains are connected in strands making flowers extremely profitable for the first few bees that visit them. Some solitary bees collect the leaves to use as nesting materials.

OTHER COMPLEMENTARY PLANTS

At the University of Toronto's GRIT Lab, we have monitored the survival and population dynamics of these two species, and others in water-constrained extensive green roof modules. In application, these plants could be used in combination with some Sedum, but aggressively spreading species (such as *S. acre*) can crowd them out when dormant at certain times of the year. Other complementary plants include grasses (*Festuca*) and drought and disturbance tolerant compact wildflowers such as *Symphyotrichum*, *Penstemon*, *Rudbeckia*, *Achillea* and even *Allium*.

Mixing plant types and species, keeping track of successes and failures, and communication among practitioners and researchers in the field, all are contributing to a more inclusive and informed design of water-constrained green roofs that include plants other than *Sedum*.

Scott MacIvor is a PhD Candidate in Biology at York University, GRIT Lab researcher, and instructor of landscape architecture at the University of Toronto.

FIND OUT MORE

University of Toronto's Green Roof Innovation Testing (GRIT) Lab: grit.daniels.utoronto.ca.

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FOR RESILIENT PEOPLE, COMMUNITIES AND PLACES

Photo: PS 62 by MKM Landscape Architecture

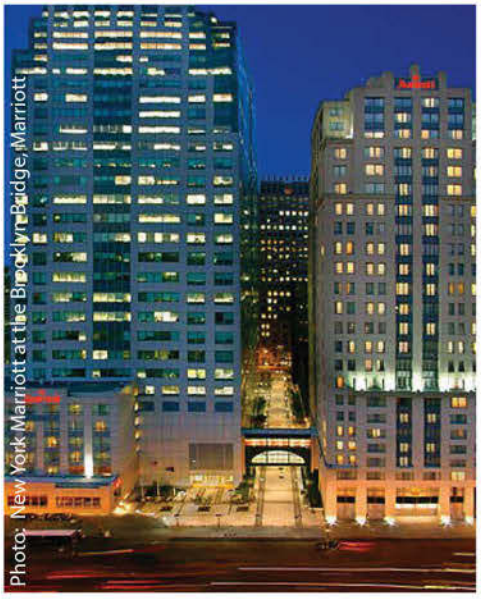

Photo: New York Marriott at the Brooklyn Bridge, Marriott

Photo: Jacob K Javits Convention Center, Metropolitan America

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Stay where the action is! This year's *CitiesAlive* Conference will be taking place at the New York Marriott at the Brooklyn Bridge. Reserve your room today!

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Join local experts as they guide you through some of New York's most inspiring green roof and wall projects.

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AGENDA AT A GLANCE

Almost all *CitiesAlive* programming takes place at the New York Marriott at the Brooklyn Bridge.

SUNDAY OCTOBER 4

8:30 am – 5:00 pm	Net Zero Water Boot Camp (Day 1)

MONDAY OCTOBER 5

8:30 am – 5:00 pm	Net Zero Water Boot Camp (Day 2)
8:30 am – 5:00 pm	Green Roof Design and Installation
8:30 am – 12:30 pm	Introduction to Rooftop Urban Agriculture
10:00 am – 12:00 pm	Green Roof Professional Exam
1:00 pm – 4:00 pm	Living Architecture Performance Tool (LAPT) Workshop
1:00 pm – 5:00 pm	Advanced Green Roof Maintenance
1:00 pm – 5:00 pm	Green Walls 101: Systems Overview and Design
5:30 pm – 7:00 pm	Opening Plenary & Keynotes
7:00 pm – 9:00 pm	Trade Show Floor Programming
8:30 pm – 9:30 pm	Women in Roofing Networking

TUESDAY OCTOBER 6

8:00 am – 8:30 pm	Coffee & Continental Breakfast
8:30 am – 10:15 am	Morning Plenary & Keynotes
10:15 am – 10:30 am	Break
10:30 am – 12:00 pm	Concurrent Technical Sessions #1*
12:00 pm – 2:00 pm	Lunch on Trade Show Floor
12:00 pm – 2:00 pm	Poster Sessions
1:00 pm – 2:00 pm	Trade Show Product Presentations
2:00 pm – 3:30 pm	Concurrent Technical Sessions #2*
3:30 pm – 5:15 pm	Concurrent Technical Sessions #3*
5:15 pm – 7:00 pm	Reception on Trade Show Floor
5:15 pm – 6:30 pm	Trade Show Product Presentations
7:30 pm – 10:30 pm	LHC Reception - Networking and Business Development Cruise

