2014 Annual Green Roof Industry Survey

May 2015
Introduction

Green Roofs for Healthy Cities (GRHC) is a member-based non-profit industry association dedicated to the development of the green roof and wall industry in North America. 2014 marks the 11th year that Green Roofs for Healthy Cities has conducted this Survey of its members and shared the results with a wide range of stakeholders. This survey is just one of many programs and activities GRHC delivers in order to advance the industry. Other programs include:

- Administration of the Green Roof Professional (GRP) training and accreditation program which is designed to develop, disseminate, and promote best practices in green roof design, installation, and maintenance. Find one of more than 700 accredited GRPs at www.greenroofs.org.

- Providing ongoing professional development opportunities through the creation of new leading-edge full and half-day training courses. (See Appendix I for a full list of GRHC’s professional training courses).


- Publishing the Living Architecture Monitor® (LAM), a quarterly digital and print magazine that covers emerging research, design, manufacturing and policy activity, and reaches more than 12,000 readers per issue. (www.livingarchitecturemonitor.org)

- Publishing the Journal of Living Architecture (JOLA), a quarterly publication of outstanding, peer reviewed scientific research.

- Providing a wide range of membership benefits for companies, non-profit organizations, and individuals, including company promotion, dissemination of leads, and advertising, training and event discounts. (www.greenroofs.org/membership).

- Advocacy through Local Market Development Symposia, which involves working with local and regional policy makers to develop green roof and wall policies that help grow local markets.

- Recognizing outstanding integrated design and installation with the Green Roof & Wall Awards of Excellence, presented annually at CitiesAlive®.
• Developing the *Living Architecture Performance Tool*, to quantify performance characteristics of different living architecture technologies for designers, policymakers, and manufacturers.

• Supporting international market development through the *World Green Infrastructure Network*, whose *World Green Infrastructure Congress* will take place in Nagoya, Japan October 14-16, 2015. ([www.wgic2015.org](http://www.wgic2015.org))

Highlights of GRHC’s *Annual Green Roof Industry Survey* are provided below.

**Annual Survey Methodology**

Each year since 2004, GRHC has conducted a survey of its Corporate Members in order to collect data on the growth and composition of the green roof industry across North America. This year the survey methodology was streamlined to make it easier to complete and more accurate. GRHC’s Corporate Members voluntarily and confidentially provided the following information on each of their projects:

- Completed square footage.
- City in which the project occurred.
- Building type, and whether it is public or private.
- Type of green roof – intensive, semi-intensive, or extensive.

The data is collected and duplicate entries are removed from the data set by comparing the type, size, and location of each project. The square footage of green roof installations is then aggregated geographically to determine the top ten metropolitan regions for green roof installations in the United States, and the top five regions in Canada.

Annual industry growth rates are derived by averaging the change in the square footage recorded by a representative sample of Corporate Members from year to year, not square footage totals, which vary depending on the number of submissions received each year. This growth rate is established by determining the average growth rate of participant corporate members. To do so, a growth rate is established for each participant corporate member for the survey year. The three largest and smallest values are removed from the calculation to obtain the most accurate overall average, and an average of the remaining values is derived.

In a change from our previous methodology, this year we have omitted the section where we report square footage totals. After reviewing our prior data, we were concerned with the accuracy of the industry forecasting based on the sample size with which we were working. All other examinations and calculations of industry data have remained the same.
This survey data does not capture all market activity because many of GRHC’s Corporate Members chose not to participate. For the 2014 Survey, 27 Corporate Members out of a possible 89 supplied data. We estimate that the data in this report generally understates the market activity by anywhere from 25 to 50 percent given that not all firms in the industry are members of GRHC and not all members are able, or willing, to participate in the annual survey. Nonetheless, the data does provide important insights into the composition of the industry.

This year we had a participation variance of 7 members, with four new participants joining the survey and three previous members not providing data. Data from these 7 members was not included in calculations of the annual growth rate since it could not be determined.

The full data set is made available to all of our Corporate Members as a membership benefit, with specific location and project attribution removed to protect confidentiality.

