Sustainable Living Walls: It’s All About Maintenance

Presenters
Jim Mumford, CLP, GRP, Goodearth Plants
Michael Madarash, Kokobo Greenscapes
Melissa Daniels, CNLP, Plant Connection Inc.

Learning Objectives
1. Learn Best Management Practices for maintaining living walls and the most common obstacles to optimal living wall performance
2. Manage client expectations of what maintenance of a living wall entails including why a maintenance should be in place for a minimum of one year immediately following installation of any living wall project
3. Obtain strategies for finding qualified maintenance Technicians and see examples of typical Maintenance Contracts including all the factors that effect cost
4. Learn how technology is being applied to help create an effective and successful living wall maintenance program

Obstacle # 1: Landscape Architects

Common Pitfalls or Obstacles to Proper Maintenance

Obstacle # 2: The Right System

Obstacle # 3: Plant Palette
Obstacle # 4: Lighting

Obstacle # 5: Access

Obstacle # 6: Trained and Experienced Maintenance Staff

Obstacle # 7: Pests & Disease

Obstacle # 8: Replacements

Obstacle # 9: Human Error
Obstacle # 10: The Unknown

Managing Client Expectations

All Plants Require Maintenance!
- Minimum 90 day’s maintenance with installation contract
- Better: one year minimum contract
- Service frequency
- Maintaining a pattern

Warranty
- Plants don’t live forever
- Replacements

Changes
- Long term growth
- Seasonal
- Rotations

Living Wall Best Management Practices:
Scope of Work for Maintenance Contracts
Successful Maintenance of Living Walls consist of a complex interface of factors

Management of proper water distribution throughout the living wall

Factors
- Initial set up and subsequent monitoring
- Timely irrigation adjustments
- Gravity influences irrigation of living wall
- Climatic conditions
- Location
- Plant choices
- Each Living wall system is unique

Delivering nutrients to plants in a living wall

Considerations
- Location
  - Interior/interior
  - urban/suburban/rural
- Climate
- Plant type and intricacy of design
- Soil vs. Hydroponic
- Gravity may influence delivery
- Nutrient types

Pruning and Detailing a Living Wall

Considerations
- Plant type
- Location
- Interior vs. Exterior
- Perennial vs. Annual
- Maintain design concept

Checking and Repairing Irrigation System

Factors
- Timely Site Visits
- Open Communication between clients and contractor
- Available access to site to perform maintenance
- Troubleshooting
- Timely repairs
- Initial sectional irrigation design
Plant replacement program

Considerations

• Plant type
• Climate/wind
• Presence of irrigation
• Location
• Design integrity versus plant appropriateness and health
• Maintenance program essential to Living Wall success

• Before

• After

Maintenance Contract Examples and Record Keeping

Structuring typical maintenance contract (with provisions for plant replacements)

Contracts should be structured to meet goals and expectations

Typical wall maintenance

- Deadheading
- Fertilization
- Pruning and shaping as needed
- Sweeping below Living Wall if debris has fallen
- Monitor for pests, disease and irrigation
- Plant health
- Make recommendation as needed
- Replace plants as needed
- Emptying basins

• Before

• After

Importance of accurate record keeping

Typical items to include in records

- Date of service
- Who performed service
- What was done
- Notes on status of wall
- Fertilizer application
- Cultural maintenance
- Replacements
- Irrigation
- Weather

• Before

• After

How To Find a Qualified Maintenance Company

Factors affecting cost

- Access
- Contact person/hours
- Plant choices
- Light conditions
- Frequency of visits
- Intricacy of designs
- Irrigation vs. no irrigation
- Is maintenance equipment be kept on site or brought each time?
Does Company Have Adequate Equipment to Access Wall?

Swing stage with roof davits
Ladders

Does Company Have Adequate Safety Training?

Safety equipment
OSHA Fall Protection Training
Harness Use Training
Scaffold safety training
Permits, licenses, etc
Equipment inspections
Afraid of heights ????

Does Company Have Adequate Experience?

Must have trained horticulturalist on team
Must be well versed in IPM and disease and pest identification
Must understand water management and irrigation system functions and settings
Must understand nutrient management and soil science
Optimally should have living wall experience
Must be willing to be trained on specifics of living wall systems and management

Beware of “No Maintenance” Living Walls

Your client is making a substantial investment that they must commit to taking care of; would they buy a Mercedes and never change the oil?
Do Not Give Your Maintenance Contract To the Lowest Bidder!!!!

- Most failures come from inexperienced maintenance or lack of maintenance altogether
- Your physical plant or building management company CANNOT take over the living wall maintenance tasks; they are too specialized
- Training is possible (and recommended) but a solid background in plant knowledge cannot be taught overnight
- All walls have a rhythm and their own “learning curve.” A good maintenance company needs time to learn the best management practices for your unique situation and should be retained after they are trained

Technology Used to Maintain Living Walls

Measuring and Managing Lighting for Your Living Wall

- Natural light
  - Orientation of wall
  - Building shade or reflective light
  - Light studies
- Supplemental light
  - Duration
  - Intensity (foot-candles)
  - Spectrum (quantum light)
  - Cumulative Moles of Light or Daily Light Integral (DLI)

Plant light spectrum

Tools to measure light

“Measuring DLI is essential, since the human eye is a terrible light sensor because it is so effective at adjusting to different light levels.”
James Faust, Professor of Horticulture, Clemson University

Measuring Nutrient Levels

- Soil testing
  - N, P, K levels
  - Micronutrient levels
  - pH
  - EC or salt levels
  - Porosity and percolation rates
- Water testing
  - pH
  - Water hardness
  - Temperature
  - Nutrient levels (hydroponic)
  - EC levels
  - Particulates
  - Pathogens
Delivering Nutrients to Plants

- Water flow
- Mixed chemical to application
- Pressure regulator
- Flow meter
- Check valve
- Concentrate

Fertilizer injector for irrigation system

Irrigation Control Room

Wireless or cable input with data collectors and software available

- Control of irrigation clock settings from remote locations
-Flow sensors that can report breaks or blocks in irrigation lines
-Flow sensors that can record flow rates and durations to track water usage

Irrigation Components

- Solenoid valve and filter
- Water filter
- Backflow preventer
- Pressure reducer valve

Advanced Irrigation Controls

Hobo Data Loggers and the like

- Light intensity levels and duration
- CO₂ levels
- VOC levels
- Soil moisture and temperature levels
- Soil salinity or EC levels
- Relative humidity levels
- Wireless or cable input with data collectors and software available

Integrating It All
Sensor Embedded in Living Wall

Control Data Station

Neighboring environmental data is captured via weather station

Monitor and interpret readings translated by software platform

Maintenance Activities Reporting

- Maintenance technicians should record all maintenance activities at each visit including irrigation settings, fertilization applications, field activities like pruning, plant replacements, and chemical applications with dates, rates, etc.

- Software platforms have real-time information in subscriptions available to client, maintenance techs and manufacturer for review

- Data is analyzed for correlative and historical trends and can be used to make better informed decisions about management of wall

Learning Objectives

1. Learn Best Management Practices for maintaining living walls and the most common obstacles to optimal living wall performance
2. Manage client expectations of what maintenance of a living wall entails including why a maintenance should be in place for a minimum of one year immediately following installation of any living wall project
3. Obtain strategies for finding qualified/maintenance Technicians and see examples of typical Maintenance Contracts including all the factors that affect cost
4. Learn how technology is being applied to help create an effective and successful living wall maintenance program

Copyright Materials

This presentation is protected by US and International Copyright laws. Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

© The American Society of Landscape Architects
Q & A