WEDNESDAY OCTOBER 7

8:00 am – 8:30 pm	Coffee & Continental Breakfast
8:30 am – 10:30 am	Concurrent Technical Sessions #4*
10:30 am – 10:45 am	Break
10:45 am – 12:45 pm	Concurrent Technical Sessions #5*
12:45 pm – 1:00 pm	Break
1:00 pm – 2:45 pm	Awards of Excellence Luncheon and Closing Plenary
2:45 pm – 5:15 pm	Tours (Day 1)
6:00 pm – 8:30 pm	Brooklyn Grange Dinner

THURSDAY OCTOBER 8

8:30 am – 5:15 pm	Tours (Day 2)
9:30 am – 5:30 pm	Harlem Green Infrastructure Design Charrette

* Concurrent Technical Sessions feature a Design, Policy, Research, and 'On the Roof With' panel discussion track.

SPACE IS LIMITED - REGISTER NOW AND SAVE!
OUR FIRST EARLY BIRD RATE ENDS JUNE 30TH.

Note: Agenda is subject to change without notice.

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Having toured around North America for more than a decade, the CitiesAlive Green Roof and Wall Conference is coming, for the first time, to New York City.

At *CitiesAlive,* as many as 1,000 designers, researchers, policy makers and industry representatives will be descending on New York from October 5-8th, 2015 to join with hundreds of local and regional design, research, policy and construction professionals who are working in the growing market for green roofs and walls.

Fantastic opportunities to network, catch up with old friends and help advance our industry.

Join Ben Flanner, Head Farmer and President of Brooklyn Grange for a tour of the farm and honey tasting.

Local Host Committee Reception - Zephyr business development cruise with dinner and drinks.

Learn and interact with an exciting roster of leading industry professionals discussing the latest on green roof and wall design, research, and policy.

PROGRAM HIGHLIGHTS

Learn from over 60 expert speakers at North America's only conference dedicated to green roofs and walls around the theme of resilience for people, communities and places.

Awesome Networking Opportunities

- Zephyr Cruise Dinner, Drinks & Business Development
- Brooklyn Grange Dinner (Sponsored by Rooflite)
- Cocktails on the Trade Show Floor
- Women in Roofing Networking Event

Expanded Tour Options at *CitiesAlive* This Year

- Jacob K. Javits Convention Center Roof Tour with Bruce Fowle, FX FOWLE
- 6th Avenue Green Wall Project with Art Elmers, Netafim
- Walk the High Line with Friends of the High Line
- Regis Highschool with Alexander Roth, Greensulate
- NYC Park Department 5 Boro Green Roof Tour with Artie Rollins & Max Lerner, NYC Parks
- Queens Botanical Garden with Stuart Gaffin, Columbia University

Programming - Technical Sessions

- Learn how green roofs and walls can treat gray and blackwater!
- Participate in discussions on improving the policy climate in New York City.
- Uncover the latest in native plant research and designing green roofs for maximum biodiversity.
- Get involved in discussions about wind uplift regulations.
- Discover programs that supply funding for your green roof project.
- Learn about the opportunities and challenges associated with multi-unit residential projects.
- See how green roofs and walls can contribute to healthier people through biophilic design.
- Discover the latest advances in growing media research on alternative inputs.
- Learn how to design for maximum stormwater retention.

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STAY AT THE CONFERENCE HOTEL

FIRST EARLY BIRD RATE ENDS JUNE 30
REGISTER NOW AND SAVE!

SUSTAINING THE FUTURE

THE CLIENT SPEAKS!—QUEENS BOTANICAL GARDEN SHARES WHY THEIR COMMITMENT TO WATER CONSERVATION WILL HELP SHAPE THE FUTURE LANDSCAPE OF NEW YORK

BY: GENNADYI GURMAN

Image provided by: Jeff Goldberg/ESTO

In August 2004, Queens Botanical Garden (QBG) in New York began construction of the first phase of our Master Plan, including, but not limited to: new gardens showcasing native plant communities and water management. Every aspect of the project exemplifies the QBG's mission of environmental stewardship and fostering cultural connections. Visitors enjoy comfortable and inspiring spaces created by considering sun, wind, water and plants, with new places for community gatherings and individual contemplation. Sustainable practices in design, construction and operations protect the health of the environment, community and future generations.