**Annual Survey Findings**

The North American green roof industry experienced a decline of 12% in 2014, compared to 2013, when the industry saw a rise of 10%, a significant change from the double-digit growth rates the industry has experienced over the past decade.

There are many possible contributing factors to this, amongst which was the change of 7 participant members in the study for whom growth rate could not be tracked.

Last year, government stimulus funding, which fueled much of the previous years of growth, had largely been spent as reflected in the increase in private projects for 2014.

Another possible factor is the impact of climate change on the installation and maintenance of green roofs in North America. According to the National Oceanic and Atmospheric Administration’s (NOAA) National Climatic Data Center, North America experienced a year of extreme temperature fluctuations, with a cooler than average summer and a record breaking cold winter in the continental United States, which delayed many projects.

A final explanation is that many private sector companies continue to sit on accumulated capital rather than make expenditures on new buildings and equipment.

In terms of reported totals, corporate members recorded 5,537,240 square feet of green roofs installed on 887 projects in 2014, compared to 6,421,537 square feet installed on 950 projects in 2013.

In a significant shift from the previous year, more square feet were installed on private projects than public. 2,241,832 square feet were installed on private projects, whereas 1,696,587 square feet were installed in public projects, with 4,672 square feet falling into the mixed use category.
(developments that had both public and private structures) and the remaining amount unspecified.

Results by Category of Green Roof

Green roofs are categorized according to the depth of their growing media, as being either extensive, semi-intensive, or intensive. As in past years, extensive green roofs (six inches of growing medium or less) installed significantly outnumbered the amount of intensive green roofs (over six inches of growing medium) or semi-intensive (areas of both types).

The trend that has emerged over the last several years continues with Extensive green roof installations being favored over Intensive or Semi-Intensive. This is likely due to the lower structural loading capacity requirements for extensive green roofs, and lower cost per square foot to install than intensive and semi-intensive systems.
Results by Metropolitan Region

The chart below shows the top ten North American metropolitan regions installed the most square footage of green roofs in 2014. For the fourth straight year in a row, Washington, DC has retained the top spot. For the first recorded year, a Canadian city places in the top 5, with Toronto securing the second most installed square footage. Completing the top five are Philadelphia, Chicago, and New York City. All of these cities have supportive policies and programs that encourage green roof implementation.

Of the top ten metro regions, seven of the main municipalities support green roofs directly through policy, programming, or installation on government buildings. Appendix III shows a large selection of public policy that has been implemented across North America in support of green roofs.

Public policy support helps to reduce the upfront costs of green roofs and monetize their many public benefits. The Benefits and Challenges of Green Roofs on Public and Commercial Buildings, a study by Arup for the United States General Services Administration in 2011, found that over the course of 50 years an extensive green roof would generate the equivalent of $38/sf of public benefit.

The public benefits of green roofs include:

- Stormwater management – quality and quantity
- Increased biodiversity
- Moderation of the urban heat island effect
- Improvement of air quality
- Improvement of aesthetics in the public realm
- Local and regional job creation
- The addition of new amenity spaces and improved health
- Urban food production and enhanced food security.

In addition to policy support, the growth of the green roof industry can also be attributed to some extent to the Green Roof Professional (GRP) accreditation program. There are now more than 700 accredited GRPs across North America. Through training and a third party-managed accreditation exam, the GRP program:

- Enables professionals to differentiate themselves in the marketplace
- Establishes a high-level of professionalism and improved multi-disciplinary collaboration
- Increases customer confidence in green roof technology
- Results in better green roof design and installation practices
- Protects the industry from the inevitable failures that result from inappropriate design, installation, and maintenance practices.

The GRP Online Directory is accessible to the public at:

http://www.greenroofs.org/index.php/membership/findagreenroofpro

To view GRHC's Corporate Members see:
www.greenroofs.org/membership/corpmemberdirectory

To register for online GRP training go to:

https://www.heatspring.com/courses/green-roof-professional-grp-accreditation-training
Conclusion

Unlike previous years since GRHC began conducting the *Annual Green Roof Industry Survey*, the growth in the green roof market in North America declined in 2014, due to a variety of economic and climatic factors. While many cities across North America have recognized the public benefits of green roofs, there are many more that need to enact strong policy measures to encourage their widespread installation, and reap the multitude of public benefits they provide.

