

Macalester College's First Green Roof



A presentation by Alese Colehour and Ellie Rogers

What Is a Green Roof?

- A planted space built on a man-made structure
- Many economic, environmental and social benefits
- A.K.A: Rooftop garden, eco-roof, or vegetated roof



Green Roofing Systems

- **Intensive:** higher up front costs, more maintenance costs, requires more structural support, public access, trees, animals, biodiversity
- **Extensive:** less growing medium, light weight, self maintaining, prairie grasses
- **Containerized:** Macalester's project, inexpensive, very light weight, low growing sedum plants, limited root spread, low maintenance

Green Roofing Systems



MSU

Intensive



Puget Sound

Extensive



Macalester

Containerized

Benefits of a Green Roof

- Slows run-off
- Mitigation of urban heat island
- Insulation value increases
- Beautiful!



Community Networking



- The Green Institute (Corrie Zoll)
- Green Roof Blocks (Kelly Luckett)
- Aloha Landscaping (Roger Grothe)
- Rosenquist Construction (Greg Reiser)

Our Project: Preparation

- Working with Facilities Management
- Getting material donations/funds
- Coordinating community groups and students



Our Project: Installation

Step 1: Unpack
56ct. 2x2ft
aluminum trays and
apply drainage pads.
*Donation by Green
Roof Blocks



Our Project: Installation

Step 2: Fill trays with soil (Rosenquist Construction)

Composition:

75%
inorganic,
lightweight
minerals

25% organic,
chemical free,
soil



Our Project: Installation



Step 3: Plant trays with plugs approx. 6/container. Low maintenance, hardy plants

*Donation by Aloha Landscaping

Our Project: Installation



Pussy Toes



Columbine



Catchfly



Aster

Our Project: Installation



The "Laddevator:"

- Used to transport planted containers to the roof (Rosenquist Construction)

Our Project: Installation



Before



After

Our Project: Maintenance



Containerized green roofs are low maintenance:

- **Watering:** 2x per week for 1mo. Watch dry spells
- **Weeding:** some okay, pull up trees, 1x/mo
- **Roof Inspection:** standard facilities management procedure.

What We'll be Testing

Insulation Value:

- R-Value
- Thermocouples/Data Logger
- Reduce heating and cooling expenses

Membrane Life:

- Roof Inspection
- Longer life span

Water Quality:

- Acidity, particulate matter
- Chemistry Equipment
- Reduce river pollution

Water Rate of Flow:

- Amount/time
- Pressure transducer/data logger
- Slow run-off, reduce river pollution, prevent sewage overflow