UNFORTUNATELY SINCE THE WETLANDS HAVE BEEN GREATLY REDUCED AND REPLACED WITH HOMES AND STREETS, THE DESTINATION BECAME OUR NEIGHBORS' BASEMENTS AND NEW YORK CITY'S OVERBURDENED AND AGING COMBINED SEWER OVERFLOW (CSO) SYSTEM.

We took on this project in this way to address the combination of our cultural and regional history and current NYC environmental needs. The land that the QBG sits on used to be crucial wetlands and tributaries that filtered water and buffered stormwater. As urbanization marched on, the water that created the wetlands didn't go anywhere. The rain still came, the water table remained high, and the stormwater needed somewhere to go. Unfortunately since the wetlands have been greatly reduced and replaced with homes and streets, the destination became our neighbors' basements and New York City's overburdened and aging Combined Sewer Overflow (CSO) system. When funds became available to address these issues, the QBG's goal was to become an example and prototype for sustainable water management in our area. We wanted to showcase as many ways for dealing with flooding as possible, hence the green roof and the bioswales, the greywater system and permeable surfacing.

Low maintenance, drought-resistant plants are used in the QBG's landscapes to reduce the need for irrigation. Throughout the project, rainwater runs off hard surfaces into bioswales, where it is filtered and absorbed into the soil. Rainwater that falls on the auditorium is absorbed by a planted green roof. At the horticulture and maintenance building, rainwater is collected for washing vehicles and tools.

Graywater from the administration building's sinks and shower is piped to a constructed wetland, while rainwater cascades off the terrace roof into a cleansing biotope. In both places, water is filtered and treated naturally through bacterial activity on the roots of carefully selected plants. The treated graywater is returned to the building for use in toilet flushing, while the cleansed rainwater supplies a meandering water channel and fountain.

Conserving fresh water reduces the burden on the city's water supply system and vulnerability to drought. The building has reduced its use of fresh water by more than 80 percent compared to a traditional building of the same size.

Collecting, storing, and recycling graywater and rainwater onsite diverts it from the city's costly, energy-intensive wastewater treatment process. These strategies also prevent the release of polluted water into local rivers and bays during large storms, when the

QUEENS BOTANICAL GARDEN
Image provided by: Jeff Goldberg/ESTO

city's wastewater treatment system is overwhelmed.

In addition to the QBG's commitment to conserving water, the whole facility is committed to sustainability through reduction in energy use, as well as human health and community.

The administration building's siting and long, narrow architecture allows 90 percent of the interior space to receive daylight and maximize natural ventilation. A geothermal system uses the earth's constant temperature to provide seasonal heating and cooling. Rooftop photovoltaic cells transform sunlight into electricity to operate high efficiency ventilation and lighting systems.

In the QBG's new structures, building materials and furnishings incorporate a high percentage of locally manufactured and recycled content. Over 75 percent of the waste produced during the construction has been recycled and reused. Interior products, such as fabrics, sealants, caulks and paints, contain no or very low levels of volatile organic compounds (VOCs).

Almost all the plant species installed in the project are native to the New York area, including those in the administration building's cleansing biotope, constructed wetland, bioswales and green roof. The structure itself is built on the former site of a parking lot, protecting open space.

In terms of advice to future projects, our recommendation would be to build in budgets for long-term maintenance of the landscapes and other systems. Unlike buildings, plants and soils don't get certificates of occupancy and take long term planning to fully realize their potentials.

Queens Botanical Garden's Master Plan calls for maintaining distinct areas for culturally significant plant displays, as well as rebuilding native plant communities throughout the property. These include woodland, savannah, wetland, ridge and swale and prairie ecosystems. The QBG will encourage the establishment and growth of these communities by taking steps such as revitalizing soils, reintroducing native plants and implementing controlled burns.

Many of the native ecosystems that once occupied New York have been destroyed or seriously degraded by development, pollution and the introduction of invasive species of plants and animals. Over many years and with proper stewardship practices, QBG'S plant communities will provide seed sources for future rebuilt and restored landscapes in and around New York.

Gennadyi Gurman is a supervising museum instructor at the Queens Botanical Garden.

