AN INTRODUCTION TO GREEN WALLS: LIVING WALLS

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Abstract

- In the challenge of urban expansion and environmental preservation, sustainable development is a significant response to our century’s requirements. Although vertical greening (green walls) are not a new concept but flourished during the last decade as one of the approaches to sustainability. Vertical gardens, vertical farms, balcony gardens, containers or planter boxes greening, green or eco-buildings, wall planters, and green envelopes are all different types of green walls. Planners and designers can look for enhanced solutions where the façades are more than tinted glass barrier; greening the building envelope with vegetation can be used as a mean to restore the environmental conditions in urban areas.

- Environmental benefits of green walls have been proven on both new and existing buildings; they can be applied for insulating against environmental impact, mitigating the effect of urban heat island, increasing biodiversity and ecological value, outdoor and indoor comfort, air quality and social and psychological wellbeing. Green walls are categorized into living walls and green facades; living walls which are the subject of this presentation categorized into passive and active systems, Mur-Vegetal and Landscape walls according to their systems and growing method.
Introduction

• Since 2000 years ago climbing plants have been manipulated to the main building façade.
• They may be applied as indoor or outdoor systems.
• The selection of plants and soils should be different according region and climate.
• Selected plants roots can grow in:
  o The wall material directly
  o Ground
  o Modular panels attached to the façade

Source: http://makinglewes.org
Benefits

Environmental benefits include:

- Aesthetic enhancement
- Pollution filtration
- Requisition carbon dioxide
- Decrease in fine dust levels
- Cleaning the air
- Photosynthesis
- Serve as an “extra insulation” to decreases the wind flow and heat radiation
- Blocking of the direct sunlight
- Energy saving
- Sound reduction

A bridge in France,(Source: http://urbantimes.co)
Green walls (vertical greening) can be categorized according to their systems and growing methods:

1. Green façades (direct and indirect system)
2. Living walls (passive, active, Mur-Vegetal and landscape wall)

This presentation will discuss different issues of living walls.
Living walls

- Living wall systems (LWS) are built of modular panels, each part holds its own soil or artificial growing medium.

- In a comparison to green facades most of these systems:
  - Need more detailed design
  - Have complicated layers, supporting materials and mechanism of water and nutrient
  - Are more energy consuming and difficult to maintain
  - Apply a variety of plants, mostly evergreen plants as ferns, low shrubs, perennial flowers and even edible plants
  - Offer much more creativity and aesthetic
The durability of living wall systems are important to take into account:

- Living wall systems based on planter boxes last more than 50 years.
- Living wall systems with panels based on felt layer have an average life expectancy of 10 years.

Living walls based on: a- planter boxes, b-foam substrate, c- felt layers, (source: R. Sharp 2008)
Passive living walls

- They are mostly applied in modular systems.
- As modular systems are usually pre-grown, can provide an immediate green effect.
- They should be supplied with irrigation system along the wall at different levels.
- A waterproof substance separates the building wall and system to prevent wetting problem.
- Fertilizers, emitters, Insulation and lighting systems may be required.

Living walls components: 1- Panels, 2- Non-soil structural growth medium, 3- Plants, 4- Remote irrigation/fertilization system, 5- Stainless steel frame, (Source: Gsky.com)
Passive living wall, (Source: La societe Green wall)
Active living walls

- Apply a forced air flow through the subs-tract.
- It is intended to be integrated into the building’s infrastructure and designed to act as bio-filter indoor and ecological air conditioning system.
- Rich nutrient water recirculated from a manifold.
- Two layers of synthetic fabric sandwich the roots mass.
- The plants absorbs carbon monoxide and produces cool fresh air by a fan that pulls environment air through the system and distribute it throughout the space.
- Where this system is integrated with the building's air condition, reduces energy consumption.

Active living wall, (Source: GM Canada and air quality solution)
Mur-Vegetal

- Mur-Vegetal is an exclusive type pioneered by Patrick Blanc who is a French botanist specialized in plants from.
- This system consists of two layers of synthetic fabric with several pockets that physically keep growing media and support plants.
- It is held by a frame and supported by a waterproof substance against the building’s main wall.
- The irrigation system that propels, water from top to down, also distribute nutrients to the plant’s roots.

Mur Vegetal (Source: http://flickr.com/photos)
Landscape walls

- Landscape walls are an evolution of landscape berms.

- They are:
  - Normally sloped against the vertical barrier and have the major functions of slope stabilization and noise reduction.
  - Constructed from some stacking material made of concrete or plastic with spaces for plants and growing media.

Landscape wall, (Source: http://www.herculesmfg.com)
Thank you
References: