



Green Roofs & Living Walls What You Need to Know

Jim Mumford, GRP
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Introduction

It was McRae Anderson that did this to me! A few years ago, he said “A green roof is basically a very large, shallow pot. All of the issues we have been dealing with – growing plants in confined spaces, getting materials and manpower in or on a building and waterproofing – it’s a natural for landscapers.”

I recently received my Green Roof Professional (GRP) accreditation from the Green Roofs for Healthy Cities organization. They are located in Toronto and offer a 4-part workshop series throughout the country on green roofs from soup to nuts; an excellent resource.

Sixty minutes is nowhere near enough time to cover everything I’ve learned! In this hour, I’m condensing 24 hours of class time, extensive reading and conversations, site visits and hands on experience over the past several years. We’ll have room for questions at the end and I will be around for the entire conference.

Some of my information relates to the climates I am familiar with, so please bear with me if your climate is not the same as southern California.

Also, I will be speaking more on green roofs than walls as I have more experience with roofs. I now know more about roofs than I ever thought I wanted to!

“We don’t inherit the earth from our ancestors; we borrow it from our children”

Overview, History and Definition: Green Roofs

Green roof - an engineered, lightweight roofing system that supports plants on a man-made structure. They can be at, above, or below grade and up to a 40% slope. Not planters.

Also known as:

Eco roof, vegetated roof, brown roof (spontaneously seeded)

History

Hanging Gardens of Babylon, Egyptians, Romans, Vikings, American-west sod roofs.

Benefits

Storm water runoff

70 – 80% retention of storm water run-off, slowed down and filtered of particulate matter

Energy savings

The industry estimates between 20- 25% energy savings. Through evapotranspiration, plants cool the roof. Also, if the AC is on the roof (commercial buildings) they draw in cooler air and work more efficiently.

Potential LEED Points

A green roof can provide points in several different LEED categories, from storm water runoff retention to energy savings and innovative design.

Bio-diversity

The plant palette can be designed to attract birds, bees and butterflies. A project that requires grading of a natural ecosystem can have the habitat recreated on the roof.

Longer roof life

Because the roof is protected from UV rays, it lasts 2-3 times a normal roof's life span. This greatly reduces the amount of old roofing material heading to the landfill.

Reduces the urban heat island affect

Adding plants to roofs can positively affect an area's microclimate, particularly if many of the buildings follow suit; making it cooler in the summer for residences and businesses in that area.

Solar panels

A green roof will bring down the temperature of a rooftop in July to exactly where Photo Voltaic panels operate most efficiently.

Sound mitigation

Instantly quieter!

Aesthetics

A green roof is much prettier than a normal roof.

Types:

While there are two main types of green roofs, all green roofs contain the same basic elements: roof deck, waterproof membrane, root barrier/protection layer, drainage layer and filter fabric, media and plants.

Intensive

- More than 6" inches of soil

- More plant diversity, cost, weight, maintenance

- Typically includes access for visitors

- Increased weight capacity allows for the placement of large trees over support columns

Extensive (our focus today)

- 6" of soil or less

- Limited plant selection, less maintenance, lower cost and weight

- No access for visitors

- Can be modular trays

Price: \$9.00/sq foot to \$35/sq ft. - most range between \$18 and \$25

Overview, History and Definition: Green Walls

Green Wall: A wall, either free-standing or part of a building that is partially or completely covered with vegetation and, in some cases, soil or an inorganic growing medium.

Also known as: Living walls, biowalls, or vertical gardens

Types of Green Walls

1. Green façades

These are made up of climbing plants either growing directly on a wall or on specially designed supporting structures while being rooted to the ground. A building's green envelope.

Green Screen – steel trellises

Cable systems

2. Living walls – Patrick Blanc French pioneer

In a living wall, the modular panels are often made of polypropylene plastic containers with individual cells, geotextiles, an irrigation system, a growing medium and vegetation.

Living walls can be further broken down into: passive and active systems.

Active living walls are a new concept in which the living wall is integrated into a building's air circulation system. The Active Living Wall harnesses nature's cleansing power by drawing air through the root system of the wall. Beneficial microbes actively degrade the pollutants in the air before returning the new, fresh air back to the building's interior.

Bio-filters

Passive living walls do not have any means of moving the air into the root system and are purely aesthetic in their appeal.

Terra Wall - inside

VGM - outside

Elevated landscape Technologies - outside

Green Living Technologies - outside

Woolly Pockets - both

Price: up to \$200 sq/ft installed, with irrigation

Team & Objectives: Green Roofs

The Green Roof Team

Architect
Engineer
Roofer
Landscape contractor

Landscape architect
Green roof consultant
Horticulturist

Three Ultimate Objectives

1. Structural integrity - determined by engineering calculations

Load bearing - a green roof weighs approx 7 pounds per inch/sq ft. That's fully saturated including the weight of the plants.

Retrofit – the roof and structure must be evaluated first

2. Waterproofing Integrity

Roof types: Shingles, Tile, Slate, Metal

Membranes:

Bituminous (or Asphalt)
Single Ply or monolithic
Thermo plastic
PVC
EPDM -

Cold applied liquid

Penetrations:

Vents, railings, mechanical

Leaks – access to the membrane

Warranty – integrated with the roofing contractor

EFVM on a concrete or steel deck, not wood

3. Long Plant Life

Drainage

Synthetic or organic solutions

Minimum slope: 1/4" : 12"

Slope of 2" : 12"% maximum before a slope stabilization system is required

On a larger roof, break up the space for better drainage

Drain box

Irrigation

All green roofs, like all gardens, require irrigation to get established
In a climate that rains in the summer, 2 years of temporary irrigation is needed to get established.

Surface – MP rotator

Sub- irrigation

Media

Organic vs. non-organic – concerns about shrinkage over time

Custom blended and get it tested; Penn State

Plant palette

Hardy, non invasive, non-aggressive roots, drought tolerant

Sedums

Natives

Succulents

Planting methods:

Cuttings

Hydro-seed over 10K sq ft

Plugs

Vegetated mats

Pre-planted trays

Vegetated free zones:

Walk ways

Perimeter

Mechanical

Adjacent to a reflective surface

Sky light

Environmental extremes:

Sunny - it's hotter than you think, particularly the higher up you go

Windy - wind scouring along edges, wind blanket

Shade – funny, where did that building next door come from?

Contractor's license required

Our new corporation: GreenScaped Buildings

Safety

Workers comp: a roofer's job is dangerous. Rates can be up to 90¢ on the dollar

Fall protection

Parapet of 42"

Personal fall arrest: Harnesses/lanyards/anchors

Safety line or safety monitor

Conveyance

Crane – permits to close the street
Freight elevator – check the load!
Lift
Front end loader
Blower truck – rent one for big jobs
Custom: on-the-job

Public works

Bonding
Union labor/prevaling wage
Roofing union wants jurisdiction over landscapers

Incentives, subsidies, tax rebates

Density bonus
Tax rebate
 Senator Maria Cantwell (Washington)
Fast track permit process
Mandatory in Chicago

What's next?

Resources

US Green Building Council (USGBC)
www.USGBC.org

Green Roofs for Healthy Cities (GRHC)
www.GreenRoofs.org

RoofScapes Inc.
www.RoofMeadow.com

www.GreenRoofs.com

Tournesol Siteworks
www.TournesolSiteworks.com

Elevated Landscape Technology
www.ELTLivingWalls.com

Green Living Technologies
www.AGreenRoof.com

Freedom Squares
www.FreedomGardenProducts.com