FIND OUT MORE

Register for the Net Zero Water Boot Camp at the Queens Botanical Garden during *CitiesAlive* 2015. www.citiesalive.org

THE VALUE OF LIVING ARCHITECTURE

UNDERSTANDING HOW GREEN ROOFS AND WALLS CAN CONTRIBUTE TO GREEN BUILDING CERTIFICATION

BY: SARA LOVELAND

Green building certifications demonstrate environmental responsibility and leadership; and there are many of them now helping to shape the built environment. These certification systems take different approaches to how they evaluate green buildings and how one might receive credit or meet a prerequisite requirement, but they all recognize the immense value of green roofs and walls. Here is a look at four systems and how your next green roof or wall could contribute to a green building certification for the project.

GREEN GLOBES

Green Globes v1.3 is the rating system of the Living Building Institute. Green walls may contribute points in four categories. The system doesn't specifically address the energy

reduction contribution of green roofs or walls. However, if an interior or exterior system can be shown to the assessor to effectively contribute to heating and cooling load management or offer increased ventilation, the project may be eligible for higher credit.

• Points are assigned by percentage of area of the roof that is vegetated, and/or has a high Solar Reflectance Index (SRI) as prescribed based on the slope of the roof (2-6 points, *Ecological Impacts 3.2.2.4*).

• The project meets municipal and/or local watershed flood and erosion control targets (5 points, *Stormwater Management 3.2.3.1.1*).

• Minimum of 50% of the vegetated area is covered with plants that are drought-tolerant (2-3 points, *Landscaping 3.2.4.3.1*).

• Minimum of 50% of vegetated area is covered with plants (new or salvaged plantings) that are native and non-invasive (2-4 points, *Landscaping 3.2.4.3.2*).

LIVING BUILDING CHALLENGE

The International Living Building Institute's Living Building Challenge 3.0 is a system of 20 Imperatives. It is perscriptive and all Imperatives must be met in order to successfully build to the challenge. Green roofs or walls can contribute to strategies in four areas.

• The project must integrate opportunities for agriculture appropriate to its scale and density using the Floor Area Ratio (FAR) as a basis for calculation (Imperative 02, *Urban Agriculture*).

• To promote good indoor air quality, a project must create a Healthy Interior Environment Plan that explains how the project will achieve an exemplary indoor environment (Imperative 08, *Healthy Interior Environment*).

• The project must be designed to include elements that nurture the innate human/nature connection (Imperative 09, *Biophilic Environment*).

• The project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to its function, as well as meaningfully integrate public art (Imperative 19, *Beauty + Spirit*).

SUSTAINABLE SITES

Sites v2 is the rating system of the Sustainable Sites Initiative, a collaborative effort of the US Botanic Garden, the Lady Bird Johnson Wildflower Center at the University of Texas and the American Society of Landscape Architects. Green roofs and walls can be a strategic component in meeting requirements in seven categories and two prerequisites and may apply to credits in the Human Health and Well Being section.

• Reduce negative impacts to aquatic ecosystems, channel morphology, and dry weather base flow by replicating natural hydrologic conditions and retaining precipitation on site (required, *Water P3.1*).

• Maintain site water balance, protect water quality, and reduce

negative impacts to aquatic ecosystems, channel morphology, and dry weather base flow by replicating natural hydrologic conditions and providing retention and treatment for precipitation on site (4-6 points, *Water C3.3*).

• Provide a connection to the local climate and hydrology by integrating aesthetically pleasing stormwater features that are visually and physically accessible and manage on-site stormwater (4-5 points, *Water C3.5)*.

• Improve landscape performance and reduce resource use by installing only plants that are appropriate for site conditions, climate and design intent (required, *Soil + Veg P4.3)*.

• Foster habitat for native wildlife that is necessary for plant reproduction by conserving or installing plants that are native to the site's eco-region (3-6 points, *Soil + Veg C4.6*).

• Contribute to regional diversity of flora and provide habitat for native wildlife by conserving existing native plant communities and installing vegetation that contributes to plant communities native to the eco-region (4-6 points, *Soil + Veg C4.7*).

• Support the water, nutrient, atmospheric gas and climate regulation ecosystem service benefits provided by vegetation on site by maintaining or establishing regionally appropriate vegetative biomass (1-6 points, *Soil + Veg C4.8)*.

