



Low Slope Roofing Systems
The University of Wisconsin Madison
Madison, Wisconsin – November 29-30, 2015

Vegetative roofs

presented by

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Rosemont, Illinois

Vegetative Roof Systems
Sometimes called “green roofs”



Definition

The NRCA Vegetative Roof Systems Manual, Second Edition

Vegetative roof system: A roof area of planting/landscaping installed above a waterproofed substrate at any building level that is over habitable space.



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Benefits of vegetative roofs

- Aesthetic improvement
- Storm water management
- Mitigation of heat island effect
- Energy efficiency
- Air quality improvement
- Noise reduction
- Increased roof system durability
- LEED® credit
- Rebates and other incentives



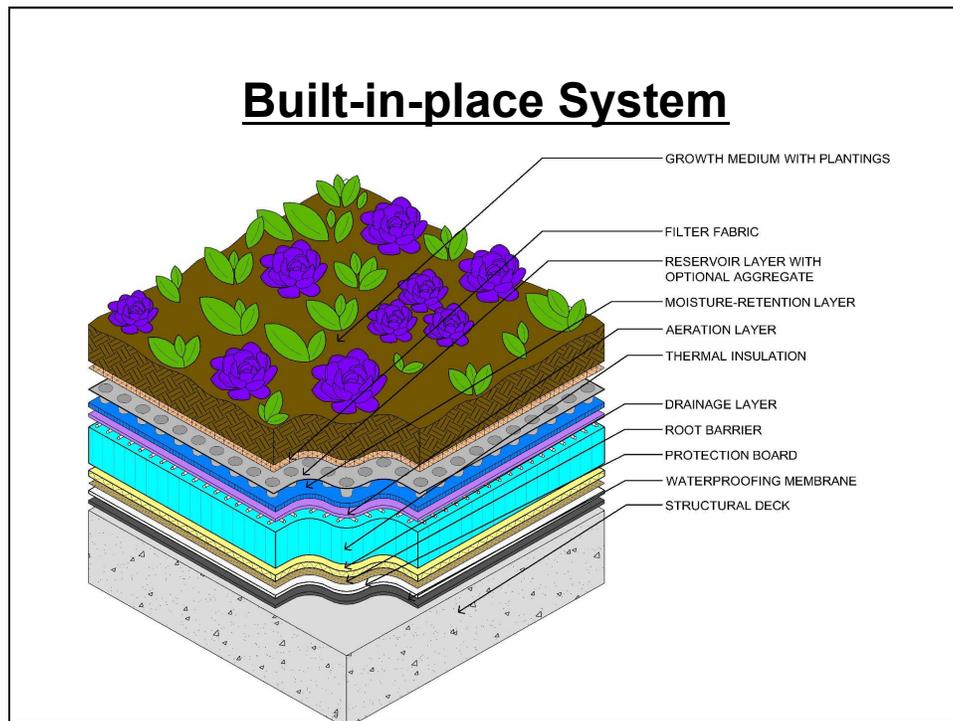
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Basic configurations