As seen in the data provided, the influence of the Canadian green roof market has grown dramatically in 2014, with Toronto becoming one of the largest installers of green roofs in all of North America. The Toronto Green Roof By-Law, passed in 2009, requires the installation of green roofs on most classes of new buildings and requires public buildings to install green roofs. This shows not only the growing international attention green infrastructure receives, but also the need for consistency amongst training and education efforts in the field.

There is still enormous potential for new green roofs to be installed on tens of billions of square feet of roofs across North America. In 2012 GRHC established an industry goal of one billion square feet of green roofs installed in North America by 2022. GRHC encourages municipalities, regions, states, and provinces to adopt policies in support of green roofs and green walls in order to build healthier, more sustainable and resilient communities.

GRHC would also like to thank its many Corporate Members for their ongoing commitment to supplying data for this annual survey (see Appendix I), and also recognizes the contribution of GRPs in the marketplace, who contribute significantly to the growth of the industry.
Appendix I: Corporate Survey Participants

In alphabetical order:

- Barrett Roofs
- Columbia Green Technologies
- Green Roofs of Colorado
- DC Greenworks
- Eco-Roofs
- Emory Knoll Farms/Green Roof Plants
- Flynn Group of Companies Canada
- GAF Materials Corporation
- Greenfeathers Modular Living Roof and Plants
- Greenrise Technologies
- Greensulate
- LiveRoof Hybrid Green Roofs
- LiveRoof Hybrid Green Roofs Ontario
- Living Roofs Inc.
- New York Green Roofs
- Omni Ecosystems
- Philadelphia Green Roofs LLC
- Pioneer Roofing Systems
- Recover Green Roofs
- Riverbend Gardens Nursery
- Rooflite Soil
- Roofmeadow
- Rooftop Sedums
- Sempergreen
- Soprema
- Weston Solutions
- XeroFlor Canada Inc

Appendix II: GRHC’s Professional Training Courses

Full-Day Courses - For Green Roof Professional (GRP) Accreditation

- Green Roof Design & Installation
- Green Roof Waterproofing & Drainage
- Green Roof Plants & Growing Media

Half-Day Courses
• Advanced Green Roof Maintenance
• Ecological Design for Green Roofs
• Green Infrastructure: Policies, Performance, and Projects
• Living Architecture and Sustainable Energy
• Green Walls 101: Systems Overview and Design, 2nd Edition
• Introduction to Rooftop Urban Agriculture
• Integrated Water Management for Buildings & Sites I, II, III, and IV

Online Courses

• Introduction to Green Roofs and Living Architecture
• Overview of Systems, Approaches and Components
• Design and Installation
• Waterproofing Design Principles
• Waterproofing Material and Component Profiles
• Drainage Design Principles
• Waterproofing and Drainage Implementation
• The Living Components of Green Roofs
• Vegetation and Growing Media Design

Appendix III: Selected Cities and Their Dedicated Green Roof Policies

• Minneapolis Stormwater Utility Fee Credit – established 2005
• Chicago Green Permit Program – established 2006
• Washington DC Green Roof Rebate Program – established 2007
• Philadelphia Green Roof Tax Credits – established 2007
• Anne Arundel County (MD) Stormwater Management Tax Credit – established 2008
• State of New York Green Building Construction Act – established 2009
• Toronto Green Roof Bylaw and Eco-Roof Incentive Program – established 2009
• Onondaga County (Syracuse, NY) Green Improvement Fund – established 2010
• Milwaukee Metropolitan Sewerage District Regional Green Roof Initiative – established 2010
• Austin (TX) Green Roof Density Bonus – established 2011
• Nashville (TN) Green Roof Rebate – established 2012
• Richmond (VA) Fast-Track Permitting – established 2012
• Atlanta (GA) Post-Development Stormwater Management Ordinance – established 2013
• Prince Georges County (MD) Rain Check Rebate Program – established 2013
Appendix IV: Green Roofs for Healthy Cities Publications

To purchase these resources go to [www.greeninfrastructurestore.com](http://www.greeninfrastructurestore.com)

*Advanced Green Roof Maintenance Training Manual*. Green Roofs for Healthy Cities. This manual contains indispensable information on green roof care and upkeep.