• Minimize effects on microclimate and human and wildlife habitat by using vegetation and reflective materials to reduce heat island effects (4 points, *Soil + Veg C4.9*).

• Place vegetation or vegetated structures in strategic locations around regularly occupied buildings to reduce energy consumption and costs associated with indoor climate control (1-4 points, *Soil + Veg C4.10*).

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

Green roofs and walls can earn points in nine categories and help the project qualify in one prerequisite category of the United States Green Building Council (USGBC) v4 rating system.

• Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity (1 point, *SS Credit 5.1*).

• Provide a high ratio of open space to development footprint to promote biodiversity (1 point, *SS Credit 5.2*).

• Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants (1 point, *SS Credit 6.1*).

• Reduce heat islands to minimize impact on microclimate and human and wildlife habitat (1 point, *SS Credit 7.2*).

• Limit or eliminate use of potable water, or other natural surface or subsurface water resources for landscape irrigation (2-4 points, *WE Credit 1*).

• Establish the minimum level of energy efficiency for the proposed building and systems (required, *EA Prerequisite 2)*.

• Achieve increasing levels of energy performance above the baseline in the prerequisite standard (up to 19 points, *EA Credit 1*).

• Reuse 5 percent of total value of project materials (1-2 points, *MR Credit 3*).

• 10 to 20 percent of the total value of project materials are recycled (1-2 points, *MR Credit 4*).

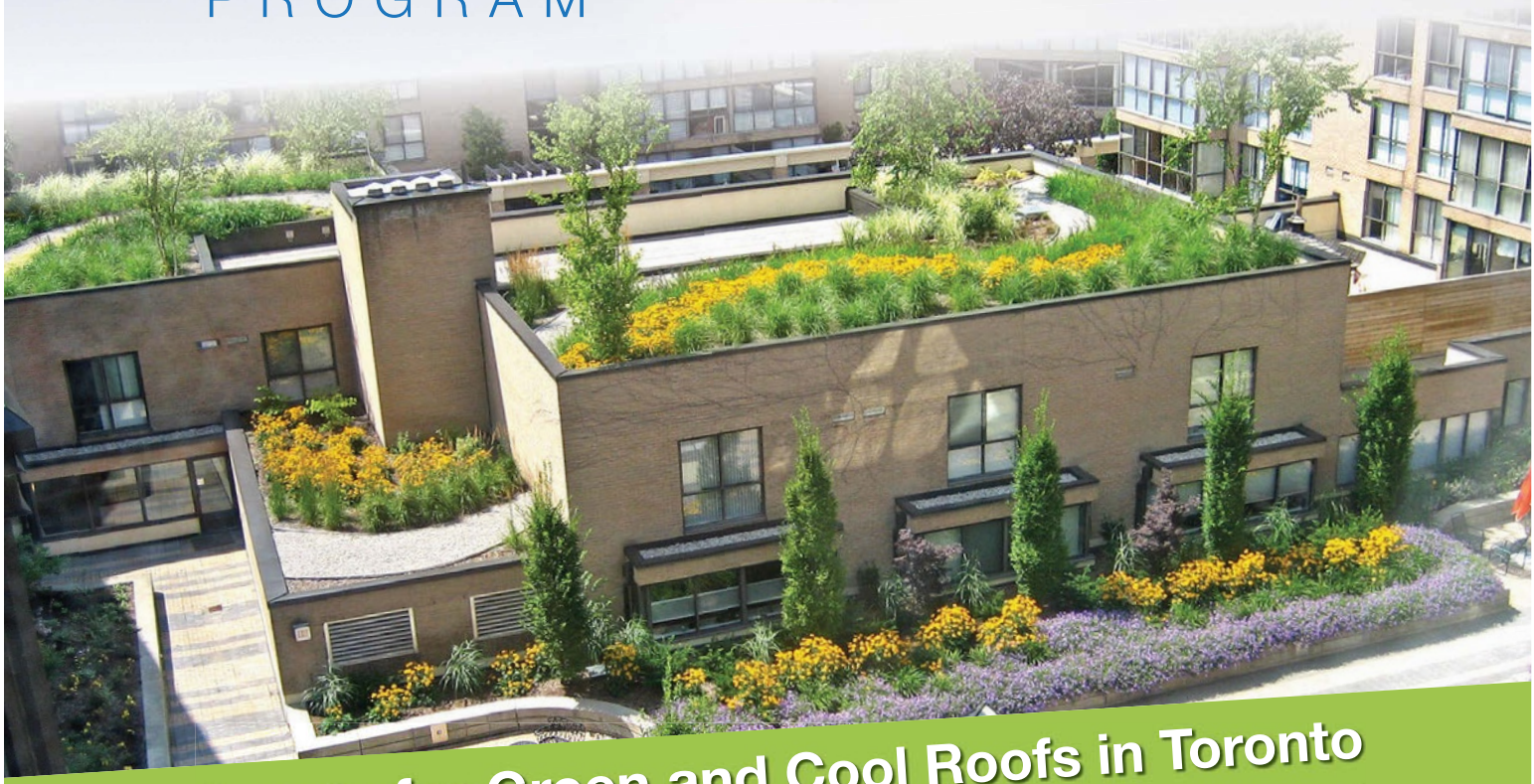
• 10 or 20 percent of product, depending on the overall percent of materials extracted, must be manufactured and assembled within 500 miles (1-2 points, *MR Credit 5.1*).