The

Macalester

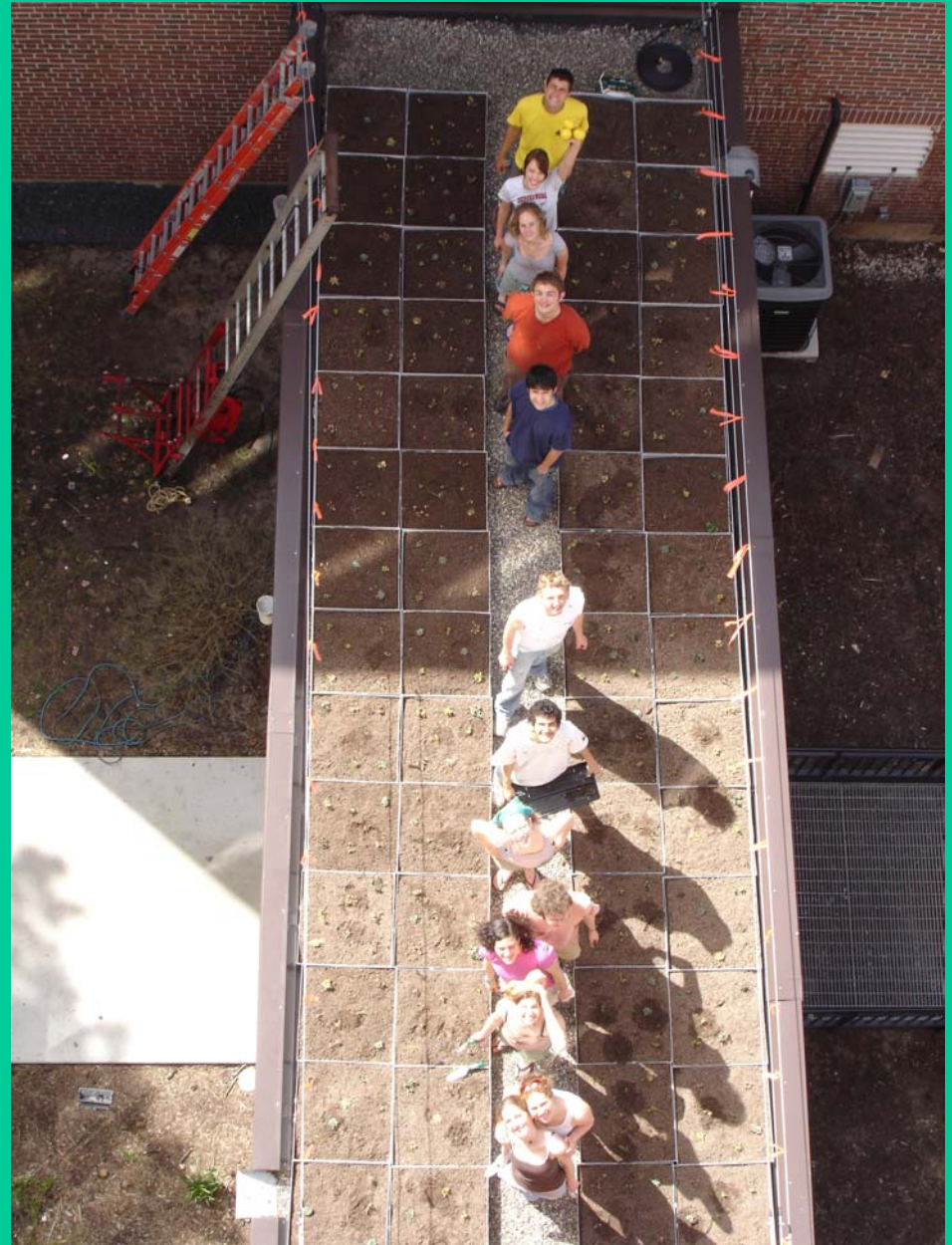
GREEN ROOF

Project

Questions?

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Community Partners

Aloha Landscaping, Roger Grothe

Donated enough plugs to plant 56 blocks, offered advice and expertise on what plants were appropriate to the conditions of the fishbowl roof. Delivered plants day of installation and demonstrated planting techniques.

Carleton College; Northfield, MN:

A contingent of students from the Macalester Conservation and Renewable Energy Society visited the Carleton College green roof, installed spring of 2005. They learned about drainage requirements, types of native plants on the roof, and various research being done. Carleton students have demonstrated increased insulation on the completed green roof, reducing the costs of heating and cooling on the building. Research is currently being done on quality and quantity of storm water run-off as well as the type of plants that thrive in such conditions.

Green Institute, The; Minneapolis, MN:

Corrie Zoll of the Green Institute, a community based organization committed to sustainability, gave three Macalester students a tour of an intensive green roof installed in Spring 2004. Mr. Zoll has offered continuing support in regards to building materials, structural restrictions, and extensive knowledge of community benefits. In addition he has referred students to other sources under his name and reputation in the green roofing community.

Green Roof Blocks:

A company based out of Missouri, Green Roof Blocks agreed to donate 56 blocks, enough for the 300 square foot project along with some plants (five per block). Green Roof Blocks also provided an instructional DVD for the project. Executive Kelly Lockett flew in to video record the project.

Community Partners (cont.)

Green Roof Design 101; presented by Haven Kiers and co-hosted by Corrie Zoll:

Ellen Rogers and Alese Colehour, primary investigators, enrolled and earned Certificate of Completion in this green roofing course. Architects, roofing contractors, students, engineers, and others attended this course designed to provide attendees with a thorough knowledge on appropriate design, relative costs, and proper installation of multiple styles of green roofing.

Rosenquist Construction, Greg Reiser

Donated soil appropriate to our request and project: 75% inorganic hatite and 25% organic, chemical free upon request. Gave free equipment rental and operation labor of laddevator.