- Modular systems
- Built-in-place systems

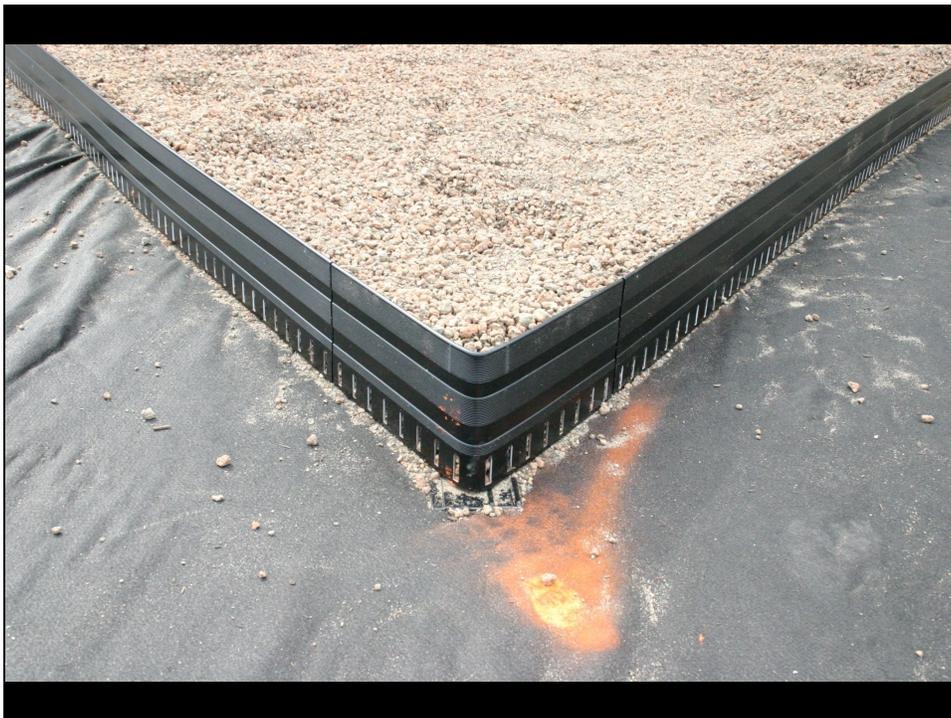


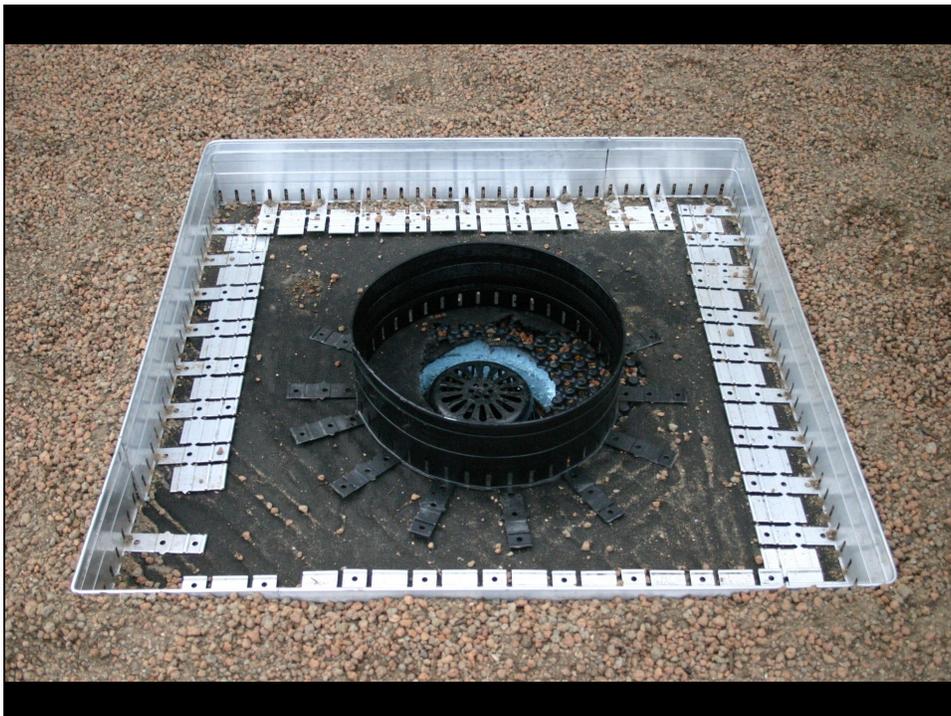




Construction Details for Vegetative Roof Systems









Membrane Integrity Testing

- Flood test
- Flowing water test
- Electronic field vector mapping



Vegetative roof systems require regular maintenance



Design standards -- ANSI/SPRI VF-1

www.spri.org

ANSI/SPRI VF-1
External Fire Design Standard for Vegetative Roofs

This standard was developed in cooperation with Green Roofs for Healthy Cities. Approved January 20, 2010.