The type of system you choose will depend on the goals of the client, size of the building and many other variables. These organizations all have great resources to help you get your project to the finish line. Be sure to share your lessons learned with other Green Roof Professionals (GRPs).

Sara Loveland is a partner at Annette Environmental, an instructor for GRHC and serves as the chair of the Green Infrastructure Foundation.

eco roof INCENTIVE PROGRAM

Grants of up to $100,000 are available to support the installation of green and cool roofs in Toronto.



Grants for Green and Cool Roofs in Toronto

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Green Roof Grants

$75 / m² to a maximum of $100,000

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Apply Today!

To date, the City's Eco-Roof Incentive Program has helped fund the installation of more than 100 eco-roofs.

Applications must be submitted before the roof is installed.

Learn more and apply online at **toronto.ca/livegreen/ecoroofs**

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GREEN ROOF LEADERSHIP

REBECCA COLE AND THE JAMES NEW YORK HOTEL

NAME: Rebecca Cole, GRP

POSITION/COMPANY: Owner, Rebecca Cole GROW

LOCATION: New York City

WHEN DID YOU BECOME A GRP (GREEN ROOF PROFESSIONAL)?
April 2014

HOW HAS YOUR EXPERIENCE AS A GRP IMPACTED YOUR BUSINESS OR WORK?
The GRP accreditation has given my company and I the confidence to introduce green roof solutions and possibilities into most of our new designs. We are still far behind in New York City to where I had hoped we would be on the international green roof map, but I know my company is going to help speed that progress along.

I designed and installed an urban green park to three stories of the James New York hotel in Soho a few years ago. My company has continued to maintain the roof with numerous challenges along the way. Becoming a GRP helped inform possible solutions to better manage the irrigation, plant choices and repairs of structural issues beneath the green roof sections that were causing leaks. Also, I've been helping the hotel understand that the value of the green roof extends far beyond the beauty and function for their guests. Suggesting ways to include the surrounding community by marketing the tremendous benefits of green roofs has been invaluable for the hotel and the neighborhood. Now other hotels are following suit and asking how they might create green roof projects on their buildings.

TOP: JAMES HOTEL NEW YORK
Image provided by: Jarrard Cole

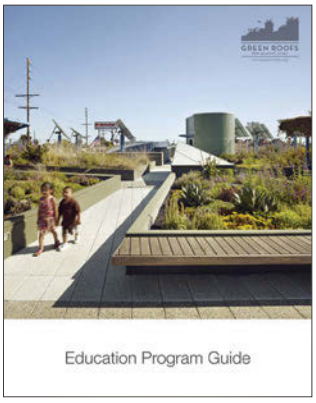
LEFT: REBECCA COLE
Image provided by: Chris Langer

NEW CORPORATE MEMBERS

GREENSCAPE INC.
WWW.GREENSCAPEINC.COM
Greenscape Inc. is an award-winning residential and commercial landscape company based in North Carolina. They have proudly satisfied their design, build and landscape clients with "Outstanding Results Through Great Service" since 1979. They are passionate about serving and strengthening their community by creating and maximizing great outdoor spaces where people live, work and play. Guided by their leadership principles and core values, they serve their clients with a variety of services that enhance the care, beauty and functionality of the outdoors.