Will Steger, founder of Global Warming 101:

As an Arctic explorer and personal observer of melting polar ice caps, Will Steger has devoted his life preventing the continuation of global warming. As the founder of Global Warming 101, Mr. Steger developed a curriculum intended to show students K-12 the effects of global climate change. Mr. Steger has allied with Macalester College by giving presentations and offering to secure media coverage of student projects related to sustainability.

On Campus Partners

Mark Dickinson, Head of Facilities Management:

Mark has shown continuing support for the fishbowl project as well as the proposed Kagin project for 2006-2007. He has connected the students with roofing consultants and structural engineers and attended meetings to work out the logistics of location, roof membrane installation, maintenance concerns, and structural support.

Brett Smith, Co-Chair of CEIC and Acting Chair of Environmental Studies Professor:

As my Independent Project advisor, Brett has outlined the requirements to earn 2 semester credits. Has set up meetings with me, and other students to prepare the project(s). Acts as a liaison for this student project and the Environmental Studies department to plan advice and other faculty connections.

Ken Moffett: Scientific Instruments Technician

Ken assisted with the experimental design of the rate of flow experiment and provided recommendations for purchasing a data logger and the appropriate instruments. Ken built downspout and barrel to collect water run-off and monitored the experiments.

References

“Carleton Green Roof Project, The.” Press Release: June 20, 2005. Independent Study by David Holman and Jason Lord. <http://www.people.carleton.edu/%7Elordj/GreenRoofExpandedPress2.pdf>

~The press release of Carleton’s green roof that we visited in the fall of 2005. Information on insulation value, installation methods, and more.

“Case Study: The Green Rooftop at the Phillips Eco-Enterprise Center.” Community Energy: Clean Energy Resource Teams. July 2004 www.cleanenergyresourceteams.org/metro/CS-Green%20Roof%20tops.pdf

~Article summarizing the green roof project on the Green Institute, developed and supervised by Corrie Zoll. Includes statistics on benefits of green roofing.

Downs, Thomas J., P.E. Personal Communications. President: BKBM Engineers.

~Referred by Mark Dickinson: Head of Facilities Management, Macalester College. Reviewed and analyzed structural support of the fish bowl. Approved a low weight, extensive green roof 12-25-lbs/square feet.

Dunnett, Nigel and Kingsbury, Noel. *Planting Green Roofs and Living Walls*. Timber Press, Inc. Portland Oregon: 2004

~Great source for ideas for planning your own green roof. Basic technical information provided.

Peck, Steven, Monica Kuhn and Dr. Brad Bass. *Greenbacks for Green Roofs: Forging a New Industry in Canada*. Canadian Housing Information Centre, March 1999.

Green Roofs for Healthy Cities. Toronto: 2000-2005 Green Roofs for Healthy Cities. <http://www.greenroofs.org/>

References (cont.)

Kiers, Haven. Architect and Educator. Green Rood Design 101: Introductory Course. Presented by Green Roofs for Healthy Cities.

~Course includes group work on problem solving methods, economics of green roofs, structural requirements, appropriate and relevant designs, and required resources

~Documents include: Green Roof Design 101 Introductory Course. Presented by Green Roofs for Healthy Cities. *Participant Manual*.

St. Paul City Council File No. 05-825 St. Paul Storm Sewer System Charge Policy 2005

~I requested this information from the City of St. Paul. Mike Kassen, St. Paul's Sewer Utility and Design engineer, forwarded me this policy regarding an inquiry on the potential benefits of green roofs.

Thone, Terry. Senior Consultant, RoofSpec, Inc. Personal Communication.

~Referred by Mark Dickinson: Terry has volunteered his time and expertise to analyze the fishbowl roof. Has approved the current roof membrane for a containerized system.

Zoll, Corrie. Personal Communication. GreenSpace Partners Director: The Green Institute, 2801 21st Avenue South, Suite 110, Minneapolis, MN 55407.

~Designed and supervised installation of intensive, 4000 square four green roof on The Green Institute property in 2004. Discussed what materials are needed to install a green roof, the benefits, and suggested other sources. Observed the fishbowl and aided advice on drainage system and structure. Found companies willing to donate materials.