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Disclaimer
This standard is for use by architects, engineers, roofing contractors and owners of low slope roofing systems. SPRI, its members and employees do not warrant that this standard is proper and applicable under all conditions.

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Design standards -- ANSI/SPRI RP-14

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ANSI/SPRI RP-14
Wind Design Standard for
Vegetative Roofing Systems

This standard was developed in cooperation with Green Roofs for Healthy Cities.
Approved 03/2010

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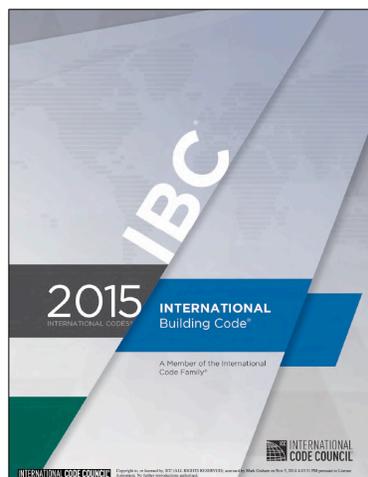
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Code requirements for vegetative roofs



IBC 2015:

Ch. 15: Roofing

- Sec. 1511: Reroofing

Ch. 13: Energy efficiency

- References IECC 2015



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Code requirements

International Building Code, 2015 Edition

1507.16 Vegetative roofs, roof gardens and landscaped roofs. *Vegetative roofs*, roof gardens and landscaped roofs shall comply with the requirements of this chapter, Sections 1607.12.3 and 1607.12.3.1 and the *International Fire Code*.

[BF] 1507.16.1 Structural fire resistance. The structural frame and roof construction supporting the load imposed upon the roof by the *vegetative roof*, roof gardens or landscaped roofs shall comply with the requirements of Table 601.



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Code requirements

International Building Code, 2015 Edition

Sec. 202-Definitions

VEGETATIVE ROOF. An assembly of interacting components designed to waterproof and normally insulate a building's top surface that includes, by design, vegetation and related landscape elements.



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Code requirements

International Building Code, 2015 Edition

Sec. 1505-Fire Classification

1505.10 Roof gardens and landscaped roofs. Roof gardens and landscaped roofs shall comply with [IBC 2018: Section 1505.1,] Section 1507.16 and shall be installed in accordance with ANSI/SPRI VF-1.



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Code requirements

International Building Code, 2015 Edition

1607.12.3 Occupiable roofs. Areas of roofs that are occupiable, such as *vegetative roofs*, roof gardens or for assembly or other similar purposes, and marquees are permitted to have their uniformly distributed live loads reduced in accordance with Section 1607.10.

1607.12.3.1 Vegetative and landscaped roofs. The weight of all landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil as determined in accordance with ASTM E 2397. The uniform design live load in unoccupied landscaped areas on roofs shall be 20 psf (0.958 kN/m²). The uniform design live load for occupied landscaped areas on roofs shall be determined in accordance with Table 1607.1.



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Code requirements

International Building Code, 2015 Edition

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Code requirements

International Building Code, 2015 Edition

**Excerpts from TABLE 1607.1
MINIMUM UNIFORMLY DISTRIBUTED LOADS, L_o,
AND MINIMUM CONCENTRATED LIVE LOADS⁶**

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (psf)
26. Roofs [some text omitted for clarity] Ordinary flat, pitched, and curved roofs (that are not occupiable) [some text omitted for clarity] Occupiable roofs: Roof gardens Assembly areas All other similar areas	 20 100 100 ^m Note 1	 Note 1

[Footnotes omitted for clarity]



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*Code compliance for vegetative roof systems
is a challenge*

--Mark Graham



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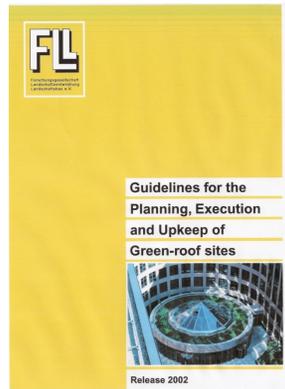
Some useful references...