SMART GREEN TECHNOLOGIES
WWW.SMARTGREENTECHNOLOGIES.COM
Smart Green Technologies Inc. (SGT) was born in the research labs at the University of Guelph and is a full service urban greening company located in the heart of Southern Ontario. With specialties in vegetative roofing, living walls, urban agriculture, rain gardens and remote monitoring, their mission is simple: to bring vegetation to as many horizontal and vertical surfaces in our urban environments as possible.

URBANSCAPE® SOLUTIONS
WWW.GREEN-URBANSCAPE.COM
Urbanscape® Solutions is a business unit within Knauf Insulation focused on systems and solutions built around unique Rock Mineral Wool technology. They have developed a material that brings significant enhancement to the water holding and root propagation characteristics that have historically led to Rock Mineral Wool being a dominant growing media in hydroponic systems, and now are been able to effectively bring those benefits to a variety of green solutions.



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GREEN YORK CITY

CAN NEW YORK CITY REALLY BECOME THE GREENEST CITY IN THE WORLD?

BY: ROB CRAUDERUEFF

We are at a critical juncture as a city, with rents increasing faster than wages (the rent is too damn high!); environmental catastrophes such as floods threatening the city's livelihood; high rates of asthma, obesity and hunger; and increasing divisions between the haves and have-nots. The benefits of green infrastructure to New York City are well documented: green infrastructure reduces energy demand, mitigates flooding, improves housing quality, air quality and public health and supports urban agriculture. Though green infrastructure is no panacea, few technologies improve cities in so many ways.

It is time that New York City utilize green infrastructure as a problem-solving tool on public and private property at a large scale. In 2014, New York City ranked fifth of all North American cities in square feet of green roofs built—despite being much larger than any of the four leading cities. We can—and must—do better. While a complete analysis is beyond the scope of this article, the following near-term improvements would help New York address numerous challenges to become the greenest city in the world.

ENHANCE GI GRANT PROGRAM

The NYC Department of Environmental Protection (DEP) released in 2010 its Green Infrastructure Plan, committing to more than $1 billion of green infrastructure investment through the next several decades. Within this plan, the DEP runs a GI Grant Program providing around $5 million of funding each year for projects on private property—the best source of green infrastructure funding in the city. The DEP has continuously sought to improve the program, and has improved its outreach and application processes over the past several years. However, three key changes would further improve this program.

- **Develop an expedited review process**
  The DEP could develop standardized designs for each type of green infrastructure on private property (such as green roofs) and expedite projects that meet these standards. For example, award funds within three months of application.
- **Create a targeted predevelopment grant program advancing equity**
  A grant program targeting structural analyses and design would help organizations that cannot afford the up-front cost of structural analyses, such as affordable housing organizations and churches.
- **Expand the program**
  In the long run, the DEP should increase the total amount of funding available.

IMPROVE GREEN ROOF TAX ABATEMENT PROGRAM

Strong cost-sharing programs are critical to the development of the green roof industry because contractors must compete directly on cost, driving down prices. However, New York City's tax abatement—a bureaucratic nightmare worth $5.23 per square foot—is woefully inadequate; the industry avoids the program like the plague. Though the city's recently released sustainability plan, OneNYC, indicated the city will wait another year to collect data on the program's performance before making changes, intensive evaluation has already concluded the program is ineffective. Zero applications were submitted from January 2014 through mid-March 2015. Moreover, property owners cannot file applications until their projects have been installed. Thus, property owners can not assume they will receive a tax credit before building a project. Not much of an incentive! This program needs a complete overhaul, focusing on four areas: increasing the per-square foot value, making the application process easier, increasing the total amount of funding available, and advancing equity. Similar programs should be developed for other forms of green infrastructure, such as green backyards and green walls.

MODIFY THE BUILDING CODE

Building codes may seem boring but have tremendous impact, as they apply to all new construction and major rehabilitation projects. The City needs to revisit its detention standard, which requires temporary storage and release of stormwater. Rather, by requiring stormwater retention, which requires the storage of stormwater, green infrastructure solutions would be prioritized over grey infrastructure with much greater frequency.