*Award Winning Green Roof Designs* (2008). Atglen: Schiffer Books. This book features over 100 beautiful, informative photos that display the green roofs technology in award-winning designs. The projects are almost exclusively the product of multi-disciplinary, collaborative design processes. Details about the plants used, growing media, drainage and irrigation systems, and waterproofing, along with descriptions of challenges overcome, and innovative design features are provided.

*Green Infrastructure: Policies, Performance, and Projects Training Manual*. Green Infrastructure Foundation. This course provides attendees with a review of various vegetative technologies in urban areas (i.e. green walls, green roofs, urban forests, rain gardens), presents the latest research on their many performance benefits, and showcases a variety of leading edge policy and program developments in cities such as Chicago, Seattle, New York and Toronto that support the greening of our cities. Ideal for policy makers and other advocates of urban greenery.

*Green Roof Design & Installation Training Manual*. Green Roofs for Healthy Cities. Green Roof Design and Installation is an updated and consolidated version of our Green Roof Design 101: Introductory Course and Green Roof Design and Installation 201 course manuals. It incorporates new research on green roof benefits and the latest technical standards, and presents tools and techniques needed to meet green roof project objectives on schedule, to specification, and within budget.

*Green Roof Waterproofing and Drainage*. Green Roofs for Healthy Cities. Waterproofing and drainage construction and maintenance for green roof assemblies. It lays out technical vocabulary and materials and presents detailed design solutions and implementation best management practices for waterproofing and drainage in green roofs.

*Green Roof Plants and Growing Media*. Green Roofs for Healthy Cities. Plants and growing media design considerations and maintenance for green roof assemblies. It establishes design and implementation best management practices for plants and growing media in green roofs.

*Green Walls 101: Systems Overview and Design Training Manual*. Green Roofs for Healthy Cities. Discussion on the design and construction best practices for green facades and living walls, as well as the latest research findings on the environmental benefits of these technologies.
**Integrated Water Management for Buildings and Sites I, II, III, & IV Training.** Green Roofs for Healthy Cities. Developed jointly by GRHC and American Society of Irrigation Consultants (ASIC) committee members, these courses provide technical and economic information on the design and performance of a fully integrated site and building water management system based on the “Net Zero Water” concept.

**Introduction to Rooftop Urban Agriculture Training Manual (2010).** Green Roofs for Healthy Cities. Discussion of the multiple approaches to growing food on rooftops through design and maintenance principles, and case studies drawn from across North America.

**Living Architecture and Sustainable Energy.** Green Roofs for Healthy Cities. Discussion of innovative approaches for integrating green roofs and walls with other green building services to reduce or eliminate energy inputs from unsustainable sources and enhance economic and health performance. Topics include: intake air cooling, photovoltaics, air freshening, bio-energy production, moderation of heat loss and gain through the building envelope, and more.

**Living Architecture Monitor (1999-present).** Green Roofs for Healthy Cities. The *Living Architecture Monitor* is GRHC’s quarterly magazine. It features in-depth interviews with leaders in the green building movement, opinions, research, as well as detailed case studies and new developments in the green roof and wall industry.

**The Rise of Living Architecture (2012).** Green Roofs for Healthy Cities. The ROLA (right) is a limited-edition tabletop book that profiles more than 50 of the hundreds of leaders that have created the base and molded the foundation of living architecture.

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**Acknowledgements**

This report was prepared by Blaine Stand, Membership Coordinator and Steven W. Peck, GRP, Honorary ASLA, founder and president, Green Roofs for Healthy Cities.