Vegetative roof systems

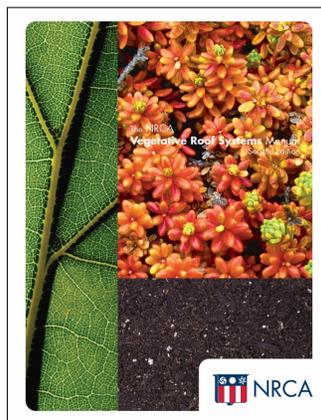


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FLL, “Guidelines for the Planning, Execution and Upkeep of Green-roof sites”

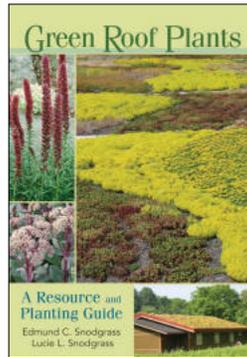


The NRCA Vegetative Roof Systems Manual, Second Edition



Green Roof Plants

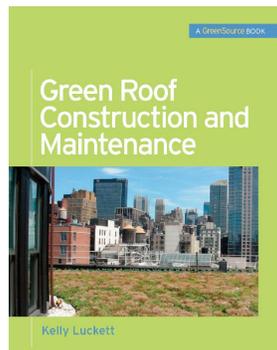
Authors: Edmund C. Snodgrass & Lucie L. Snodgrass



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Green Roof Construction and Maintenance

Author: Kelly Lockett



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www.greenroofs.com

Greenroof & Greenwall Projects Database: 1,629 Projects = 35,044,419 ft² (3,255,803 m²) Friday, November 20, 2015

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Project of the Week 11.16.15
Sherway Gardens Shopping Centre Expansion
Toronto, Canada

Greenroofs.com's Network:
Twitter Facebook LinkedIn YouTube Pinterest

1/200 ZinCo Headqu...

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Incentive programs

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www.dsireusa.org

The screenshot shows the DSIRE website homepage. At the top, there is a navigation bar with the DSIRE logo and the text "NC CLEAN ENERGY TECHNOLOGY CENTER". Below the navigation bar, the main heading reads "Find Policies & Incentives by State". A large map of the United States is displayed in the center, with states shaded in various shades of blue. Below the map, there are three dropdown menus for selecting "US Territories", "District of Columbia", and "Federal".

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The screenshot shows the search results page on the DSIRE website. A red banner at the top states "We've found 91 programs that match your filters". Below this, the "Filter Options" section is visible, with a dropdown menu set to "State/Territory: Wisconsin". A search bar and a "Subscribe" button are also present. The main content is a table listing search results.

Name	State/Territory	Category	Policy/Incentive Type	Created	Last Updated
City of Milwaukee - ME3: Milwaukee Sustainable Manufacturing Program	WI	Financial Incentive	Grant Program	09/27/2016	09/27/2016
U.S. Department of Energy - Loan Guarantee Program	US	Financial Incentive	Loan Program	09/12/2008	08/18/2016
Interconnection Standards for Small Generators	US	Regulatory Policy	Interconnection	10/30/2007	07/27/2016
Qualified Energy Conservation Bonds (QECBs)	US	Financial Incentive	Loan Program	10/23/2008	06/16/2016
Low Income Home Energy Assistance Program (LIHEAP)	US	Financial Incentive	Grant Program	03/16/2015	06/16/2016
USDA - High Energy Cost Grant Program	US	Financial Incentive	Grant Program	09/27/2010	06/09/2016
Residential Energy Conservation Subsidy Exclusion (Corporate)	US	Financial Incentive	Corporate Tax Exemption	03/05/2002	05/26/2016
Residential Energy Conservation Subsidy Exclusion (Personal)	US	Financial	Personal Tax	03/05/2002	05/26/2016

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