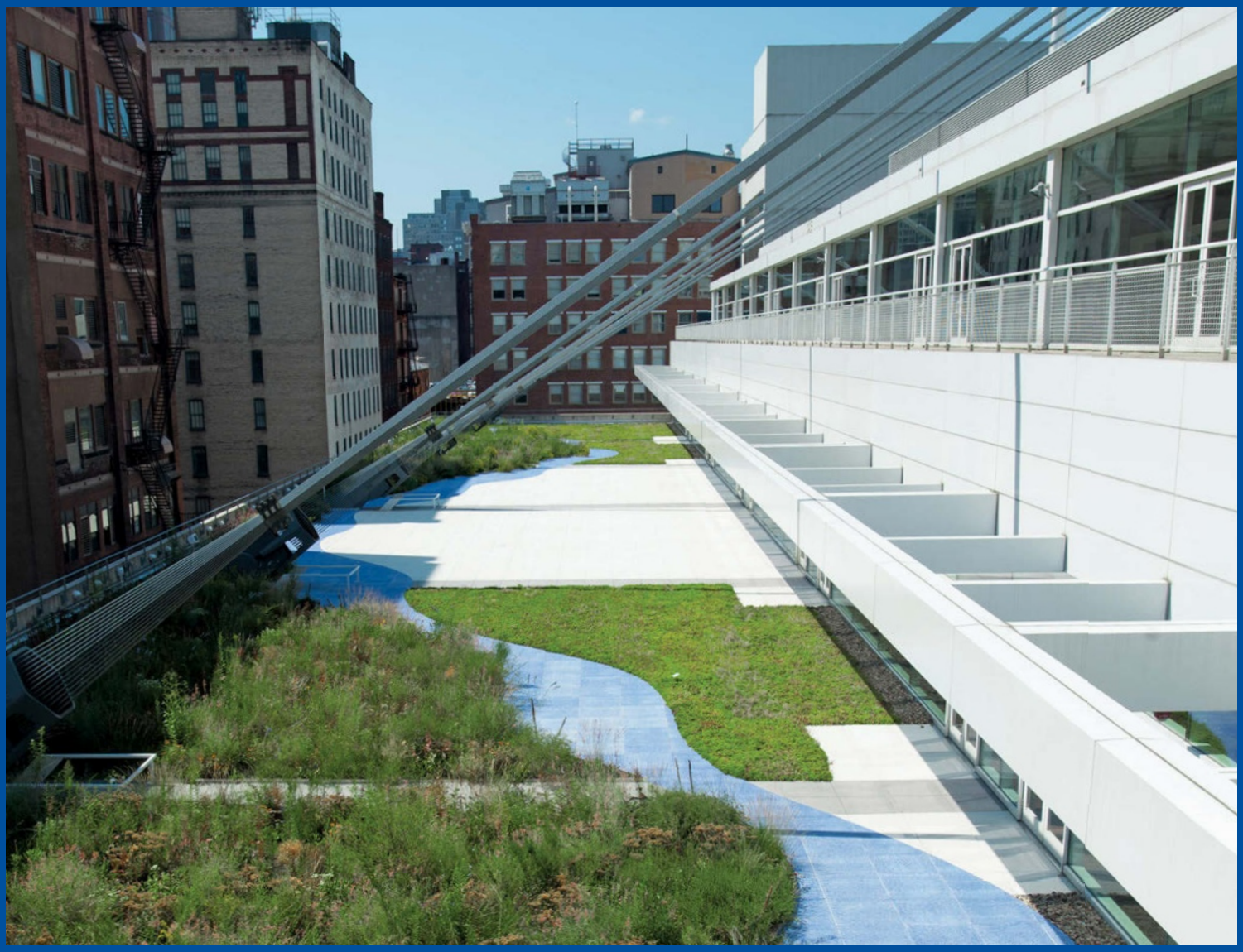
The City should also require roofs of new buildings to incorporate an additional 30 pounds per square foot dead load. This change would make it easy to conduct a green roof retrofit on buildings constructed after the new code.

For New Yorkers, the choice is ours whether we embrace green infrastructure as a critical solution to our environmental and societal challenges, or whether this technology remains underutilized. By improving incentives and regulations, and developing with nature and communities, we can address our city's most pressing problems and lead the world, one green project at a time.

Rob Crauderueff is the CEO of Crauderueff & Associates and chair of the CitiesAlive *NYC Policy and Legacy Committee*

FIND OUT MORE

CitiesAlive: 13th Annual Green Roof & Wall Conference is taking place in New York City October 5-8, 2015. www.citiesalive.org



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